National & Kapodistrian
University of Athens

Income inequality, economic growth and financial integration

Andreas Kyriakopoulos

2023

Supervising Committee:
Emerita Professor Nikolina Kosteletou
Professor Nikolaos Theocharakis
Professor Christos Papatheodorou

"As long as poverty, injustice, and gross inequality persist in our world, none of us can truly rest."

Nelson Mandela

Acknowledgements

Embarking on the path to my PhD was a decision filled with anticipation and a sense of purpose. As I now stand at the culmination of this remarkable journey, I find myself reflecting on the invaluable experiences, knowledge, and personal growth it has brought. Thus, finishing my PhD has been a life odyssey where finally, paraphrasing the famous lyrics of the poem “Ithaka”, the journey was more important than the destination.

This life changing journey could not have been accomplished without the encouragement, inspiration, and guidance that I received from many people. Firstly, I would like to extend my deepest gratitude to my supervisor Prof. Nikolina Kosteletou, whose mentorship and expertise were invaluable throughout this journey. Her patience and her dedication to my academic growth has been a constant source of inspiration and motivation.

I would also like to thank my thesis committee Nikolaos Theocharakis and Christos Papatheodorou for their support and their encouragement. Additionally, I would also like to thank Prof. Michalis Psalidopoulos for providing a sincere support to this “journey”.

A warm expression of gratitude goes out to Maria, who has been my support companion since our MPhil in economics and throughout this PhD journey. She has been with me every step of the way, sharing in every moment and providing an invaluable source of support for discussing my thoughts and addressing my concerns. She played the most pivotal role as a fellow traveler on this profound journey.

In conclusion, I wish to express my heartfelt gratitude and profound respect to my family, with a special mention of my father and mother. Despite facing significant life challenges that prevented them from completing basic education, they provided unwavering support to both my brother and me, enabling us pursue our studies and reach our academic aspirations. pursue our studies and reach our academic aspirations. Their resilience and unwavering determination make them true inspirations and fighters in every sense.

Hence, while this journey was filled with rigorous academic pursuits, it was not without its challenges. These obstacles, however, only strengthened my determination to persevere. Overcoming them has been a testament to the resilience and tenacity that this journey has instilled in me.

As I reflect on the impact of this PhD journey, I am excited about the future. The knowledge and experiences gained during these years will undoubtedly shape my career and life aspirations. I am eager to apply what I've learned to make a meaningful contribution to economic science and society as a whole.

In closing, I wish to express my heartfelt thanks once more. This journey has been an extraordinary one, and I look forward to the new opportunities and challenges that lie ahead.

Sincerely,

Andreas Kyriakopoulos

Contents

1 Intro

Issues of income distribution and inequality have gained prominence in public debates over the last several decades, as societies worldwide have observed high levels of income inequality and their negative impacts on economic and social outcomes. Although one of the primary goals of societies is to ensure the well-being of their members, disparities in wealth persist. The distribution of wealth and income among society's members has long been a central concern for economists and policymakers. Economic theories offer various perspectives on income distribution, yet when explaining the origins of inequality, it can be argued that individuals play a role in shaping their own fates, and each society determines the relative income positions of its members. Consequently, while economic theories offer diverse approaches to income distribution, the process through which each society decides to allocate the total output resulting from production is predominantly viewed as a political matter that societies should resolve autonomously. Hence, the morality, acceptability, or desirability of inequality levels within a society becomes a decision that each nation's constituents must make in line with their political systems.

Plato, the eminent ancient Greek philosopher, asserted that income inequality is the most significant of all afflictions (Desai, et al., 2009). Plato further believed that a successful state should neither tolerate extreme poverty nor excessive affluence among its citizens, and this principle should be established from the inception of the state. However, such a rule seems utopian, particularly in the realm of modern capitalism, where globalization has reached a level where the entire world appears interconnected as one vast integrated economy, making regulation that curtails extreme poverty and excessive wealth impractical. Consequently, the economic landscape has shifted over the past few decades due to increased global integration and transformed social structures. As argued, in environments marked by economic integration, shared policy applications, and common shocks, controlling inequality levels through domestic policies, especially within Europe has become nearly impossible (Galbraith, 2012). In a global market and a world connected by digital media, particularly the internet, behaviors, lifestyles, and consumption patterns tend to converge, suggesting that the globe can be envisioned as one multinational society. As a result, the legislative authority of individual countries seems dwarfed by the influence of markets and the pressures arising from an interconnected world. Consequently, many countries find themselves with limited policy options, particularly concerning income distribution and subsequent inequality. As Galbraith (2012) states, a significant portion of global inequality originates beyond national borders. Moreover, a number of these countries, especially smaller ones, are unwilling or unable to counter these forces that perpetuate inequality (Galbraith, 2012).

Furthermore, the boundaries of inequality levels appear to be spiraling out of control, as extreme poverty and excessive wealth have become hallmarks of societal growth in recent decades. Noteworthy examples can be observed in regions such as Latin America and sub-Saharan Africa. Moreover, global inequality levels have been highlighted by numerous organizations and studies. For instance, according to Oxfam's report, the world's ten wealthiest individuals collectively possess more wealth than the bottom 3.1 billion people (Ahmed, et al., 2022). Additionally, the richest 10% of the global population currently garners 52% of global income, while the bottom half receives only 8.5% (Chancel, et al., 2022). The substantial surge in global inequality over the past two centuries should serve as a cause for concern, considering the development of the international economy (Van Zanden, et al., 2014).

Hence, a significant objective is to identify the factors influencing income distribution and subsequently income inequality in today's globally interconnected capitalism. Given that financial development is a pivotal aspect of modern economies, some argue that the potential impact of financial sector policies on inequality has been largely overlooked, deserving greater attention in the study of inequality (Martin Čihák, 2020). While mainstream economic theories attribute wage share declines primarily to technological change and secondarily to globalization, political economy approaches emphasize financial and trade globalization, alongside declining union density (Stockhammer, 2012a). However, inequality trends in emerging markets and developing nations present complexities; certain countries have achieved reduced income inequality while still experiencing persistent inequalities in education, healthcare, and financial access. In contrast, the gap between the affluent and the impoverished in developed countries is at its widest point in decades (Dabla-Norris, et al., 2015).

Beyond the intriguing patterns of inequality, particularly during the mid-20th century, and its link to societal outcomes, the relationship between inequality and economic performance has garnered substantial attention. It is evident that income inequality correlates negatively with various social indicators, such as health, education, social cohesion, and trust. However, the relationship with economic performance remains more intricate. Focusing on the correlation between income inequality and economic outcomes is essential for effective policy-making.

Economists have identified numerous channels through which inequality could influence economic growth, including fiscal policy, financial development, and fertility (Persson & Tabellini, 1994; Perotti, 1996a). Alternative theoretical perspectives suggest that the connection between inequality and growth can arise from differences in saving rates between capitalists and workers, as well as through demographic composition and population growth's role within the economy (Kaldor, 1961). The linkage between economic growth and income inequality is crucial, as the income of different social classes shapes consumption and investment levels. Additionally, economic growth and income distribution can intersect through technological innovation (Arrow, 1962). Technological advancements significantly impact income inequality due to changes in the production process, leading to corresponding income shifts. Kuznets (1955) also postulates that inequality may follow a predictable trajectory as economies expand. According to Kuznets, the relationship between economic growth and income inequality over time takes the form of an inverted "U," initially being positive during early development stages and eventually becoming negative.

However, economic theory has yet to reach a consensus on whether inequality's effect on growth is positive or negative. On one hand, it is argued that inequality is essential for achieving growth, as investment predominantly stems from the wealthier segments of the population (Kaldor, 1956). Conversely, inequality has been found to hinder economic growth or lead to unsustainable growth (Persson & Tabellini, 1994; Stockhammer, 2012a; Galbraith, 2012; Stiglitz, 2012; Perotti, 1996a).

Furthermore, the relationship between income inequality and economic growth has become more intricate in recent decades, given the impacts of economic integration, including technological changes, expanded international trade, and advanced financial systems, on the economic landscape.

In summary, economists and policymakers should consider both economic growth and equitable income distribution as crucial components for a thriving society. To sustain societal well-being and avoid social upheaval, societies must ensure that most members' needs are met and aim to increase overall wealth, enabling improved standards of living and potential introduction of new needs.

The objective of this thesis is to analyze how inequality is escalating in the globally integrated environment and its connection to economic growth. The aim is to provide appropriate policy tools for sustainable growth, considering the influence of income inequality. Before debating whether inequality is beneficial or detrimental to the economy, the factors influencing inequality are discussed at both theoretical and empirical levels. Subsequently, the channels through which income distribution affects economic growth are explored.

Understanding income inequality and its origins is pivotal. Thus, Chapter 2 defines income inequality, introduces major theoretical approaches to income distribution and inequality, and distinguishes functional and personal inequality. This distinction is crucial in understanding inequality growth during production. Moreover, the chapter highlights prominent inequality indexes. In Chapter 3, key theoretical perspectives on the relationship between income inequality and economic growth are presented. Chapter 4 delves into the literature's theoretical perspectives on the evolution of income inequality and its link to economic growth, considering the influence of economic integration's core components. The interactions of technology, trade openness, and financial development with economic performance due to rapid globalization have induced substantial changes in economic processes. Consequently, the relationship between income distribution and economic growth has evolved over recent decades. Chapter 5 develops a theoretical model of inequality and its connection to economic growth, incorporating the functional-personal distribution distinction and the impact of financial integration. Income inequality is classified into factor inequality (between wage and profit earners), labor inequality (among workers), and profit inequality (among profit earners). Empirical evidence from the literature on determinants of inequality and its correlation with growth is presented in Chapter 6, using panel data models based on the theoretical model in Chapter 5. The analysis focuses on integrated eurozone economies, and results are outlined in Chapter 7. These results offer insights for designing economic policies that promote growth while limiting income inequality growth. Finally, Chapter 8 discusses the Eurozone's economic strategy's impact on inequality and growth.

2 Inequality

2.1 Definition of inequality

At its core, income inequality underscores the divergence in economic potential among individuals due to disparities in their earnings. This inequality exerts a profound influence on people's access to basic necessities such as food, healthcare, and legal protection. Moreover, inequality is associated to their overall well-being and social outcomes, including trust, social cohesion, stability, crime rates, social mobility, educational attainment, and social security (Wilkinson & Pickett, 2007; Pickett & Wilkinson, 2014). Consequently, income inequality levels and trends can significantly shape the prosperity of a society's members. This connection implies that income inequality has a mutual relationship with various factors associated with growth, including social cohesion, consumption patterns, unemployment rates, investment, education, financialization, and open markets. Indeed, indices of income inequality offer valuable insights into how the rewards of economic growth are distributed among society's members (Van Zanden, et al., 2014).

Beyond its social implications, income inequality is profoundly intertwined with economic performance. For instance, arguments have been made that inequality fuels unemployment due to its creation of an incentive to actively search for better opportunities, leading to elevated unemployment rates (Galbraith, 2012). Consequently, income inequality has become a topic of discussion for a multitude of reasons and demands comprehensive attention.

Economic inequality is characterized by the fundamental disparities that grant some segments of the population access to goods and services while withholding them from others. In his work "Measuring Inequality," Cowell (1995) acknowledges that "inequality" is a complex term, often associated with challenging social and economic issues. He refers to Rein and Miller's nine criteria of equality, each offering distinct facets of what inequality entails, including concepts like:

- One-hundred-percentism: in other words, complete horizontal equity – "equal treatment of equals."
- The social minimum: here one aims to ensure that no one falls below some minimum standard of well-being.

- Equalization of lifetime income profiles: this focuses on inequality of future income prospects, rather than on the people's current position.
- Mobility: that is, a desire to narrow the differentials and to reduce the barriers between occupational groups.
- Economic inclusion: the objective is to reduce or eliminate the feeling of exclusion from society caused by differences in incomes or some other endowment.
- Income shares: society aims to increase the share of national income (or some other "cake") enjoyed by a relatively disadvantaged group - such as the lowest tenth of income recipients.
- Lowering the ceiling: attention is directed towards limiting the share of the cake enjoyed by a relatively advantaged section of the population.
- Avoidance of income and wealth crystallization: this just means eliminating the disproportionate advantages (or disadvantages) in education, political power, social acceptability and so on that may be entailed by an advantage (or disadvantage) in the income or wealth scale.
- International yardsticks: a nation takes as its goal that it should be no more unequal than another "comparable" nation.

(Cowell, 1995).

Numerous theories have endeavored to explain the origins of inequality, as the uneven distribution of wealth and income has persisted throughout history. At first glance, one might assume that inequality arises from compensating individuals based on their contributions to the production process. This distribution of income, often encompassing wages and profits, plays a significant role in determining inequality.

Sahota (1978) categorizes historical theories on wealth inequality into two groups. The first asserts that people shape their destinies, and each community defines the relative economic status of its members. This group encompasses theories ranging from conservative "choice" theories to institutional and inheritance theories of liberal and radical economists advocating for reform the social order to mitigate inequality. The second group contends that inequality is preordained to varying extents. This group comprises three schools of thought: those suggesting genetically predetermined income-determining skills, those emphasizing chance and stochastic factors, and those discussing life-cycle theories proposing income and inequality hinge on skills acquired throughout one's growth. (Sahota, 1978)

In general, the income that each individual ultimately receives can be influenced by various factors. Furthermore, income, as the outcome of the production process, possesses a dual nature. On one hand, it can serve as a reward for productivity and as a proxy for welfare. The greater an individual's income, the more goods and services they can consume and acquire. Therefore, an individual striving to maximize their welfare may exert more effort in the production process to attain a higher income.

Furthermore, it has been argued that an individual's well-being may be determined by their income in relation to that of others (Ferrer-i-Carbonell, 2005). Stochastic influences also play a role in individuals' optimizing behavior, as indicated by Milton Friedman's theory of free individual choice (Bigsten, 1983). Small groups within a society can accept greater total revenues by accepting risk, especially when potential losses are outweighed by potential gains. This notion posits that societies primarily composed of risk-averse individuals are more likely to maintain greater equality. Moreover, a general observation is that affluent individuals tend to take risks more readily than those with lower incomes. Inequality is further reflected in consumption expenditure, serving as an appropriate economic indicator of income inequality (Blundell & Preston, 1998).

However, wealth accumulation isn't solely a product of diligent labor. Wealthier individuals also tend to enjoy better living conditions and often have improved access to opportunities, such as higher education or a substantial initial amount of wealth for investment. Nepotism, which refers to the tendency for wealthier individuals to originate from affluent families, is a phenomenon that perpetuates inequality. This phenomenon is pronounced in the United States, where children of wealthy parents are more likely to maintain affluence, particularly during periods of heightened inequality (Corak, 2013). Beyond this, inequality can stem from inheritance or lottery winnings.

On the other hand, given that an individual's income can be utilized for consumption, investment, or savings, and thus influences the economic process, income can determine the allocation of resources and, consequently, serve as an indicator of economic growth. Thus, the existence of inequality signifies that at least a few individuals, particularly the wealthier ones, have the capacity to accumulate the minimum physical capital necessary to start a business or invest in human capital (Barro, 2000). The significance of inequality is highlighted in investment in education and human capital, which involve fixed costs and increasing returns (Galor & Zeira, 1993; Perotti, 1993). Furthermore, inequality can stem from the initial distribution and persist across subsequent generations due to the risk of 'poverty traps' associated with fixed investment costs (Piketty, 1994). Additionally, it's worth noting that wealth doesn't always contribute to production; it can also be saved or used for luxury consumption. There are situations where capital or economic productivity decreases while wealth increases (Kanbur & Stiglitz, 2015). In addition to the above, the initial distribution can also influence economic growth through its impact on equilibrium factor prices, such as interest and wage rates. The initial wealth distribution can determine the levels of supply and demand for credit, thus defining the equilibrium interest rate. Consequently, an unequal initial distribution, which often involves a significant proportion of the lower-income population, is associated with a high demand for capital (Piketty, 1997). This leads to expectations of a high equilibrium interest rate, difficulties in securing loans, and lower upward mobility. Conversely, a more equal initial distribution results in a lower interest rate, fostering greater upward mobility, faster capital accumulation, and reduced interest costs.

Moreover, the initial distribution of wealth can also shape the wage rate through its impact on labor demand. Lower-income classes primarily consist of workers rather than employers, who often face challenges in accessing credit for investments with higher returns. Consequently, their primary option is to sell their labor rather than investing in physical or human capital. In contrast, upper-income classes typically include employers who can invest in physical and human capital, either through their savings or by having easy access to credit. As a result, it becomes evident that a more unequal distribution increases labor supply, whereas a more equal distribution boosts labor demand. In the former case, with a high labor supply, equilibrium wage rates, capital accumulation, and upward mobility tend to be low. Conversely, less inequality and high labor demand appear to promote higher wage rates and increased mobility (Banerjee & Newman, 1993).

Therefore, while the first aspect of income is associated with the income distribution resulting from the production process, its second side is closely linked to economic growth.

Moreover, inequality can serve as an indicator of the polarization of economic power, which can have a range of consequences for different political regimes. The implications of inequality extend beyond economic considerations. Increased economic power often leads to long-term inequality, as those who benefit from it seek to maintain their positions. Furthermore, as argued by Marx, the legislative system tends to be perpetuated alongside the capitalist class, often resulting in legislation that favors their own class. Therefore, the lack of socioeconomic mobility and long-term inequality can pose a threat to democracy. In extreme cases, long-term inequality may provide opportunities for the wealthiest individuals to influence the political environment, thus undermining democracy and potentially leading to the peril of despotism.

In cases where wealth indirectly contributes to inequality through nepotism, various policies can be implemented to mitigate inequality while avoiding its detrimental effects. Concerning human capital, one potential policy is to ensure equal educational opportunities for the entire population. Additionally, for physical capital, a policy proposed by Atkinson (2015) involves providing a sum of money to every young adult upon reaching adulthood, thus offering an initial capital for investment.

Furthermore, depending on how it manifests, inequality may be more apparent in certain societies, particularly those with high levels of poverty, while it may be concealed in the lifestyle of residents in wealthier societies.

For instance, in countries without social protection, inequality can be observed in the stark contrast between the lavish residences of those who own expensive cars and the poverty-stricken favelas. It can also be seen in individuals who tragically pass away because they cannot afford medical treatment, while others spend a significant portion of their income on cosmetics or other luxury items. In contrast, in other societies, inequality might be more subtle, manifesting solely through individual habits. For example, some people can afford better cars or more extravagant vacations. Consequently, we can readily discern why inequality can be identified in both affluent and disadvantaged segments of the economy. However, the most challenging aspect lies not in detecting inequality but in identifying its sources, which may vary among nations, historical periods, or economic systems.

2.2 Income distribution and inequality

As discussed earlier, inequality arises from the distribution of income, which serves as both a welfare and an economic power indicator. But how is total income distributed among the members of society?

Income distribution has long been a prominent concern for societies striving to determine the fairest way to allocate their wealth. A fundamental objective for contemporary economies is to increase their overall production and aggregate income, which subsequently must be distributed among their citizens. Income distribution has been a central topic in economic literature and research. Economists and policymakers have discussed several theoretical approaches proposing optimal methods for how income should be distributed.

Primarily, the unequal distribution of total income among the members of an economy leads to income inequality. When we refer to income or wealth distribution, we are addressing the proportion of total income or wealth that each person in society receives or possesses. Understanding how income is distributed can help us comprehend the generation of inequality within society. Consequently, we can assert that income distribution mirrors both economic growth and income inequality within a society, assuming it represents the level of income and how it is divided among individuals.

Furthermore, considering that income distribution is the final stage of the production process and profoundly influences wealth and its recipients, it becomes apparent why economists and policymakers engaged in discussions on wealth distribution have not reached a consensus. Most theoretical approaches argue that distribution is determined by employment levels and payments to the means of production, primarily consisting of labor and capital. However, significant differences exist among these theoretical approaches, primarily in the assumptions they make about market behavior and the determination of wage, product, and service prices (Ahluwalia & Chenery, 1983,).

Different schools of economic thought present different explanations of the determinants of income distribution. As it has been presented there are several factors that determine differences in income like marginal costs, the conflict between workers and capitalists, the level of monopoly in the market, and investing in human capital. According to neoclassical economics, technology and preferences are assumed to determine income distribution. In Keynesian economics the main determinant of income distribution is effective demand, while in Marxian economics the class struggle is assumed to determine income distribution. "Unfortunately, these results are obtained only in the highly restrictive setting of a long-run equilibrium of a closed economy characterized by full capacity utilization" (Stockhammer, 2009). However, during the last decades, most economies have become more open to international markets following a process of globalization.

Furthermore, we can focus on income distribution through two perspectives. The first is the perspective of functional distribution. Functional income distribution refers to the distribution of income that is returned to the main factors of production, which usually are labor and capital. The second perspective is the personal distribution, which refers to the distribution of income that is being distributed among households and individuals. Income inequality can be also observed among individuals with the same source of income.

In order to understand the difference of functional and personal distribution we should take under consideration the status of the income receiver. Thus, functional distribution refers to the income that is being distributed among different statuses, including firms, families, states, and individuals, while personal distribution refers to the income that is being distributed among individuals, sometimes proxied by households.

However personal distribution and functional distribution are strongly related to each other. Increases in inequality among classes may be the fundamental cause of the increases of personal income inequality (Wolff & Zacharias, 2007). As it has been argued by Atkinson, (2009), in order to understand personal income inequality, we should analyze functional income distribution. As it has been suggested, a redistribution between wages and profits affects the personal income distribution due to the distribution of the production factors among individuals (Molero-Simarro, 2016,).

For instance, it has been argued that distribution of capital is usually more unequal than that of labor. 'In a capitalist economy, income distribution is combined out of the distribution of capital income, the distribution of labor income and the shares of capital and labor in total income. As capital inequality is much greater than income inequality, a decrease in capital’s share would decrease income inequality.' (Minsky, 1973). Hence in contrast, in these cases, an increase of the profit share would increase personal inequality (Garca-Pealosa & Daudey, 2007).

Thus, the distribution of personal income, and hence total income inequality, is determined by the distribution of labor and capital endowments and the distribution of the aggregate output between labor and capital. Therefore, the levels of factor shares seem to be related to personal income distribution and inequality, and hence the determinants of functional income distribution can provide an explanation for the other dimensions of redistribution (Atkinson, 2009; Glyn, 2011).

Therefore, when trying to identify the determinants of inequality, we should seek those factors that lead to changes in functional and personal distribution. Furthermore, we should focus on the causes that lead to changes in these factors.

2.2.1 Functional distribution

Functional distribution refers to the way output is divided between the factors of production, usually capital and labor. Given that factors of production may be unequally distributed among individuals, functional distribution can be considered a strong determinant of personal inequality. Although the distribution of income and the way inequality is created takes different forms in different economies, it is generally accepted that it usually comes with a decline in the wage share. Since individuals of the middle or lower income classes mainly belong to the labor factor of the production process, the wage share can be considered a main indicator of inequality. For instance, in the post-war period, there was a reduction in inequality accompanied by a rise in wage shares. In contrast, in recent decades, inequality seems to have increased in most advanced countries, while wage shares have decreased (Atkinson, 2015). Therefore, even though there isn't an integrated theory that universally explains income distribution and inequality, a general "rule" has emerged from the policies that have been implemented, which is to redistribute wealth from the rich classes in an attempt to reduce inequality.

The earliest theory regarding income distribution can be found in the work of David Ricardo. Income distribution was a central issue in economic thought for Ricardo, who argued that the principal problem in Political Economy is to "determine the laws which regulate" the distribution of factor shares (Atkinson, 1997; Giovannoni, 2010; Glyn, 2011). According to Ricardo, the main factors of production are labor, capital, and land, while the main sources of income are wages, profits, and rent, respectively. Ricardo's approach stated that the differences in rent prices depend on land fertility, which explains why some landowners receive higher rents than others. He considered the increase in land rent as a consequence rather than a cause of already distributed wealth. Ricardo believed that the surplus over the cost of production is used to pay land rent, while the remaining payment is distributed among workers and capitalists. Furthermore, he accepted the Malthusian theory, which implies that labor, paid in subsistence wages, is unlimited (Kaldor, 1956; Cline, 1975). Ricardo's theory suggests that wage levels are determined by labor supply, which is defined by the accumulation of capital (Kaldor, 1956). Additionally, since land is assumed to be limited with varying fertility, in the long run, profit shares will decrease while the shares of land rent and wages, despite real wages remaining at subsistence levels, will increase. Ricardo believed that this distribution, favoring landowners, hinders economic growth and leads to stagnation. According to Ricardo, a decrease in import restrictions coupled with technological innovation, while maintaining labor with subsistence wages and full employment, would achieve growth (Gillis, et al., 1987). Therefore, Ricardo not only focused on redistribution from landlords to capitalists regarding economic growth, but he also placed the inequality between profits and wages at the core of economic thought.

From a different perspective, Marx centered on labor exploitation by the means of production owners as the main cause of inequality. According to Marx, the key characteristic of the capitalist production process is that the value of products is created by labor, with profit income being part of this value extracted by the capitalist class at the expense of labor-supplying workers. Marx believed that certain capitalists become extremely wealthy by exploiting the labor of the working class. Thus, while worker income remains at subsistence levels, profit incomes represent the difference between the value of the total product and the value of labor. Consequently, inequality can be seen as a conflict between the capitalist class, which profits from profits, and the working class, which derives income from wages. In general, factor shares in a country are determined by the value created by labor and the value of that labor (Herr, 2018).

Additionally, the value of labor power is determined by the value it can create in a given time period. Technological changes can increase labor productivity, allowing the same labor to create more value in a certain period compared to the past. If wages remain constant or close to subsistence levels, profits will increase, leading to increased inequality. According to Marx, the pursuit of profit drives one of capitalism's positive aspects—the power to enhance productivity, creating strong incentives for firms to continuously modify the production process (Herr, 2018). "This process of creative destruction, as Joseph Schumpeter (1942) called it, is the secret to why capitalism, in comparison to all other modes of production known to date, is so successful in increasing productivity and driving innovation" (Herr, 2018). Marx also concurred with the idea that labor is practically unlimited, but for different reasons than Ricardo. Marx believed that there is always a level of unemployment, which he termed a "reserve army of labor," enabling capitalists to maintain wages close to subsistence levels to achieve their desired profit rate. Unemployment is seen as weakening the bargaining power of workers. According to Marx, a higher wage share is a double-edged sword: it increases living conditions but decreases profits, potentially resulting in reduced growth and higher unemployment. Thus, Marx, assuming workers are paid subsistence wages while the rest of the income goes to profits, posited that real wages are determined in the labor market (Herr, 2018). Therefore, a change in income distribution structure will only occur when relationships in the production process change. If these relationships persist in the capitalist production process, capitalists retain more power in income distribution. Additionally, capitalists tend to reproduce their relationship with the production process alongside the reproduction of legislation relevant to income distribution. Marx's theory implies that wages can only increase through collective organization of the working class, compelling the capitalist class to return some of their surplus value. Marx anticipated that productivity development would boost profits while workers' living conditions would deteriorate, eventually leading to a workers' revolution as the only solution to end exploitation.

In contrast, neoclassical economic theory posits that capital, land, and labor constitute the factors of production. Total product emerges from the interaction of these factors in the physical production process. A key characteristic of neoclassical economic theories is the assumption of individual rationality and market clearance. Consequently, each factor receives income based on its contribution to production, shaping functional income distribution. Another assumption of neoclassical distribution analysis is full capacity utilization and the clearance of markets in long-run equilibrium. According to neoclassical economic theory, product value is defined by marginal utility, which also determines the income returned to production factors. Marginal productivity is considered the basis for factor payment, with income distribution forming part of the general price-setting process in the economy. Therefore, market forces are expected to ultimately determine factor prices, including wages, as they determine good and service prices. Consequently, in equilibrium markets, income distribution is governed by technology (Stockhammer, 2009). Unlike Marx and Ricardo, neoclassical theory assumes that no factors are available in unlimited quantities. "Thus, if the total supply of all factors (and not only land) is taken as given, independently of price, and all are assumed to be limited substitutes to one another, but the share-out of the whole produce can also be regarded as being determined by the marginal rates of substitution between them" (Kaldor, 1956). In general, income distribution in neoclassical theory relies on elasticities and substitution processes (Cline, 1975). Therefore, as neoclassical theory tries to explain income distribution through the process of distribution of the productive factors, individuals' income depends on their total endowments. In neoclassical economics, prices adjust to achieve equilibrium, which means that aggregate supply of goods and services should be equal to aggregate demand (Cowell, 2007). According to neoclassical economic theory, changes in factors distribution and, consequently, changes in the size of distribution over time can be explained by changes in the relative supply of a factor, the substitution elasticity between factors, changes in demand for certain products, and technological advancements (Cline, 1975). In neoclassical economics, functional distribution is automatically determined by the market (Cowell, 2007).

Furthermore, following the tradition of Marx, Keynes argued that values are primarily created by labor and that exploitation is the source of profits, considering the income of rentiers from interests and dividends as expressions of exploitation. They both rejected the marginal productivity theory of income distribution (Herr, 2018). Keynes rejected the idea of perfect rationality and instead emphasized the role of fundamental uncertainty and the importance of socio-psychological phenomena.

At the center of Keynes's analysis is the determination of output and employment in the short run. On one hand, demand is driven by investment, while on the other hand, demand influences prices and employment. In the view of Keynesian economics, where nominal wages and functional distribution are negotiated in the labor market, wages not only represent income for workers but also serve as costs for firms. Therefore, wages, like other costs, play a role in determining the prices of goods and services. The total labor cost is determined by the nominal wage and productivity. A decrease in nominal wages could lead to a decrease in prices and result in a deflationary spiral. However, depending on the level of competition among firms in the economy, changes in nominal wages can be adjusted so that the level of profits remains unchanged. According to Keynes, changes in the wage cost may primarily impact the price level rather than functional distribution. According to Keynes' analysis, real wages are more of an ex-post outcome of economic activity rather than a choice variable (Stockhammer, 2009).

Furthermore, influenced by the Marxist perspective on wage shares, Kalecki (1971) proposed a distribution model that revolves around wage shares through a monopolistic analysis (Kalecki, 1971). The Kaleckian analysis places functional income distribution at its core. In an oligopolistic or monopolistic market, profits are assumed to be determined by the markup that firms set over their costs, according to Kalecki. Consequently, if firms can set prices, demand changes have a limited impact on prices. Therefore, income distribution tends to be stable rather than an ex-post result. The degree of monopoly determines the level of the markup and, consequently, income distribution, according to Kalecki. Monopolistic pricing by firms is considered a major determinant of functional distribution (Kalecki, 1937). Competition constraints are important for analyzing the lower part of the earnings distribution, while monopoly power is relevant for analyzing earnings in professions with restricted entry (Cowell, 2007). Therefore, one determinant of the degree of monopoly, and thus the markup, is the "degree of price competition among firms in the goods market." A higher degree of concentration within an industry or sector has a positive effect on the markup, while the relevance of price competition compared to other forms of competition has a negative effect on the markup. Additionally, even if firms can offset an increase in nominal wages by raising prices, the impact on aggregate demand may not favor total profits.

Moreover, as has been argued, "supply and demand do not fully determine the market wage; they only place bounds on the wage, allowing scope for bargaining about the division of the surplus" (Atkinson, 2015). Additionally, "Once one abandons the assumption of perfect competition, income distribution becomes the outcome of a bargaining process between firms and labor, typically represented by labor unions"

(Stockhammer, 2009). Bargaining power is the relative power of one income class over the other. The bargaining power of workers, often mediated by trade unions, negatively impacts the markup, creating a strategic game with firms. Consequently, monopolization raises profit shares, while stronger bargaining power of labor is associated with higher wage shares. Moreover, if labor demand is inelastic, wage shares will also increase (Stockhammer, 2009; Stockhammer, 2017). Several authors have presented simple models demonstrating how wage shares are affected by bargaining power (Bentolila & Saint-Paul, 2003; Checchi & Peñalosa, 2005; Azmat, et al., 2007). Thus, it is expected that "the more powerful the trade unions are, the more they will be able to restrain the mark-ups and thereby to increase the share of wages in national income" (Kalecki, 1971). Furthermore, unemployment can impact bargaining power. The fear of unemployment can weaken the bargaining power of workers, leading to lower wages and higher inequality.

Finally, overhead costs, according to Kalecki, impact the degree of monopoly and the markup. Since overhead costs, like other costs, reduce gross profit, firms may increase their markup to protect profits. Interest payments on debt are also part of overhead costs, so an increase in interest rates could lead to an increased markup (Hein, 2013). Similarly, to Keynesian economics, if nominal wages increase, firms can adjust their markup, resulting in higher prices. Therefore, in Keynesian and Kaleckian economics, changes in nominal wages do not necessarily lead to changes in functional distribution. However, there is always the risk that this could cause lower demand and subsequently lower profits.

In conclusion, functional distribution focuses on the employment of production factors—primarily labor, capital, and rents—and their corresponding payments: wages and profits. Consequently, an individual's contribution of factors to the production process determines their personal income and, consequently, their level of inequality. Therefore, assuming that factors are unevenly distributed among individuals, changes in factor shares could result in changes in personal inequality. The literature suggests that a fall in wage shares is indicative of increased inequality (Stockhammer, 2012c). A decline in wage share has been associated with changes in income distribution, which also relates to personal inequality (Atkinson, et al., 2011). Thus, the changes in inequality observed over recent decades could be related to shifts in functional distribution. It is widely argued that wage shares have decreased since the 1980s

(International Monetary Fund, 2007b; International Labor Organization, 2011; Onaran, 2012; Stockhammer, 2012c).

In general, there is evidence that wage shares are negatively correlated with inequality (Garca-Pealosa & Daudey, 2007; Schmid, 2013), while profit shares are associated with higher levels of inequality (Giovannoni, 2010). Checchi & Peñalosa (2005), conducting a panel data analysis for 11 OECD countries from 1960 to 2000, found evidence that changes in personal distribution can be explained by variations in factor distribution (Checchi & Peñalosa, 2005). Specifically, they discovered a negative relationship between the wage share and inequality, as measured by the GINI coefficient.

2.2.2 Personal distribution

In modern economies, individuals receive income from various sources, making factor distribution only a part of the overall distribution and inequality explanation. If it's assumed that the distribution of endowments is equal across income classes—meaning every individual or household has the same amount of capital and labor power—changes in factor distribution wouldn't affect inequality. However, if income classes possess varying amounts of capital and labor, shifts in factor distribution could impact overall inequality. Additionally, the determinants of wage share levels can also lead to differences in earnings among different groups of workers. Differences in wages can be justified when individuals work longer hours, take on more responsibility, or perform less desirable jobs (Atkinson, 2015). Workers possess different labor skills, while capital owners have differing amounts of capital. Therefore, income inequality is influenced not only by the factor distribution between wages and profits but also by the way wages and profits are distributed among income classes.

Hence, while it is assumed that every individual seeks to maximize their utility by maximizing their income, personal distribution, which refers to the distribution of income among individuals or households, is determined by factor distribution and the contribution of personal endowments of these factors. Therefore, on one hand, as previously discussed, personal income depends on the factors that each individual contributes to the production process and the level of returns on those factors, which typically include profits and wages. Thus, the more capital stock or labor hours one provides, the higher their income. On the other hand, individuals with the same share of factors may receive varying levels of income depending on the productivity of these factors. Therefore, it is essential to focus on the contribution of these factors to the production process and factors that can influence their productivity, such as education and technological advancements.

Therefore, if we assume that wages may constitute the primary source of income for most households, wage distribution becomes a crucial factor in total inequality. One of the key findings of Piketty and Saez (2003) is that at the top of the income distribution, rentiers have been replaced by the working rich. Consequently, among the determinants of inequality, special attention should be paid to the factors contributing to wage inequality among wage earners.

Wage inequality can stem from various factors, including investments in human capital through education. As has been argued, differences in wages may primarily stem from variations in training for jobs that require higher skills (Mincer, 1958; Sahota, 1978). According to Adam Smith, "a man educated at the expense of much labor and time... must be expected to earn over the usual wages... the whole expenses of his education, with at least the ordinary profits of an equally valuable capital" (Atkinson, 2015). Therefore, jobs requiring more extended education are typically compensated with higher wages to account for the time and financial investment in education.

Marx made a similar argument, contending that the labor power of workers with higher skills is more valuable because it includes the cost of education required to acquire those skills. The overall level of education can influence inequality, particularly when individuals must choose between investing in education (i.e., human capital) and working as unskilled laborers (Galor & Zeira, 1993). Consequently, investing in human capital through education can lead to higher returns on labor, impacting income distribution and inequality.

It has been noted that in the last two decades of the twentieth century, there was a significant widening in wage distribution (García-Peñalosa, 2010). Additionally, it has been argued that there is a rising skill premium since the 1980s, primarily driven by increased income among the highly educated, rather than a decrease in income among those with basic education (Ivanova, 2019).

Furthermore, experience gained through age can also lead to higher income by acquiring skills. According to the competition of professions, as proposed by Lester (1975), wage levels are determined by job characteristics, and employment opportunities depend on workers' relative positions in the job queue, which is often influenced by educational training (Lester, 1975). However, this perspective suggests that wages are determined not by the marginal product of the worker's education but by the marginal product related to skills acquired on the job. Thus, workers with the same education might receive different wages based on the skills they acquire through work. Additionally, the time required to gain necessary skills often depends on factors such as work and family conditions. Age might also measure biological growth and decline, assuming that productivity decreases over time (Mincer, 1958).

In addition to stochastic factors like chance and luck, labor income inequality is determined by skills acquired through education and experience. Higher-skilled individuals generally earn more than those with basic skills. The resulting income difference due to skill differences is known as the income premium. Consequently, lower levels of inequality tend to correlate with small differences between skill levels or between incomes of highly skilled and basic-skilled individuals. Evidence suggests that the increase in wage inequality has primarily been driven by the rise in the relative wage—the ratio of highly educated workers' wages to those of basic-educated workers (Gottschalk & Smeeding, 1997; Atkinson, 2008). Additionally, as different goods and services rely on varying skill levels, prices may also be affected. A higher wage premium leads to a higher relative price for goods relying heavily on skilled labor (Atkinson, 2015).

Furthermore, the level of the skill premium can be influenced by several factors. Beyond education, the labor market can impact the skill premium. If the demand for skilled labor increases, the skill premium tends to rise. A larger supply of skilled labor can decrease the skill premium, contributing to reduced inequality in labor income distribution (Li, et al., 1998). Countries with higher education levels often experience lower inequality (Checchi, 2001; Checchi & Garcia-Penalosa, 2004). However, Chambers (2005) suggested that primary education reduces inequality, while secondary and higher education might increase it (Chambers, 2005).

Moreover, Milton Friedman's theory of individuals' free choice argues that stochastic influences align with individuals' optimizing behavior (Bigsten, 1983). He posits that small groups in a society can reap larger total revenues by accepting risks, as potential losses are significantly smaller than potential gains. Consequently, if the majority of a society is risk-averse, it could be more equal than a society of risk-takers. Additionally, it's commonly observed that wealthier individuals tend to be more risk-tolerant than poorer individuals. Therefore, individuals' risk behavior can contribute to personal inequality within economies.

Furthermore, the type of labor can significantly influence income inequality. There is evidence of an increase in the share of supervisory workers (Mohun, 2013). Moreover, the rising remuneration for management, which is considered a labor cost, has played a role in increasing personal inequality in English-speaking countries (Stockhammer, 2013). The decrease in income inequality among wage earners in France and the decline in wages at the bottom of the distribution in Germany since the mid-1990s also correspond to the decreasing share of non-managerial wage earners in national income (Stockhammer, 2012c).

Finally, Behringer & Treeck (2018) suggest it's essential to investigate the relationship between personal and functional income distributions, specifically exploring whether an increase in personal inequality leads to a decline in wage shares (Behringer & Treeck, 2018).

2.3 Measuring inequality

Measuring inequality has posed significant challenges in economic studies. For example, many countries have not traditionally included measures of inequality in their national income accounts or labor statistics (Galbraith, 2012). Among the various measures used in empirical literature, the GINI index stands out as the most widely employed measure of income inequality, typically derived directly from the Lorenz curve.

The Lorenz curve provides a visual representation of the income distribution across the population of an economy. In a Lorenz curve diagram, such as the example in Figure 1, the horizontal axis represents the cumulative proportion of the population, while the vertical axis represents the corresponding proportion of income. The 45-degree line visible in Figure 1 represents perfect equality, signifying that for every portion of the population, an equal portion of income is received. In essence, this means that every individual receives an equal income.

Inequality is quantified by the area between the 45-degree line and the curve representing the actual income distribution. The size of this area directly correlates with the level of inequality. Consequently, as depicted in Figure 1, the smaller the A area (or conversely, the larger the B area), the less pronounced the inequality. The GINI index coefficient is computed based on this area using the following formula.

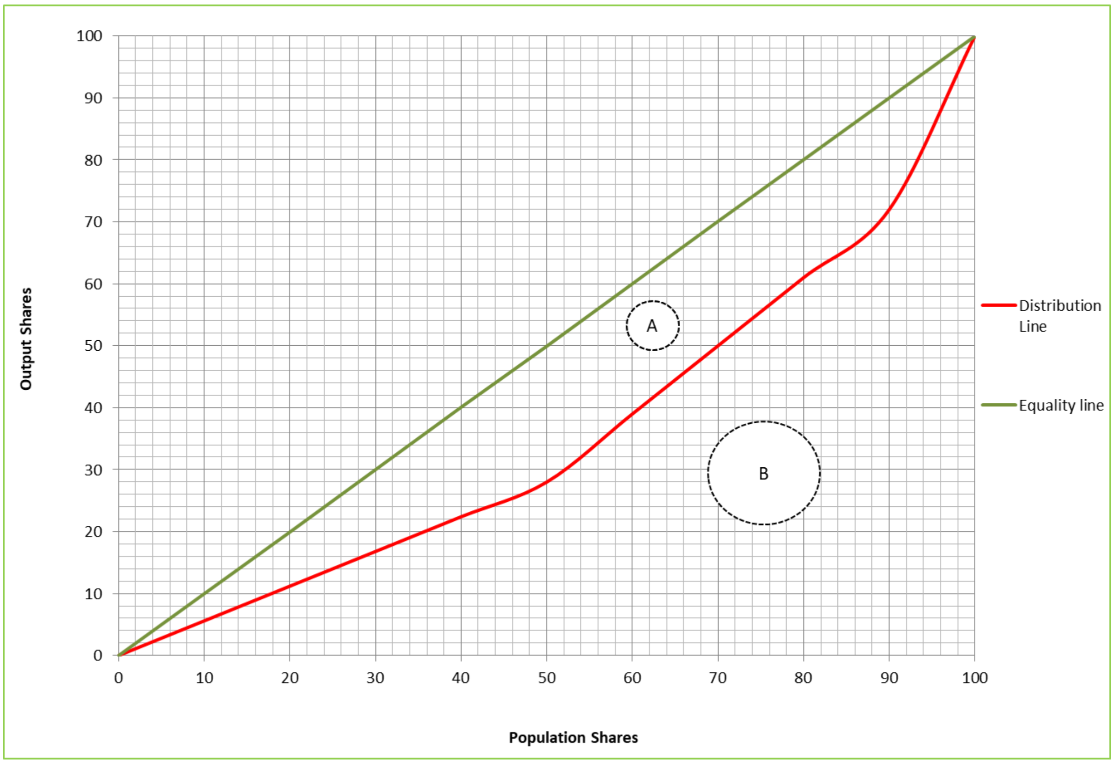
$$GINI = \frac{area\ A}{area\ A + area\ B} = 1 - 2area\ B \qquad (2.3.1)$$

The GINI index is known for its simplicity in computation, and it spans a range from 0 to 1. A score of 0 signifies total equality, indicating that national income is distributed evenly among all individuals, while a score of 1 signifies total inequality and concentration of income, where one person possesses the entire national income.

One valuable attribute of the GINI coefficient is its ability to compare every income value with all other incomes in the distribution (Sen, 1973). Furthermore, it is primarily sensitive to the number of individuals involved in income transfers, in addition to its sensitivity to income disparities at higher income levels where these transfers take place. Additionally, the GINI coefficient tends to be more responsive to values near the median income rather than extreme values (Buhmann, et al., 1988).

Moreover, the GINI coefficient can be applied to different income and population concepts, including household or individual incomes, gross or net income, income or consumption, and can be computed for urban centers or the entire country.

Figure 1. Lorenz curve



Another widely used measurement of inequality is the Theil index, which serves as a measure of dispersion frequently employed to gauge income inequality. The Theil index is derived from total income (or payroll) and the total population (or employment), and it involves calculating the ratio of each group's share in the entire population to the ratio of each group's average income to the overall population's average income. Consequently, the "Theil element" results from multiplying these two shares by the logarithm of the second ratio (Galbraith, 2012).

Moreover, the Theil index can be scaled from zero, representing perfect equality, to one, representing complete inequality. One notable advantage of the Theil index is its capacity for decomposition into within-group and between-group inequality components, allowing for a more detailed analysis of the demographic factors contributing to inequality (Galbraith, 2012; Boushey & Price, 2014).

Additionally, the Atkinson index is a widely recognized welfare-based measure of inequality. It quantifies the percentage of total income that a given society would need to forgo in order to achieve a more equitable distribution of income among its citizens. This measure is contingent on the extent of society's aversion to inequality, a theoretical parameter determined by the researcher. A higher value indicates a greater social utility or a stronger willingness among individuals to accept smaller incomes in exchange for a more equal distribution.

A noteworthy aspect of the Atkinson index is its capability to decompose inequality into within-group and between-group components. Unlike other indices, it allows for the exploration of the welfare implications of various policies and introduces normative considerations into the analysis. In empirical studies, alternative measures of inequality based on percentile comparisons are also utilized. Some of these alternative measurements include the income share of the third quantile, the sum of the income shares of the third and fourth quintiles, and the ratio of the income share of the first quintile to that of the fifth quintile (Panizza, 1995).

3 The relationship with growth

Inequality serves as both a cause and a symptom of various social and economic outcomes. Beyond the compelling interest in understanding the trends and underlying drivers of income inequality, the impact of income inequality on economic performance, particularly economic growth, has become a subject of significant concern for economists and policymakers alike. The relationship between income inequality and economic growth is a topic marked by ongoing debate and exploration (Barro, 2000; Galanis, 2014). Consequently, there exist multiple theoretical frameworks that seek to elucidate how income inequality can influence economic growth and overall economic performance. However, even though many economists accept the concept of a trade-off between inequality and economic efficiency, the nature and direction of this trade-off remain uncertain.

The channels and mechanisms through which income inequality and economic growth are interrelated tend to vary, contingent on the specific theoretical approach, statistical analysis, model, variables, time period, or geographic context employed in each study.

As a result, economic growth, which is considered among the indicators of quality of life, appears to be connected to income inequality in a range of ways. However, a consensus has yet to emerge among economists regarding the nature of the relationship between inequality and growth.

Consequently, the primary objective is to determine whether there is a causal relationship between growth and inequality or whether both are independent endogenous outcomes influenced by similar economic factors and policies.

3.1 Kuznets hypothesis

The notion of a possible relationship between inequality and growth was first highlighted by Simon Kuznets in 1955 in his seminal paper "Economic Growth and Income Inequality" (Kuznets, 1955). Kuznets argued that levels of inequality could be linked to output levels as an economy develops over time. The Kuznets hypothesis posits a positive non-linear relationship between inequality and total output during the early stages of growth, which then shifts to a negative correlation as the economy matures. Consequently, Kuznets proposed that income inequality initially increases during the early growth stages, stabilizes during the transition from rural or pre-industrial to industrial economies, and eventually decreases during the later stages of growth. This suggests that the graphical representation of the relationship between economic growth and income inequality would resemble an inverted "U" shape.

Kuznets based his suggestions on historical data from three developed countries (USA, UK, and Germany) spanning the period from 1919 to 1945. According to Kuznets, income inequality seems to oscillate between a positive and negative relationship with GDP per capita as an economy shifts from a poor rural to a prosperous industrialized state. This phenomenon was particularly evident during the industrial revolution when rural economies transformed into industrial ones. This transition led to expansion in sectors yielding higher returns, prompting the population to migrate from rural to urban regions in pursuit of higher-paying jobs and improved living conditions. As this demographic shift gained momentum, inequality, which initially increased, started stabilizing and then decreasing, thus forming the characteristic inverted U-shape of the Kuznets hypothesis. Consequently, the economy featured a larger proportion of high-paid industrial workers and fewer low-paid agricultural laborers.

Kuznets's hypothesis suggests that the observed inequality in less developed countries might only represent a phase in their development trajectory, with inequality expected to decline as these countries continue growing (Boushey & Price, 2014). Kuznets's optimism also echoes in the analysis of Solow (1956), who delineated the prerequisites for an economy to attain a balanced growth path where all variables experience uniform growth rates. This balanced growth path ensures that every social group benefits from growth to an equal extent (Piketty, 2014).

The debate surrounding the validity of the Kuznets hypothesis has given rise to numerous controversies regarding the intertemporal relationship between inequality and economic growth. There are several reasons to doubt the Kuznets hypothesis. Firstly, Kuznets's assumptions relied on the transition from rural to urban and from agricultural to industrial sectors during income rise, which may not apply universally across different historical contexts. The observed decrease in inequality during the sample period for the USA, one of the countries included in Kuznets's study, could be attributed to the impact of World Wars and the Great Depression rather than representing a lasting relationship (Piketty, 2014). Additionally, modern economies, particularly in the last three decades, have undergone substantial changes and crises that may affect both inequality and growth. These shifts, including credit market imperfections and skill-biased technical changes, may not align with the Kuznets hypothesis (García-Peñalosa, 2010).

Kuznets himself acknowledged that his hypothesis was constructed using limited empirical data, simple mathematical extrapolation, and theoretical speculation (Boushey & Price, 2014). He humorously stated that his work comprised "perhaps 5 percent empirical information and 95 percent speculation" (Kuznets, 1955). Furthermore, Kuznets argued that developing countries were unlikely to follow an inverted U-shaped pattern of inequality and growth due to two primary reasons. Firstly, developing countries have relatively fewer savings compared to developed nations, which limits their ability to drive growth through investments. Additionally, wealthier individuals in developing countries tend to channel their savings to developed economies where investments are considered safer or opt for luxury consumption (Todaro, 1994). Secondly, the potential for political instability due to initial inequality spikes is more pronounced in poorer nations. This instability can disrupt economic growth trajectories and the relationship between growth and inequality. Thus, poor economies may struggle to achieve higher growth and lower income inequality. Contrary to Kuznets's assumptions, it's possible that as populations transition from rural to urban areas, inequality may decrease due to shifts in market power. For instance, as the supply of agricultural products diminishes, prices may rise, leading to higher incomes for farmers. Kuznets himself appeared surprised by his findings, pondering how two developmental processes assumed to be inherently unequal—concentration of savings among the wealthy and the simultaneous shift from agriculture to industry—could lead to income convergence (Korzeniewicz & Patrick, 2005).

Furthermore, it's essential to recognize that inequality can stem from disparities in access to education, both socially and politically (Ahluwalia, 1976; Simpson, 1990). For example, certain political regimes, like social democracies, are often associated with reducing inequality (Galbraith, 2012).

Taking these factors into consideration, we might expect that developing and impoverished countries are situated on the left, ascending side of the inequality curve, while developed, wealthier countries are on the right, descending side of the curve. However, it's important to note that developed countries went through their development process in different historical periods and likely under different economic conditions than those currently developing. Therefore, the current position of developed countries may not necessarily reflect the future trajectory of developing nations.

Furthermore, it's observed that the growth path of developing countries can be heavily reliant on the economic activities of developed countries (Saith, 1983). This economic dependency could potentially perpetuate high levels of inequality in poorer and developing nations (Bollen & Jackman, 1985; Evans & Timberlake, 1980).

While the validity of the Kuznets hypothesis has been debated in the literature, Kuznets offers two crucial insights that shed light on the relationship between income inequality and capitalism. Firstly, economic growth plays a pivotal role in shaping inequality, particularly through the transitions between older and newer modes of production. These transitions have the capacity to reveal the effects on income distribution, making it a dynamic process. The second insight emphasizes that the features of income distribution in any given society are influenced by the impact of institutions and collective social forces on power arrangements. In other words, the way income is distributed is shaped by the interplay of economic and social factors, including institutions and societal forces (Galbraith, 2012).

Indeed, Kuznets was onto something significant with his recognition of the organic relationship between inequality and transformative changes within national economies. However, he may not have accounted for the influence of global financial forces, which have become increasingly influential and parallel the impact of Keynesian and Minskyan global forces (Galbraith, 2012).

In a modern context, one can draw parallels between Kuznets's hypothesis concerning the movement of people from rural to urban areas and the contemporary transition from less developed economic environments to modern financial systems. This can also be likened to the shift from sectors of the economy with outdated technology to those with new technology, which has been widely observed in various economies over recent decades.

As financialization advances capital allocation and spurs economic growth, it is initially the affluent segments of society that tend to benefit most. However, over time, an increasing proportion of society gains access to the financial markets, resulting in broader and more equitable distribution of benefits across income strata.

Similar effects can also be observed due to technological progress and the shift in leading economic sectors from high-volume manufacturing to high-value information and technological services, as witnessed in recent years. Consequently, the relative demand for skilled and unskilled labor can undergo changes. This has led to increased income inequality, with wages of unskilled workers experiencing downward pressure while returns for skilled workers have been on the rise (Berman, et al., 1994; Acemoglu & Robinson, 2000; Autor, et al., 2008). However, as technology becomes more widely diffused in later periods, the supply of skilled labor is expected to increase, potentially reducing income inequality. However, as technology diffuses more widely, the supply of skilled labor is likely to increase, potentially reducing inequality. Additionally, the transitions from old to new systems entail certain costs, including retraining and losses due to the necessary abandonment or replacement of older technology and capital.

3.2 How inequality affects growth

Since Kuznets, many theoretical approaches have attempted to dissect the relationship between inequality and growth. Over the years, numerous economists who have argued that inequality is linked to growth have presented several channels where this connection becomes evident. For instance, these channels include fiscal policy and taxation (Alesina & Rodrik, 1994; Panizza, 1995), sociopolitical instability (Perotti, 1996a), or imperfect markets (Alesina & Rodrik, 1994).

Other channels that concern the modern globalized economy include technology, open markets, credit, and international financial deregulation. Additionally, international financial deregulation and prolonged current account deficits may impact growth. In debt-led growth models where inequality coexists with household debt, long-term instability can arise (Stockhammer, 2012b).

In general, it appears that the relationship between income inequality and growth is a topic that warrants attention from economists and policymakers alike. Consequently, on one hand, there are approaches arguing that inequality can contribute to growth, particularly at the outset of a country's economic activity and growth. On the other hand, there are approaches contending that inequality can be detrimental to growth.

The prevailing argument among economists is that higher inequality resulting from a greater share of profits leads to rapid growth. This argument stems from the fact that investment and entrepreneurship, which drive economic growth, depend on profit income. Moreover, it's widely accepted that investments primarily stem from the savings of the wealthy, who can save in contrast to the poor, who tend to spend most of their income. Therefore, the acceptance of "some" inequality, especially in the initial stages of growth, is deemed essential for achieving growth. It follows that, since the propensity to save is higher for the rich than for the poor, higher initial inequality is expected to result in greater savings, capital accumulation, and growth (Kaldor, 1956; Bourguignon, 1981). Consequently, inequality could boost growth by ensuring that at least a few individuals possess the minimum income necessary for investing in education or starting a firm (Barro, 2000; Kolev & Niehues, 2016).

Conversely, other perspectives argue that inequality can impede growth or lead to unsustainable growth in the future (Panizza, 1995; Perotti, 1996a). Various indications suggest that income inequality can erect barriers to economic growth. For example, certain theoretical perspectives contend that income inequality can hinder growth by limiting the poor's access to credit, thereby hindering business development. Additionally, it reduces access to education for lower-income classes and ultimately decreases consumption (Benabou, 1996). Furthermore, it is asserted that unequal distribution denies the poorest access to quality healthcare and subjects them to malnutrition (Perotti, 1996a; Aghion, et al., 1999), potentially resulting in less productive labor. Moreover, inequality could escalate the risk of crises by creating instabilities, whereas a more equal distribution enhances demand, production, employment, and investment. As a result, rapid growth is associated with the advantage of broader participation in processes that foster growth (Todaro, 1994).

In essence, it is argued that inequality affects growth in two ways. On one hand, inequality has a positive impact on growth, following traditional literature that correlates increased savings with higher investment and growth. Conversely, inequality negatively affects growth due to opportunity disparities and investment limitations (García-Peñalosa, 2010).

3.2.1 Social-political effects

It is quite evident that inequality can be associated with growth through political issues. Income inequality, as argued, not only has a negative relation with welfare, but it also strongly correlates with social outcomes such as trust, social cohesion, social stability, crime, social mobility, health, educational quality, and social security (Wilkinson & Pickett, 2007). The social, political, and institutional structures that exist within economies are important factors in understanding the impact of income inequality on growth. High levels of inequality may erode political and social stability. It has been observed that societies characterized by high inequality or polarized income distribution often witness attempts by individuals to enhance their income through illegal economic activities, significantly impacting social and political stability. Consequently, disputes over laws and property arise, investments are discouraged, and growth is hindered. Similarly, income inequality can incite extreme social and political instabilities that can lead to violent uprisings, political violence, and organized crime – all of which detrimentally affect a country's economic performance and growth. These forms of extreme social and political instability are thought to negatively relate to economic growth in two distinct ways. First, they generate uncertainty within the political and legal environment, thereby affecting growth. Second, they disrupt markets and labor relations, directly impacting productivity (Perotti, 1996a). Moreover, social and political instabilities are characterized by wasted labor potential that could otherwise be harnessed efficiently for production, thereby boosting growth. For example, high levels of inequality can drive marginalized groups to resort to illegal activities in their pursuit of increased income, subsequently necessitating greater security measures. As a result, economic resources may be squandered due to illegal actions, negatively affecting growth.

For example, high levels of inequality may drive some economically disadvantaged groups to engage in illegal activities to increase their income, leading to a greater demand for security measures. As a result, the economy may suffer losses due to these illegal activities, which can have a negative impact on growth.

Consequently, given that income inequality fosters social and political instability, which, in turn, impedes investments, productivity, and growth, one can assume a negative connection between income inequality and growth. The argument has been made that heightened political instability and the resultant uncertainty due to greater inequality can hamper investments, while negative social outcomes typically give rise to insecurity, ultimately leading to reduced investment and growth (Alesina & Perotti, 1996). Additionally, as is conceivable, damage to social structures can render economies vulnerable to various economic shocks, complicating the task of maintaining growth stability. However, the impact of inequality on growth could potentially be more intricate and multifaceted, contingent upon the specific timeframe under consideration.

Assuming a link between income inequality and the political regime of a society is reasonable, as greater inequality might intensify the demand for income redistribution. It has been argued that inequality levels are influenced by the relationship between the type of government and economic outcomes (Galbraith, 2012). Empirical evidence supports the idea that more democratic nations, stronger law enforcement, and financial development are linked to less inequality, while segmented labor markets are correlated with greater inequality (Bourguignon & Morrisson, 1998; Barro, 2000).

Consequently, it is expected that high levels of inequality will spur demands for redistribution, resulting in policies that influence growth. If redistribution is achieved through taxation, greater inequality can lead to heightened demands for income redistribution through taxes. This, in turn, discourages investments and negatively affects growth (Alesina & Rodrik, 1994; Persson & Tabellini, 1994). Fiscal policies, such as government spending and taxation, are posited as channels through which income distribution influences economic growth. This perspective is primarily rooted in the work of Meltzer & Richard (1981), involving a model of an economy comprising units with varying productivity and income levels. In this model, voters gain from redistribution through taxes. A key objective of fiscal policy, whether through taxation or public spending on education and healthcare, is wealth redistribution to mitigate inequality. Consequently, higher levels of inequality drive greater demand for redistribution (Meltzer & Richard, 1981). The median voter then determines the extent of redistribution based on their income relative to others. Reducing inequality through taxation can influence economic growth, as redistributive transfers voted for by the median voter could be invested to stimulate growth, associating inequality with lower growth.

Hence, accepting that fiscal policy is determined by policies shaped through elections implies that, ultimately, the median voter sets fiscal policy. This translates to the proportion of the population with income below the median income desiring more taxation and government-led redistribution. This redistribution can manifest as allowances or public spending on education, healthcare, and other public welfare endeavors. Thus, we can identify a political mechanism wherein the median voter, often representing the middle class, influences fiscal policy by voting to reduce inequality. Alesina & Rodrik (1994) have empirically confirmed this effect. They demonstrated that the desired tax rate in an economy is contingent upon the ratio of income derived from labor to income derived from capital – specifically, the smaller this ratio, the greater the desired taxation (Alesina & Rodrik, 1994). Additionally, those with lower income relative to average income are more likely to benefit from taxation (Persson & Tabellini, 1994).

Furthermore, interventions aiming to decrease inequality through policies may distort production and adversely impact economic growth. Therefore, attempts to reduce inequality may yield counterproductive results (Okun, 1975). This introduces an economic mechanism, where government spending for redistribution disrupts growth trajectories, leading to a negative relationship between redistributive fiscal policy and growth.

As it becomes evident, income inequality and economic growth are intertwined through these two mechanisms, particularly in the context of endogenous fiscal policy. The political mechanism suggests that growth improves as distortion taxation decreases, while the economic mechanism entails that government expenses for redistribution and taxation decrease as income inequality decreases. Consequently, a negative relationship between growth and income inequality emerges (Perotti, 1996a). Therefore, inequality is negatively associated with growth due to the distortion resulting from demanded redistribution by lower income classes.

However, political incentives might be more intricate. Wealthier income groups, for instance, may wield political influence through lobbying (Benabou, 2000; Stiglitz, 2012). In such cases, the political mechanism in question becomes invalid, as fiscal policy is shaped by the upper income strata. This perpetuates inequality and may lead to political and economic corruption, impeding growth. Thus, inequality can negatively impact growth even without substantial income redistribution. Moreover, the political mechanism could foster a positive connection with growth by investing in human capital, such as government spending on education (Verdier, 1993; Gilles & Thierry, 1993).

However, this notion can be disputed if we question the concept of economic rationality. Often, better wages are not the sole incentive for increased effort. Conversely, a more democratic and egalitarian society may provide the right incentives for individuals to enhance their economic performance. Additionally, meritocracy, where individuals expect rewards based on effort, can be more motivating than higher wages. Conversely, phenomena like nepotism discourage effort among the working population. The absence of meritocracy, often accompanied by low mobility across income classes, provides little incentive for workers to be productive. Therefore, a trend toward reduced inequality due to meritocracy can foster economic growth (Acemoglu & Robinson, 2000).

Furthermore, the fundamental assumption underlying the concept of the median voter, or the average individual, is that they have the ability to influence the level of redistribution. However, this assumption of a smoothly functioning democracy may not hold true in many modern economies. It has also been suggested that a similar logic, akin to the mechanisms of the median voter approach, can be applied even in dictatorships. As Alesina and Rodrik (1994) argue, 'Even a dictator cannot completely ignore social demands for fear of being overthrown.' While in some totalitarian regimes, authorities can make decisions about fiscal policies and other matters without the need for voting, there are situations where the desires of large majorities cannot be disregarded. Thus, the trajectory of inequality observed by Kuznets might be more of a political effect than an economic one. This transformation occurred by extending voting rights to segments of society that previously had no political representation (Acemoglu & Robinson, 2000). According to Acemoglu and Robinson (2000), the fear of a revolution by the impoverished population compelled the elite to grant more rights to lower classes, leading to a reduction in income inequality. They argue that an increase in inequality is often linked with growing social discontent and tends to foster movements toward democracy. Consequently, democracy, in turn, triggers wealth and income redistribution, promotes public education, and ultimately works to diminish inequality. In this perspective, wealth distribution can be viewed as a dynamic struggle between the impoverished and the elite. On one hand, the impoverished strive to gain more rights and a larger share of the economic output, while on the other hand, the elite seeks to maintain or enhance their power.

This scenario often resembles a class struggle, as articulated by Marxists, where income distribution hinges on the bargaining power of capitalists and workers. Notably, it has been posited that inequality, in certain instances, arises from the weakening of labor unions and the erosion of the real value of minimum wages (Freeman, 1993). Moreover, it is contended that emerging technologies can facilitate economic mobility, creating a favorable environment for individuals from lower economic strata to accumulate wealth and transition to higher-income groups as these technologies become more accessible. In this context, the prevailing political regime emerges as a pivotal factor influencing both inequality and economic growth.

For example, under more authoritarian regimes, the elite might hinder the adoption of new technologies in production due to concerns that such innovations could empower the impoverished populace, potentially leading to challenges to their authority. This, in turn, can thwart the process of "Schumpeterian" creative destruction, which typically fosters economic growth. Consequently, one could posit that in less authoritarian regimes that actively encourage the adoption and widespread accessibility of new technologies, lower levels of inequality tend to have a positive impact on economic growth.

Furthermore, it is posited that inequality can influence economic growth through its impact on fertility. Lower fertility rates have often been associated with higher levels of inequality, as increased income among the less affluent can lead to larger, better-educated families (Perotti, 1996a; Rodríguez, 2000). When considering parents' choices regarding wealth allocation, two options typically arise: investing in the education of their existing children or having more offspring. This dynamic reveals a direct link between fertility and human capital investment.

Within the context of imperfect markets, fertility appears to interact with income distribution, particularly concerning education. Education is often accompanied by fixed costs. To elaborate, within a given income distribution, higher fertility rates imply that fewer financial resources are allocated to each family member, thereby reducing disposable income within households. Pursuing the same line of reasoning, within a fixed fertility rate, greater income inequality implies that less income is available to impoverished households for investing in education (Galor & Zang, 1997). In this vein, initial inequality can hinder future growth rates, as inequality exerts a notable influence on overall fertility rates.

The fertility perspective unveils two effects: the income effect and the substitution effect. The income effect refers to parents choosing to have more children in response to increased income. Conversely, the substitution effect arises when the opportunity cost of raising a child escalates, prompting a reduction in fertility rates as parents opt to invest in the education of their existing offspring. Typically, it is posited that the income effect prevails in lower-income classes, while the substitution effect dominates among the wealthier classes. Intriguingly, despite the evident links between fertility, income distribution, and economic growth, the fertility approach has been relatively overlooked in the literature pertaining to income distribution and economic growth. Yet, there are indications that suggest that fertility rates are related to investments in human capital (Perotti, 1996a).

Dahan & Tsiddon (1998) introduce a compelling hypothesis: rising income inequality tends to prompt poorer households to have more children rather than invest in human capital (Dahan & Tsiddon, 1998). This primarily arises from the widening income disparities between the unskilled, numerous offspring of impoverished families and the skilled progeny of the affluent. Consequently, the increased supply of unskilled labor, coupled with a decreased supply of skilled labor, fuels greater income inequality. However, it is expected that a tipping point occurs where impoverished families decide to invest in education or education becomes more financially attainable. This leads to an expansion in the supply of skilled labor and a subsequent decline in inequality, resulting in an inverted U-shaped trajectory of inequality over time, reminiscent of Kuznets's hypothesis. It should be noted, however, that the decision to have fewer children might also be influenced by cultural shifts, not solely driven by economic factors.

To conclude, the endogenous fertility approach implies that lower inequality levels correspond with lower fertility rates due to the substitution effect. This, in turn, encourages investment in education and human capital, ultimately promoting growth. Conversely, high initial inequality levels lead to higher fertility rates and increased supply of unskilled labor, driving down wages for this group and raising costs for skilled labor. This imbalance translates to lower growth. Additionally, the influx of cheap unskilled labor might increase not solely due to fertility, but also due to immigration, yielding similar results for inequality and growth. Hence, political choices regarding taxation or the fixed cost of education might influence individual behavior, as manifested through voting or the decision to invest in educating the first child instead of having a second child.

3.2.2 Aggregate demand

As previously mentioned, income can be expressed in two ways. Firstly, income is the reward for every factor or individual's contribution to the production process. Furthermore, individuals can allocate their income in various ways. An individual can utilize their disposable income to consume goods and services, invest, or save a portion of their income for future spending. Thus, the second dimension is that income, by determining available factors and demand, activates the production process.

For instance, since wages have a dual role, acting as both production costs and a source of demand, their total impact on growth is ambiguous. The historical, cultural, economic, and institutional characteristics of a nation determine which of these variables dominates (Zeman, 2019).

Consequently, as economic growth is shaped by decisions regarding the allocation of factor shares (labor and capital), inequality in functional distribution will be closely related to growth levels due to the production process. This can occur due to various saving propensities among income classes, influencing aggregate demand and investment. Economic theories influenced by Keynesian approaches, such as Kaldor (1955), Robinson, and Pasinetti (1962), as well as Kaleckian and Marxian economics, suggest differing saving decisions between capitalists and workers. The key ideas of these theoretical approaches revolve around the notion that the propensity to save from profit incomes is higher than that from wage incomes. Thus, changes in functional distribution, such as a decrease in wage shares in national income, can reduce aggregate demand (Cowell, 2007; García-Peñalosa, 2010; Pettis, 2013; Lavoie & Stockhammer, 2013; Stockhammer, 2015). Conversely, the effect on investment may be positive, driven by increased profitability (Kumhof, et al., 2012; Lavoie & Stockhammer, 2013). For instance, Stockhammer et al. (2008) indicate a saving differential of around 0.4 for the Euro area (Stockhammer, 2012a).

Therefore, as early approaches by Kuznets (1955) and Kaldor (1956, 1961) argued, inequality is essential for growth due to higher saving and investment rates. Similar conclusions are drawn from Marxian assumptions and Goodwin (1967), suggesting that reduced inequality translates to lower investments funded exclusively by profits (Stockhammer, 2014). Thus, economies with higher inequality might experience faster growth compared to more egalitarian economies (García-Peñalosa, 2010). However, if the Kuznets hypothesis holds, later stages should lead to higher personal incomes and reduced inequality through trickle-down effects.

Moreover, redistributing in favor of lower-income groups, shifting from investment to consumption, might not necessarily harm growth. The potential positive effect of shifting from profits to wages, proposed by the Kaleckian and Keynesian schools of thought, introduces a new perspective (Carvalho & Rezai, 2015). Their assumptions suggest that reducing wage shares or household incomes—major sources of consumption—can decrease both consumption and aggregate demand due to higher marginal propensity to consume among households compared to firms. According to

Kaleckian assumptions, decreasing inequality by increasing wage shares could boost aggregate demand, thanks to higher consumption from wages.

The concept of effective demand driving output levels is central in post-Keynesian/post-Kaleckian models. The distribution of income, often presented as a balance between wage and profit earners, significantly influences demand and output, as outlined in models by Dutt (1984) and Bhaduri & Marglin (1990). More specifically, the framework proposed by Bhaduri & Marglin (1990) accommodates both Kaleckian and Marxian assumptions and is widely used in post-Keynesian economics (Stockhammer & Onaran, 2004; Naastepad & Storm, 2007; Hein & Vogel, 2008; Onaran & Galanis, 2012). According to their model, if the consumption resulting from increased wage shares outweighs the negative impact of reduced investment and net exports due to falling profit shares, the demand regime grows faster in wage-led economies. Conversely, if the impact of investment exceeds that of consumption, profit-led economies experience faster growth with higher profit shares (Stockhammer & Kohler, 2019).

In a wage-led regime, capital accumulation and subsequent growth exhibit a positive relationship with an increase in wage share. Conversely, in profit-led regimes, growth tends to rise in conjunction with an increase in profit share. Consequently, assuming that profits constitute the earnings of the upper-income classes, an elevated wage share in a profit-led economy, while advantageous for addressing inequality, ultimately proves detrimental to profits. This scenario unfolds as the economy experiences reduced demand and diminished growth. In contrast, within a profit-led economy, a shift in favor of profit share redistribution amplifies both inequality and growth.

However, in a wage-led economy, a redistribution favoring wages enhances overall consumption, thereby boosting aggregate demand and consequently fostering higher growth. Simultaneously, this redistribution leads to a reduction in inequality. Therefore, as it becomes evident that equality does not impede growth, the positive impact of higher wages on demand underscores the notion that "wage-led growth can be more broadly defined as equality-led growth" (Onaran, 2019). Consequently, since inequality may interact with growth differently depending on the economy's growth regime, policies that are either pro-capital or pro-labor can either bolster or impede growth, with consequences for inequality. Therefore, echoing Dutt (2017), "the primary question does not revolve around whether an economy leans toward wage-led or profit-led growth in a given period; instead, it centers on whether inequality can be curtailed without adversely affecting growth, and indeed, can be increased through a balanced blend of policy-induced adjustments" (Dutt, 2017).

Numerous empirical studies explore the relationship between factor inequality and growth. Rodríguez (2000), for instance, found evidence that higher profit shares associate with lower growth rates due to decreased investment in human capital (Rodríguez, 2000). Moreover, the post-1980 economy in the USA is often viewed as more profit-led, attributed to heightened inequality (Carvalho & Rezai, 2015). Onaran (2019) suggests that among G20 countries, only Canada and Australia lean toward profit-led economies, while USA, UK, Japan, Germany, France, eurozone, Italy, Korea, and Turkey tend to be wage-led. Emerging economies like China, India, Argentina, Mexico, and South Africa are considered profit-led. According to Onaran (2019), an increase of profit share by one percentage point is associated with a 0.36 percentage point decline in global GDP in most developed and developing economies. (Onaran, 2019)

Thus, the search for the relationship between inequality and growth posits that functional inequality significantly affects growth through aggregate demand and consumption in a growth regime-dependent manner. Policies favoring capital in profit-led regimes may increase growth and inequality, while wage-led economies benefit from wage-friendly policies that enhance both growth and equity. Nevertheless, the fact that high-income individuals may also earn wages introduces further complexity into this connection.

Moreover, in theoretical models where growth cycles are assumed, income distribution is proportionate to these cycles. Therefore, there isn't an inherent mechanism guaranteeing reduced inequality with economic growth. Structural barriers to inequality reduction might persist with or without growth (Harris, 1993). Furthermore, it's argued that "the dynamics of wealth distribution reveal powerful mechanisms pushing alternately toward convergence and divergence. There is no natural, spontaneous process to prevent destabilizing, inegalitarian forces from prevailing permanently" (Piketty, 2014). Assuming that there isn't an inherent trend toward greater or lesser inequality, periods of decreasing inequality observed in various timeframes could be transient. Consequently, relying on mechanisms that promise decreasing inequality with future growth might not be entirely justified.

The effect of increased wage shares on inequality also hinges on how wages are distributed among workers. Wage inequality and saving out of wages must also be considered when exploring the relationship between inequality and growth. The impact of wage savings on demand has garnered attention in recent decades from various authors (Kiefer & Rada, 2004; Barbosa-Filho & Taylor, 2006; Franke, et al., 2006; Ederer & Stockhammer, 2007; Hein & Vogel, 2008). For instance, higher-income workers may choose to save a proportion of their income instead of consuming it all, for investment or future consumption. The opportunity for high-income groups to receive wage income and save a portion introduces additional complexity. If skilled and unskilled labor exhibit different consumption propensities, the effect of wage savings becomes uncertain. As evidenced by Carvalho & Rezai (2015), evidence from the US economy suggests that higher-income quintiles tend to save more than lower quintiles. This implies that aggregate demand could increase with redistribution in favor of lower incomes (Carvalho & Rezai, 2015). Consequently, although wage shares increase, consumption might not increase as expected due to high-income wage earners saving more. This could lead to weaker aggregate demand, potentially countering the anticipated decrease in inequality. Hence, increased personal income inequality might either increase demand growth due to higher savings among the wealthy or reduce demand growth if consumption decrease outweighs the impact on investments (Frank, 2007; Frank, et al., 2014). Various authors have proposed theoretical frameworks accounting for differing saving propensities among individuals with the same income source (Carvalho & Rezai, 2015; Hein & Prante, 2018). For example, Palley (2015) introduced a model featuring three economic classes, where distinct saving propensities among classes impact demand (Palley, 2015). Other frameworks consider wage inequality's effect on the demand regime based on workers' saving propensities (Carvalho & Rezai, 2015; Hein & Prante, 2018). Evidence from Carvalho & Rezai (2015) suggests that wage earners have varying saving propensities dependent on their disposable income levels. Thus, wage inequality affects aggregate demand and output through the paradox of thrift.

Additionally, under wage inequality, the impact of functional income distribution on output becomes ambiguous. Wage equality could favor a wage-led economy, while wage inequality might signal a preference for a particular type of labor by capital, especially when capital is substituted for basic or skilled labor.

4 Income inequality and growth due to financial integration

In our attempt to comprehend the existence of inequality in modern economies, we must understand how incomes are generated in an era of financial integration. Factors such as globalization, technological change, financialization, and distributional policies in favor of capital have contributed to the polarization of income (Stockhammer, 2012c).

According to Atkinson (2015), credit should be given to economists who have focused on the rising inequality and identified several contributing factors, including globalization, technological change (information and communications technology), the growth of financial services, changing norms, the reduced role of trade unions, and the scaling back of redistributive tax-and-transfer policies.

The literature presents various drivers of income distribution due to globalization. Over the past decades of globalization, economic performance has been characterized by open markets and financialization, both of which can impact income distribution, as discussed in the following chapters. Additionally, technological changes have been considered the primary determinant of income distribution during globalization (Stockhammer, 2017). Moreover, shifts in bargaining power between labor and capital resulting from globalization may influence income distribution. Inequality may arise from the power shift between capital and labor that has emerged due to globalization and financialization (Stockhammer, et al., 2015).

Income distribution can result from changes in both factor and personal distribution due to globalization. There has been extensive debate about whether globalization and economic integration could reduce poverty and inequality through rapid growth (Dollar & Kraay, 2002). However, the benefits of globalization might not have been equitably distributed, potentially leading to higher levels of inequality within and between countries. Openness and international trade tend to favor capital and high-skilled labor over basic labor, potentially correlating globalization with increased inequality (Firebaugh, 2003; Wade, 2004).

The impact of financial integration on income distribution has been extensively discussed in empirical literature. Several authors have identified technological change, globalization, and financialization as primary determinants of changes in wage shares in recent decades (Rodrik, 1998; Harrison, 2002; International Labour Organization (ILO), 2008; International Monetary Fund, 2007b; Stockhammer, 2013). Evidence from OECD countries suggests that financial globalization, trade globalization, and the decline in union density were the main contributors to falling wage shares (Stockhammer, 2009). Furthermore, globalization, financialization, and increasing inequality have been identified by various authors as key features of neoliberalism (Duménil & Lévy, 2004; Harvey, 2005; Glyn, 2007; Brenner, et al., 2010; Dardot & Laval, 2014). Neoliberalism appears to be a significant factor in the polarization of income distribution, as the rise in capital power is evident in wage trends (Stockhammer, 2012a). In recent decades, inequality has increased in most developed countries, accompanied by a decrease in wage shares—a contrast to the post-war period when inequality decreased alongside rising wage income shares (Atkinson, 2015). Additionally, the effects of globalization on wages have been used to explain inequality between skilled and unskilled workers (Geishecker & Görg, 2008). Furthermore, inequality may be linked to growth through the effects of research and development, education, and access to credit (Madsen, et al., 2017).

Furthermore, observing inequality has become more intricate in modern economies, where income can stem from various sources beyond wages. Workers can also receive income from profits. Similarly, besides profits, some capitalists may earn income from managerial or highly skilled labor.

Moreover, the outcomes of applied economic policies can be more ambiguous. The demand and supply of factor shares, along with their total returns, are influenced by the pressures of financial integration, where open markets and financialization shape the economic landscape. For instance, in a world where the vast majority of countries are wage-led, a higher share of income going to profits could lead to stagnation tendencies. While a higher profit share might promote growth in profit-led economies, a simultaneous global decrease in wage shares could lead to global demand deficiencies and lower growth. Thus, as Atkinson (2015) points out, "Globalization is the result of decisions taken by international organizations, by national governments, by corporations and by individuals as workers and consumers. The direction of technological change is the product of decisions by firms, researchers, and governments. The financial sector may have grown to meet the demands of an ageing population in need of financial instruments that provide for retirement, but the form it has taken regulation of the industry have been subject to political and economic choices." (Atkinson, 2015).

4.1 Technological change

Given the close relationship between the technological process and economic growth, particularly through enhanced productivity, the onset of the "fourth industrial revolution" is expected to bring about various economic shocks and changes in factor shares. Consequently, inequality and income distribution are strongly intertwined with technological advancements.

Several theoretical approaches, including the works of Arrow (1962) and Shell (1973), stress the importance of the technological process or research and development in uncovering the link between income inequality and growth (Arrow, 1962; Shell, 1973). Technological changes have long been utilized to explain variations in personal income, given that technological advancements have always been considered a factor influencing income distribution (Dolton & Pelkonen, 2008).

To begin with, technology holds a pivotal role in production, thus technological changes can exert a significant impact on economic processes, especially production and labor dynamics. Differences in productivity and technological capabilities have been posited as explanatory factors for variations in economic performance across countries (Storm & Naastepad, 2015).

Furthermore, the primary causes of the declining trend in wages can be attributed to technological changes and the balance of power between labor and capital (Onaran, 2019). In the context of technological changes, the interplay of bargaining power becomes pivotal in reshaping factor distribution. As technological advancements impact the cost of production by altering labor and capital productivity, changes in nominal wages and factor distribution are to be expected. Thus, increased productivity, whereby two cars can be manufactured with the same effort as one, would yield varying impacts on inequality based on bargaining power. If the bargaining power is strong, such as in the case of highly influential car industry workers, wage income would experience a more significant increase than the changes in vehicle prices and profit income, leading to a reduction in inequality. Conversely, if technological change results in decreased wage shares while capital benefits from the advancement, inequality levels could rise. Consequently, technological changes can impact inequality by diminishing bargaining power and reducing costs due to increased productivity. However, it has been argued that technological change tends to augment capital and acts as a primary driver of wage reduction (International Monetary Fund , 2007a; European Commission, 2007; Stockhammer, 2012c).

Moreover, the broader influence of technological progress can be contextualized within the framework of Schumpeterian growth dynamics and the concept of "creative destruction." Capitalism thrives on innovation to stimulate growth, a process that inevitably leads to creative destruction where the obsolescence of existing elements makes way for new ones (Schumpeter, 1942). The dominance of novel technological products and production methods emerges as a result of technological innovation. In parallel, outdated methods and products become obsolete due to unfavorable production costs and waning demand.

Faster technological change driven by innovation can lead to shifts in inequality. According to the Schumpeterian perspective, technological innovations are endogenously influenced by market conditions and economic incentives. Therefore, as higher income levels provide a more compelling incentive for innovation, inequality tends to change when individuals opt to take risks and engage in innovation, subsequently increasing their income relative to others. This implies that a certain level of inequality can provide the necessary incentives for investment and growth. In other words, the presence and acceptance of income inequality, as a consequence of higher returns, can serve as a catalyst for motivating innovation and entrepreneurship (Lazear & Rosen, 1981).

Furthermore, it has been argued that innovation can disproportionately benefit specific groups, typically those who are already privileged, due to the reinforcement of property rights (Cozzens, 2008). Therefore, when there are heightened incentives for investment and entrepreneurship, this can lead to a larger share of profits and faster economic growth, but it may also result in increased inequality. Consequently, inequality can be regarded as crucial for fostering innovation and driving technological advancements.

According to the theoretical arguments of Korzeniewicz & Patrick (2005), who emphasized the role of technological progress in the context of Schumpeterian growth processes and the idea of "creative destruction," technological innovation often accompanies higher levels of inequality. They posit that such a process, characterized by continuous technological changes and shifts in labor demand, tends to have a detrimental impact on the simultaneous occurrence of high growth and low inequality. Consequently, this process is more likely to result in a persistent trend of increasing inequality. Furthermore, Korzeniewicz & Patrick (2005) argue that the effectiveness of both institutions and markets in redistributing wealth is contentious, often leading to a persistent trend of inequality that is highly dependent on the specific region and time period under consideration. As a result, observations regarding the relationship between income inequality and growth cannot be generalized (Korzeniewicz & Patrick, 2005).

Taking a Schumpeterian perspective, where capitalism evolves dynamically through continuous creative destruction, we may need to redefine our understanding of the relationship between inequality and economic growth. For instance, technological changes, particularly those related to information and communication technology, have influenced shifts in corporate organization (Saint-Paul, 2001; Garicano & Rossi-Hansberg, 2006).

Furthermore, personal income inequality is closely linked to technological changes, primarily through variations in labor skills. New technologies often create new types of jobs that require different skills from those currently available. Consequently, technological changes frequently result in income disparities between the skills required for current technologies and those needed for emerging technologies. Additionally, the type of investment that arises from technological changes determines the kind of labor required and, subsequently, the relative demand for skilled and unskilled labor.

In cases where investment leans towards skilled labor, the demand for skilled workers can positively affect inequality. Conversely, if investment drives demand for basic labor, inequality is expected to decrease. However, technological development tends to increase the demand for skilled labor, potentially replacing unskilled labor through technological innovations, resulting in a bias toward skilled labor. According to several authors, new technologies are often more complementary to skilled labor, leading to a rise in the demand for skilled workers compared to less skilled individuals (Autor, et al., 1998; Goldin & Katz, 2008). Some argue that a faster rate of innovation necessitates a more educated labor force to engage in research and development (Grossman & Helpman, 1991; Aghion & Howitt, 1992). Moreover, it is proposed that technological changes require a more educated and skilled labor force to enhance productivity and achieve higher incomes (Zeman, 2019). In essence, education plays a crucial role in supplying skilled labor and promoting growth through technological changes. It is widely suggested that education can impact growth through factor accumulation, as more efficient labor results in higher output levels (Lucas, 1988). Consequently, not only is more educated labor more productive, but technological changes also necessitate a more educated labor force for their adoption and widespread implementation (García-Peñalosa, 2010).

Additionally, the increased demand for highly educated workers leads to higher wages for skilled labor, thereby affecting wage inequality due to changes in the income gap between skilled and unskilled labor. Skilled-biased technological changes and a shift in the economy toward innovation and high-tech products are believed to result in a greater demand for skilled labor, leading to an increased wage premium (Berman, et al., 1994; Autor, et al., 1998; Buera, et al., 2015).

In general, it has been suggested that when technology is skewed towards skilled labor, new technology investments result in higher demand and wages for skilled labor compared to basic labor, as well as higher capital shares in the national income, while the wage share declines overall (Stockhammer, 2009; Dünhaupt, 2016). Increased demand for skilled labor implies a rise in the skill premium, affecting wage inequality, which suggests compatibility between skilled and unskilled labor. Simultaneously, increased demand for skilled labor, coupled with higher capital shares, implies that technological change is more capital-intensive, with skilled labor being complementary to capital. This suggests a positive trend in factor inequality. Therefore, if skilled labor complements capital, a pro-capital policy is likely to result in increased overall inequality.

Hence, the inequality witnessed over the past few decades may be an effect of skilled-biased technological change, primarily associated with high-information and communication technologies (ICT). Given that computers and other ICT are more complementary to skilled labor and substitutes for basic labor, it has been suggested that the increased use of ICT has affected the demand for both skilled and basic labor. Consequently, ICT capital increased simultaneously with an increase in demand and wages for highly skilled workers relative to low-skilled workers. Thus, technological changes and economic progress since the 1980s have been characterized by skill bias, accompanied by capital augmentations and lower wage shares. (Stockhammer, 2017)

Empirical research indicates that technological change often has a significant impact on income distribution. For instance, the inequality observed between highly skilled and low-skilled labor during the 1970s was primarily attributed to workplace computerization (Berman, et al., 1994; Autor, et al., 1998). Furthermore, evidence shows that between 1990 and 2007, approximately 80% of the decrease in wage shares within industries can be attributed to specific sectors, particularly those with skilled labor, especially in information and communication technologies (OECD, 2012; Herr, 2018). Moreover, there is evidence that skilled-biased technological change has played a major role in income distribution in the USA, with high-paying jobs being less susceptible to outsourcing (Dew-Becker & Gordon, 2008). While Stockhammer (2012bb) does find some evidence linking changes in income distribution to technological changes, he argues that this is not the primary determinant. Thus, technological change can impact both labor and overall inequality through wage premiums and shifts in the relative demand for skilled labor (Stockhammer, 2012c).

Additionally, it has been argued that a rapid diffusion of innovation can reduce income inequality as industrial transformation progresses (Antonelli & Gehringer, 2013). It is expected that in the future, as creative destruction leads to the dominance of innovation in the market, more skilled labor will be supplied, and more firms will have accepted new production standards. As a result, labor inequality is projected to decline, following patterns proposed by Kuznets' hypothesis.

Furthermore, the reasons behind rising inequality can be attributed to shifts in the balance of power influenced by globalization and technological change (Atkinson, 2015). Generally, technological changes result from innovation and investments in research and development (R&D). In addition, globalization and market openness have a further positive impact through technological diffusion, primarily via foreign direct investments (FDIs). Consequently, globalization is seen as a force that reinforces trends toward technological change. Additionally, globalization may be the main driver of technological changes in less developed countries that may not have invested significantly in R&D (Asteriou, et al., 2014). International trade competition compels economies to keep pace with technological changes, facilitating faster technology diffusion (Coe & Helpman, 1995; Kali, et al., 2007; Keller, 2004; Soukiazis & Antunes, 2011). A higher level of openness may result in more innovation and technological diffusion, leading to higher economic growth, primarily due to the expansion of new markets and increased foreign direct investment (Grossman & Helpman, 1991). Therefore, more developed countries with highly skilled labor and advanced technology are likely to produce more sophisticated products, transmit innovation and knowledge, and achieve higher growth (Spilimbergo, 2000). Outsourcing, a fundamental feature of globalization in which corporations relocate the production of intermediate goods to reduce costs, may further amplify this impact. Furthermore, faster integration of production processes will be achieved as a result of this technological progress, while increased competitiveness arising from openness may lead to the exploitation of economies of scale (Andraz & Rodrigues, 2010).

4.2 Trade openness

While examining the relationship between inequality and growth in financially integrated economies, it is imperative to analyze how diverse economies, with varying technological levels and labor skills, interact through trade openness and globalization. Initially, globalization and trade openness have brought about significant transformations in the economic performance of countries worldwide, primarily owing to technological diffusion, international competitiveness, and labor market deregulation. As a result of international competitiveness and the deregulation of labor markets, the prices of goods tend to decrease in open economies, exerting downward pressure on wages. This implies a reduction in wage share and an increase in inequality.

As argued, higher degrees of openness arising from globalization augment labor supply, particularly in developed nations, resulting in slower wage growth (Zeman, 2019).

Furthermore, open markets have bolstered exports of intermediate goods from developing to developed countries and imports of advanced economy goods from emerging economies. Consequently, wage shares in both developed and developing countries have significantly declined, indicating a shift in bargaining power in favor of capital (Onaran, 2019). Openness, as it has been posited, is intertwined with expanded market dimensions and increased product sales due to heightened demand pressures demand (Andraz & Rodrigues, 2010; Soukiazis & Antunes, 2011). Additionally, when markets are open, there is an upsurge in demand for various products within the economy, resulting in concurrent increases in producer income and national income. Furthermore, foreign investments in specific regions or sectors within a country can influence overall inequality while promoting growth (Anderson, 2005).

Moreover, trade openness's formidable impact on inequality, manifested through the decline in wage shares driven by weakened labor bargaining power, becomes evident (Harrison, 2002; Stockhammer, 2012c; Dünhaupt, 2013). Trade openness diminishes trade union influence, fostering labor market deregulation, which exacerbates unemployment and suppresses wages. Furthermore, trade openness's impact on income distribution is often more pronounced than changes in relative prices due to its effects on labor and capital bargaining positions (Rodrik, 1997; Onaran, 2011).

Furthermore, it is widely acknowledged that openness can stimulate specialization and more efficient resource allocation. Consequently, increased capital mobility resulting from openness expands investment opportunities for capitalists seeking higher profits in new markets. Moreover, workers may migrate in pursuit of improved working conditions and higher wages. However, trade openness typically benefits the more mobile factor, which is often capital (Rodrik, 1997). Evidence suggests that capital restrictions and capital mobility influence income (Rodrik, 1998; Harrison, 2002; Jayadev, 2007).

Moreover, according to the Heckscher-Ohlin theory, international trade alters factor prices by elevating compensation for the abundant factor in each country[1]. Since competing economies possess distinct factor endowments, this has varying implications for different economies. Classical trade theories, as embodied in both Stolper-

[1] (Atkinson, 2015)

Samuelson and Heckscher-Ohlin theorems, posit that the abundant factor benefits from international trade.

In general, economies endowed with excess capital and skilled labor tend to specialize in capital and skill-intensive products, while economies with abundant unskilled labor produce intermediate inputs through offshoring and immigration. Advanced economies are often endowed with advanced technology due to innovation, abundant capital, and skilled labor. Consequently, developed economies, characterized by abundant skilled labor and physical capital, manufacture advanced products or services that heavily rely on skilled labor. Conversely, developing countries, which typically possess ample unskilled labor but a scarcity of capital, produce simpler goods or services reliant on unskilled labor. These two types of economies can interact through open markets and globalization features such as outsourcing and immigration. Consequently, developed economies export capital and skill-intensive products and services, while emerging economies import labor-intensive goods.

Therefore, the Heckscher-Ohlin theory implies that trade openness significantly impacts the supply and demand for skilled and unskilled labor and their corresponding goods. The abundant factor in each country plays a pivotal role in shaping pricing and income distribution. Consequently, shifts in the relative demand for skilled and unskilled labor can cause changes in functional and personal inequality.

As a result, open markets are likely to affect both factor and labor inequality. First, labor employment may decrease in advanced economies as labor-intensive industries relocate to economies with abundant labor, leading to increased factor inequality. Conversely, inequality may decrease in developing countries with lower labor costs due to heightened demand for unskilled labor. Second, economies with a higher relative demand for skilled labor are expected to experience a higher wage premium, leading to increased inequality among workers. Conversely, economies experiencing a decreasing wage premium due to heightened demand for unskilled labor are likely to experience lower levels of inequality. In accordance with the Heckscher-Ohlin theory, trade openness can increase labor inequality in advanced countries while decreasing it in developing countries.

Globalization should ideally benefit both capital and skilled labor in developed nations and labor in underdeveloped countries. However, labor losses are apparent in both developing and developed nations. While globalization was initially expected to benefit less-skilled workers, presumed to be the locally abundant factor in developing countries, evidence suggests that they are not necessarily better off, especially when compared to higher-skilled or educated worker (Goldberg & Pavcnik, 2007). On one hand, economies reliant on unskilled labor struggle with international competitiveness, resulting in job losses or outsourcing to lower-wage economies. On the other hand, the demand for highly skilled workers has increased as production shifts toward high-skilled industries (Atkinson, 2015). Therefore, outsourcing or foreign direct investment (FDI) in developing countries may not always benefit unskilled labor and lower income. Additionally, the benefits of openness related to technological changes may vary based on a country's level of development. Hence, analyzing openness necessitates considering the technological components of exports and imports. Moreover, since high-skill-intensive inward FDI from advanced economies to developing nations may involve low-skill-intensive outward FDI from the advanced economy, the demand for skilled labor in poorer countries should increase, while the demand for unskilled labor should decrease. Depending on the degree of education in developing nations, outsourcing may potentially benefit skilled workers (Feenstra & Hanson, 1997). Consequently, inequality may grow in both emerging and developed economies due to skill-biased FDI (Acharyya, 2011). Additionally, evidence indicates that exports of high-technology products positively influence growth, while exports of low-technology-intensity products negatively impact growth. This outcome is attributed to productivity disparities resulting from trade openness, and the evidence varies between developed and developing economies (Cuaresma & Wörz, 2005). Moreover, while the transfer of resources from low-return, stagnant industries to dynamic entrepreneurial sectors can yield efficiency gains, the co-evolution of financial arrangements and technological advancements can lead to instabilities that worsen economic performance (Zalewski & Whalen, 2010).

Moreover, the fact that firms now possess the ability to move capital investments easily can exert pressure on labor during negotiations. Key features of globalization, such as outsourcing and foreign direct investment (FDI), augment the bargaining power of capital in relation to labor. Outsourcing, in particular, exacerbates this erosion of bargaining power through similar mechanisms (Hein, 2013; Hein & Detzer, 2015; Dünhaupt, 2016; Stockhammer, 2017). For instance, it amplifies the 'threat' of relocation, simultaneously weakening labor's bargaining position and pressuring for reductions in capital taxes.

As a result, while trade openness can bring benefits to economies, primarily through improved capital allocation and increased technological diffusion, especially in poorer countries, leading to higher growth rates and reduced poverty, the advantages of globalization may not be distributed evenly. This can result in higher levels of inequality both within and between countries. Conversely, the benefits of trade openness and the changes brought about by globalization over the past few decades can be associated with a decrease in both poverty and inequality due to an increase in average income. However, as Stockhammer (2009) contends, regardless of theoretical considerations, empirical data clearly indicates a discernible impact of globalization on functional distribution, signifying that globalization reduces wage shares, a viewpoint also supported by the IMF (2007a) (Stockhammer, 2009).

Evidence from the literature is diverse, with some authors reporting no impact of openness on inequality (Li, et al., 1998; Higgins & Williamson, 1999; Dollar & Kraay, 2002), while others observe a positive effect, particularly in poorer countries (Barro, 2000; Ravallion, 2001; Lundberg & Squire, 2003; Milanovic, 2005). In contrast, several authors have identified negative effects of globalization and openness on inequality. Harrison (2002), analyzing data from 100 countries during the period of 1960-1997, found evidence that capital-labor ratios strongly influence distribution in a positive direction, while globalization is negatively correlated (Harrison, 2002). Jayadev (2007), using data from 80 countries during the period of 1970-2001, discovered that trade openness and financialization have eroded bargaining power (Jayadev, 2007). Stockhammer (2012bb, 2015a) uncovered data indicating that workers have not benefited in developing economies over recent decades, revealing that wage shares have declined in both advanced and emerging nations, contradicting the Stolper-Samuelson theorem (Stockhammer, 2012c; Stockhammer, 2017).

4.3 Financial development- Financialization

During the last decades, we have witnessed an increased role of financial activity leading to transformations of economies and societies. According to Hein (2019), "Since the early 1980s, financialization has become an increasingly prominent feature in developed capitalist countries, with different timing, speed, and intensities in different countries" (Hein & Dünhaupt, 2019). Financial openness has resulted in fundamental changes in the economic performance of the majority of economies globally, but it mostly tends to transform advanced economies (Palley, 2007; Stockhammer, 2012a).

Among the several definitions, it has been argued that financialization is "the increasing importance of financial markets, financial motives, financial institutions, and financial elites in the operations of the economy and its governing institutions, both at the national and international levels" (Epstein, 2001). Additionally, Stockhammer (2009) suggests that "Financialization refers to the increased influence of financial institutions and financial motives on non-financial activities" (Stockhammer, 2009).

In general, financial development is commonly acknowledged to have a significant impact on growth and income distribution, with certain income groups benefiting more than others. Since it has been suggested that trade policies and financial regulation have a greater impact on income distribution than labor unions, financialization may be the missing ingredient when it comes to changes in distribution (Stockhammer, 2017).

As a consequence, on the one hand, financialization has been regarded as beneficial to economic growth and income inequality. It has been claimed that financial growth promotes poverty and inequality reduction by disproportionately increasing earnings in the lowest quantiles of the distribution (Beck, et al., 2007). More specifically, according to Beck et al. (2007), "40% of the long-run impact of financial development on the income growth of the poorest quintile is the result of reductions in income inequality, while 60% is due to the impact of financial development on aggregate economic growth. Moreover, the proportion of people that live with less than $1 a day decreases as the financial sector gets developed." According to them, there are two channels through which financial development can affect the poor classes. Firstly, due to increases in aggregate growth, which allows some people in the lowest income classes to overcome the poverty limit, and secondly, by changing the distribution of poverty. Thus, through their findings, Beck et al. (2007) claimed that greater financial development, in fact, helps the poor, as their incomes grow faster than the average income growth, leading to a reduction of inequality (Beck, et al., 2007). Therefore, financialization improves access to financial resources which, as a consequence, may increase the income of the poorest faster than average GDP growth, leading to a reduction of inequality (Beck, et al., 2007).

On the contrary, financial development may disproportionately benefit the wealthy, who already have higher access to financial systems, leading to increased inequality and the perpetuation of disparities in economic opportunities (Greenwood & Jovanovic, 1990). As it has been argued, financialization affects income distribution mainly in favor of profits and high wages, leading to falling wage shares and increasing wage inequality (Hein & Dünhaupt, 2019). For instance, there is evidence that financialization strongly affects functional distribution (Dünhaupt, 2016; Stockhammer, 2017; Kohler, et al., 2018). In addition, according to the International Labour Organization (ILO), although without econometric evidence, financial globalization has contributed to the decline of wage shares (International Labour Organization (ILO), 2008). Stockhammer (2015a) provided similar evidence, arguing that financialization had a large contribution to the decrease in wage share (Stockhammer, 2017).

Additionally, financialization has been related to the increased indebtedness of households, financial deregulation, increased volatility of asset prices, short-termism of financial institutions, and weaker bargaining power of labor (Zeman, 2019). Furthermore, it has been suggested that financialization has affected both households and firms, mainly due to rising debt and shareholder value orientation, respectively (Stockhammer, et al., 2015). These aspects of financialization may have a significant impact on economic growth and income distribution. As it has been argued, inequality may be affected by reduced worker bargaining power, rising shareholder profits, and changes in the sectoral composition of the economy at the expense of the non-financial sector and government (Stockhammer, 2012c; Hein, 2019; Detzer, 2018). Moreover, financialization has led to the deregulation and liberalization of labor and financial markets, the downsizing of the public sector, the privatization of public enterprises, the break-up of labor rights, has been connected with the rising power of finance, and has contributed to a decrease in wage shares (Dünhaupt, 2013). Financial deregulation gives more investing options while empowering shareholders against labor. Additionally, financialization has contributed to distribution changes due to an increase in the income of top management, hostile takeovers and mergers, and the liberalization of international trade and international finance (Hein, 2013; Tridico & Pariboni, 2017). For instance, the deregulation of financial and labor markets, especially in Anglo-Saxon countries, caused an explosion in top management salaries, share options, and other profit-related elements. The fact that the earnings of the CEOs of the Standard and Poor's Index in 2015 were 335 times higher than the average earnings of a non-supervisory worker, and 819 times higher than the minimum wage of a US federal worker is ostensive (Herr, 2018). Hence, although financial development should help reduce inequality, a poorly managed financial system can potentially be a source of higher inequality (Martin Čihák, 2020). Therefore, the era of financialization may be related to higher inequality and lower growth, mainly due to a lower demand for investment, a higher possibility of debt or wealth-financed consumption instead of wages, and with the deregulation of national and international financial markets and capital accounts (Hein & Dodig, 2014).

Thus, financialization can affect economic performance in many ways. According to Palley (2007), "Its principal impacts are to (1) elevate the significance of the financial sector relative to the real sector, (2) transfer income from the real sector to the financial sector, and (3) increase income inequality and contribute to wage stagnation. Additionally, there are reasons to believe that financialization may put the economy at risk of debt deflation and prolonged recession" (Palley, 2007).

Furthermore, poorly managed financial systems may lead to financial crises and slowing economic growth. Additionally, while resource shifts from low-return, stagnant sectors to dynamic, entrepreneurial sectors may result in decreased efficiency, the co-evolution of financing and technical progress can also lead to instabilities that impede economic growth, as Minsky suggested (Zalewski & Whalen, 2010). For instance, commercialization due to the internet might combine with financial innovation to produce speculative bubbles that eventually collapse, generating economic instability (Kindleberger, 2000). Furthermore, rising inequality increases the propensity to speculate, as richer households tend to hold riskier financial assets that provide greater returns. The rise of hedge funds and subprime derivatives has been linked to the rise of the super-rich (Stockhammer, 2012b).

4.3.1 Sectoral composition and short termism

As previously stated, the most significant impact of financialization is the elevation of the position of the financial sector in relation to the real sector (Palley, 2007; Stockhammer, 2012b). Since financial development has given more options to capital, which can choose between investing in financial or real assets, financialization may cause a shift in the economy's sectoral composition (Hein & Dünhaupt, 2019; Stockhammer, 2017). Changes in sectoral composition may have a significant impact on both income distribution and income.

Initially, since income levels vary among sectors, a shift in sectoral compositions may affect income distribution. Factor distribution will be affected due to increases in profits and more specifically due to increases in retained profits, dividends, and interest payments (Hein, 2014; Stockhammer, 2017). Therefore, as the finance sector is increasingly dominating real activity, the income transfer between sectors can be related to increasing inequality and wage stagnation (Palley, 2007; Ivanova, 2019). Additionally, this may also affect personal profit inequality among individuals who choose to invest in real sectors and those who prefer to invest in financial sectors. For instance, evidence provided by Duménil and Lévy (2001) supports that the increase in profit shares between 1960 and 2001 was mostly due to increases in financial profits in France and the United States; hence, rentiers benefited primarily from income distribution (Duménil & Lévy, 2001). Additionally, while an increasing share of the financial sector in comparison to the non-financial sector may affect the sectoral composition of the economy, an additional impact will be due to a reduction in government activities in GDP. This privatization trend may also reduce wage shares since the private sector seeks higher profits while public utilities only need to pay costs (Herr, 2018).

Furthermore, sectoral composition may affect growth as a result of investment. A main characteristic of financial integration is that rising profits have not translated into rising investment. This might be the result of rent-seeking, which has become a common feature of firms in recent decades. As it has been argued, there has been a shift in the behavior of managers through financialization which has turned from "retain and reinvest" to "downsize and distribute" (Lazonick & O'Sullivan, 2000). Hence, firms tend to choose to reorient from long-term investment motives to shareholder value maximization (Manea & Wildauer, 2019). This comes in line with Hyman Minsky who argued that if the only criterion of the performance of managers is total profits, then there will be a reorientation in focusing on the maximization of shareholder value (Minsky, 1996). Thus, financialization has increased the rate of return on equities and bonds held by rentiers, while short-term performance has become more crucial, leading managers to align with shareholder interests (Hein, 2011; Onaran & Grafl, 2011).

According to the evidence found by Minsky (1996) among firms in the United States, managers' goal of profitability and flexibility in the workplace will result in inequality and insecurity for workers (Zalewski & Whalen, 2010). Thus, focusing on maximizing profits due to the financial sector may have an impact on both functional distribution and growth. Takeovers and leveraged buyouts will also be used against corporations that do not comply (Stockhammer, 2017).

There is econometric evidence that financialization can explain a significant portion of the accumulation slowdown (Stockhammer, 2004). Apart from changes in employment and the sectoral composition of the economy, we should pay attention to the sources of profits and whether they come from the financial or non-financial sectors. Thus, on the one hand, short-termism in managements may decrease animal spirits by changing their priority from growth to profitability. On the other hand, sectoral shifts through short-termism drain sources of funding that could be used for capital stock investment targeting short-run profitability rather than long-run economic growth (Hein, 2011; Hein, 2013b; Hein, 2014; Detzer, 2018; Hein & Dünhaupt, 2019). There is evidence that both impacts will have a detrimental impact on actual investment (Stockhammer, 2004; Davis, 2018; Hein & Dünhaupt, 2019). Additionally, financialization, it is argued, has been linked to a decrease in labor productivity; the fact that financialization diverts resources away from productive investments and toward more speculative ones will have a detrimental impact on technological progress and productivity (Tridico & Pariboni, 2017). As a result, given that productivity growth is capital embodied, this behavior will have an impact on economic growth (Hein, 2013). Therefore, factor inequality may increase, accompanied by a low level of investment and productivity, and hence slow growth.

Furthermore, financialization weakens the strength of labor unions due to the undermining of working-class identities (Stockhammer, 2017). Hence, since the erosion of labor unions and the decline in public social protection spending are strongly associated with financialization and globalization, impacts on functional inequality due to capital-labor bargaining power will also arise (Onaran, 2019). As has been argued, bargaining power may decline as a result of sectoral changes that result in wage declines (Hein, 2014). Moreover, since rent-seeking has been a major characteristic of corporations in recent decades, financialization has been characterized by changes in corporate governance and an increasing role for shareholders. The rising influence of shareholders in the corporation and their power over workers has been a critical component of financialization (Stockhammer, 2004; Hein, 2011; Onaran & Grafl, 2011). In addition, corporate behavior has been in line with the interests of managers and against the interests of workers and their unions (Stockhammer, 2004; Zalewski & Whalen, 2010). Hence, the fact that the alignment of management and shareholders has raised dividend and fee profits at the expense of wages indicates a decrease in labor bargaining power. Thus, financialization may lead to factor share inequality increases due to bargaining power.

Furthermore, according to Stockhammer (2012), the financial sector appears to have evolved considerably as a result of financialization, with non-bank financial institutions gaining weight. Non-financial institutions perform similar activities to banks; however, they are less regulated. These institutions have served as a financialization engine, and they are often referred to as the shadow banking system (Pozsar, et al., 2010). Financial innovations, mostly driven by shadow banking organizations, may act as a catalyst for the entrepreneurial process of economic development; nevertheless, as Minsky (1990) suggests, they may also impede economic advancement by causing financial instability (Minsky, 1990). Shadow banking has been accused of serving for tax evasion and money laundering (Shaxson, 2010; Stockhammer, 2012a).

4.3.2 Credit

There are three main reasons why financial development could affect income distribution and inequality. Firstly, financial development has an impact on income distribution and inequality due to easier credit access; secondly, due to the growth models that emerge from financialization; and finally, because of the crises that emerge from financialization, given that losses are usually unequally distributed.

To begin with, improved credit accessibility is a key feature of financial integration and changes in financial standards. Assuming that everyone can increase their income through lending, future distribution and growth will be affected in a variety of ways. Credit accessibility depends on several factors like the level of financial development, legal institutions, poverty, and asymmetrical information. As stated, wealth distribution is assumed to be directly connected to individuals' borrowing accessibility since their initial endowment may be used as collateral (Galor & Zeira, 1993; Banerjee & Newman, 1993). Therefore, unequal access to credit by different income classes can affect initial distribution and, consequently, future inequality.

In cases where certain individuals, often those with lower income, are excluded from financial markets due to the lack of credit access, it becomes more difficult for them to invest in education or start a business compared to households that can rely on their initial wealth. While the wealthy often have the resources to support education, investment, and research and development, underdeveloped financial systems have a stronger impact on lower-income groups (Galor & Zeira, 1993). As a result, in situations of financial underdevelopment, where investment in education or capital relies on initial wealth, lower-income groups find it challenging to escape poverty. This inability to gradually invest in larger projects means that low-income individuals can't move to higher income levels, leading to low income mobility (Piketty, 2000). Consequently, in imperfect markets, existing inequality may persist, contributing to greater income disparities between the rich and the poor. This can ultimately impact consumption and aggregate demand, affecting growth. The evidence suggests that inequality is related to growth as a result of financialization, with credit availability playing a crucial role in this relationship (Galor & Zeira, 1993; Piketty, 1997; Aghion & Bolton, 1997).

Furthermore, it has been widely suggested that lending constraints arising in imperfect markets can not only create income inequality but also diminish the efficiency of capital allocation (Galor & Zeira, 1993; Aghion & Bolton, 1997; Galor & Moav, 2000). Consequently, financial underdevelopment may hinder the economy from reaching its full potential, as limited credit in certain circumstances can prevent individuals from utilizing their skills and abilities for productive investments (Galor & Moav, 2000). It appears that in less financially developed nations with limited credit access, inequality hampers economic growth due to the costs associated with education, innovation, and fixed capital investments (Madsen, et al., 2017). Thus, the negative impact of inequality on growth seems more pronounced under financial underdevelopment, primarily due to limited credit access for lower-income families. As such, in cases of financial imperfection, lower growth could result from the absence of beneficial investments by lower-income classes.

Many authors have emphasized the role of financial market imperfections in the relationship between initial wealth distribution and long-term growth (Banerjee & Newman, 1993; Galor & Zeira, 1993; Aghion & Bolton, 1997; Piketty, 1997). Deininger & Squire (1998) found evidence suggesting that initial land inequality is statistically significant for the poor, but not for the rich. This finding aligns with the theoretical approach that argues highly unequal distribution generates credit restrictions for some individuals, discouraging them from investing (Deininger & Squire, 1998). Thus, as they claim, initial distribution indeed affects future growth due to the imperfect market approach, where the impact of initial inequality in land distribution on future growth has been found to be statistically significant. Furthermore, since initial inequality can affect education but not investments in physical capital, they concluded that the effect of investments in physical capital and not in human capital is a result of the variable of inequality. Hence, they found that high initial inequality in land distribution is associated with lower growth in subsequent years, with the level of market imperfection having a significant impact on future growth, especially concerning human and physical capital (Deininger & Squire, 1998).

Therefore, imperfect markets significantly impact human capital accumulation (Galor & Zeira, 1993). For instance, if we assume that education comes with private costs, there is a risk of a poverty trap, and inequality may be inherited from the previous generation at every time period. Thus, wealth distribution can impact the overall education level of the economy (Galor & Zeira, 1993). According to García-Peñalosa (2010), a higher human capital stock results from a more equitable distribution of wealth due to the diminishing returns on education investments (García-Peñalosa, 2010).

As a result, initial distribution becomes a potential determinant of inequality and the production process, as lower-income groups refrain from investing in human and physical capital, which could yield higher returns and contribute to higher growth.

Thus, initial distribution may consistently impact future growth and distribution. However, despite the fact that imperfect markets suggest that higher inequality leads to lower levels of human capital, innovation, and growth on the one hand, while creating incentives for investing and innovating on the other, these processes can coexist and operate simultaneously (García-Peñalosa, 2010).

In contrast, while imperfect financial markets often rely on initial income distribution, financial development reduces the impact of initial distribution by allowing more people to access credit. Therefore, given that lower-income classes have easier credit access compared to the past, they should benefit from improved credit access, leading to increased income and improved income distribution, thereby reducing inequality. Improved financial institutions enable lower-income groups to use credit strategically, enhancing future income by investing in education or physical capital, which ultimately leads to higher income mobility. It has been argued that financial development reduces income inequality due to changes in financial standards and the introduction of new financial instruments, resulting in improved credit access for low-income households and ultimately lower income inequality (Clarke, et al., 2006; Mookerjee, 2010; Kim, 2016; Detzer, 2018). Additionally, financial development is argued to improve the growth rates of the income of the poorest to the extent that it is eventually related to poverty alleviation (Beck, et al., 2007).

However, the relationship between inequality and credit availability is complex and depends on the quality of regulation and supervision (Martin Čihák, 2020).. As mentioned earlier, differences in credit access can be explained by variations in financial system growth, as well as the degree of deregulation and liberalization (Kumhof, et al., 2012; Belabed & Treeck, 2017).

Furthermore, unlike imperfect markets, where credit barriers may lead to lower growth levels, better financial systems enable lower-income groups to utilize credit for investing in human and physical capital, thereby promoting growth. Therefore, the harmful effects of inequality on growth appear to be less pronounced in financially developed countries (Barro, 2008; Madsen, et al., 2017). As suggested by Beck, et al. (2007), the reduction of credit constraints that lower-income groups used to face due to financial integration leads to higher investment in human or physical capital, resulting in increased economic growth. This can also lead to a greater increase in the income of poorer individuals in relation to GDP growth, consequently reducing inequality (Beck, et al., 2007).

Cardaci & Saraceno (2016) found evidence suggesting that when inequality increases with credit constraints, the economy enters a recession. Conversely, if there is high access to credit, income redistribution initially leads to expansion (Cardaci & Saraceno, 2016). Additionally, as suggested by Greenwood and Jovanovic (1990), who developed a model with a nonlinear relationship between financial development, income inequality, and economic growth, financial development increases the incomes of the poor while simultaneously improving capital allocation and boosting aggregate growth at every stage of economic development. Furthermore, according to their implications, the Kuznets hypothesis is confirmed, as in the early stages of development, where the rich have more access and directly benefit from financial development, income inequality between the rich and the poor is expected to widen. However, when the economy matures and has a fully developed financial structure, enabling most people to access financial markets and financial development affecting a larger number of individuals, income inequality between the rich and the poor narrows (Greenwood & Jovanovic, 1990).

Therefore, in a developed economy, where everyone can invest their desired amount of capital, savings and distribution have less impact on growth, which becomes more dependent on financial development. Consequently, the relationship between financial development and inequality becomes essential in savings and growth regressions (Madsen, et al., 2017).

Moreover, while financial integration has made credit more accessible to everyone, enabling both the rich and the poor to borrow, both investment and consumption can be fueled by borrowed income. As suggested, financialization can impact economic activity through both consumption and investment (Onaran & Grafl, 2011). Hence, credit can be used in both investment and consumption, influencing aggregate demand.

4.3.3 Debt

As previously mentioned, investment and consumption patterns have shifted due to financial integration and widespread access to credit for individuals. However, credit is not a panacea, and if not used judiciously, the outcomes might not align with expectations.

Borrowing norms have evolved over the past several decades, and borrowing for consumption, in addition to loans for business startups, has become commonplace. Consequently, while it is assumed that individuals choose to borrow to boost their income, in reality, some individuals are "compelled" to borrow in order to sustain their diminished income. It has been observed that the compressed and low wages resulting from market deregulation, labor flexibility, capital mobility, and global finance have been supplemented by consumption driven by credit (Tridico & Pariboni, 2017). Additionally, it has been argued that financial liberalization has increased consumer credit, which has "compensated" for the adverse impact of reduced wages on consumption, thus mitigating the decline in consumption compared to income reduction (Krueger & Perri, 2006; Heathcote, 2010; Gu, et al., 2014). Consequently, inequality can impact the economy's debt, leading individuals to borrow to maintain social consumption standards when their income falls short. Thus, even though individuals may borrow to align with their income class, the eventual outcome of increased credit accessibility might not align with expectations, potentially leading to debt.

As argued, the mounting debt of the poorest households over the past decades was a result of their attempts to uphold an elevated living standard in their society while their real incomes remained stagnant (Stiglitz, 2015). Additionally, it is suggested that a portion of the accumulated debt observed could be due to stagnant or declining wages, with workers striving to maintain their consumption norms (Stockhammer, 2012a). Therefore, in situations where consumption norms outpace wage growth, workers are pushed into debt to maintain those norms. This has led to the notion that household debt serves as a substitute for wages (Pivetti & Barba, 2009). Consequently, growing inequality, coupled with financial development, compels lower-income households to increase their debt to sustain their consumption norms (Rajan, 2011). Several studies have provided evidence of a positive relationship between inequality and private household debt (Iacoviello, 2008; Cynamon & Fazzari, 2008; Mian & Sufi, 2008; Frank, et al., 2014). Moreover, evidence suggests that heightened inequality in advanced financial systems leads to increased growth and escalating debt for workers in the short term, with the effect appearing to be positively correlated with the level of integration (Kumhof, et al., 2012).

In addition, it has been argued that inequality is linked to increased household debt due to income shocks that create a higher demand for credit (Krueger & Perri, 2006; Iacoviello, 2008). For example, a relationship has been identified between US wage inequality and the ratio of household debt to disposable income from the 1960s to the present, which could explain both the trend and the cycle of household debt levels (Iacoviello, 2008). Therefore, financialization, mainly driven by financial innovations and easier access to credit, when combined with inequality, is associated with rising levels of debt in the private sector.

Furthermore, it's widely argued that in cases where financialization influences consumption norms, leading to consumption based on debt, future growth becomes financially fragile (Hein, 2014). Therefore, if borrowing against future income is not employed prudently, it can lead to credit becoming a future problem rather than a short-term solution. Borrowing has been shown to increase aggregate demand and output in the short run but raises household debt in the long run, which has a negative impact on growth (Kim, 2013). Additionally, high levels of debt might compel banks to restrict credit access in the future, resulting in lower growth (Detzer, 2018). Furthermore, a surge in private sector credit may heighten the potential for a financial crisis (Sahay, et al., 2015). Consequently, while capital market imperfections and limited credit access can exacerbate inequality, financial deregulation amplifies credit availability, leading to higher leverage and financial vulnerability (Acemoglu, 2011).

To summarize, there's a risk that increased credit accessibility might not yield the intended results on inequality and that it could lead to an unforeseen problem—unmanageable debt. Moreover, although financialization instruments have brought short-term growth benefits, it appears that this might come at the expense of future income and growth.

Furthermore, the broader credit access resulting from financial development has charted new growth trajectories for economies. Debt-driven consumption can pave the way for new growth models as economies seek new avenues to address shifts in domestic demand.

Firstly, as credit becomes more accessible and individuals borrow to consume, potential deficiencies in domestic demand due to low incomes can be offset by consumption fueled by borrowing. Changes in national financial systems have led some countries to counter potentially stagnant demand by generating demand through debt-financed consumption, creating a debt-led growth model where wage growth is substituted by household debt (Pivetti & Barba, 2009; Detzer, 2018; Stockhammer, 2012a).

Consequently, the fact that individuals consume through credit can stimulate domestic demand that might otherwise diminish due to stagnant or decreasing wages. In terms of consumption, credit has acted as a solution to counter the weakened aggregate demand stemming from wage stagnation. Debt-driven consumption has been considered a response to reduced aggregate demand caused by declining wage shares in various advanced and emerging economies such as the United States, United Kingdom, Spain, Ireland, Turkey, and South Africa leading up to the Great Recession (Onaran, 2019).

Thus, financialization has, on one hand, provided certain countries the means to compensate for low demand with credit-driven consumption. On the other hand, this has resulted in an increasing debt-to-income ratio among households. Consequently, when stagnant wages prompt households to consume through credit and, consequently, accumulate private debt to offset domestic demand decline, inequality becomes closely tied to a debt-led growth model. In these scenarios, growth might increase as debt and inequality rise simultaneously. Therefore, while financialization might "correct" inequality through credit, the level of financial system development, regulation, and liberalization—which also determine households' credit access—play a role in whether a debt-led growth model or reduced activity due to inequality prevails (Kumhof, et al., 2012; Belabed & Treeck, 2017).

Moreover, as argued, there's a strong empirical connection between financial liberalization and higher current account deficits, primarily due to debt-driven growth models that result in these deficits (Kumhof, et al., 2012). Therefore, as inequality rises, domestic demand increases simultaneously with a current account deficit due to consumption driven by credit. In essence, "the rich fund a significant part of their increased domestic lending by intermediating foreign savings" (Kumhof, et al., 2012). Thus, in financially developed economies, debt-driven models generally result in higher debt and current deficits due to inequality. Stockhammer (2012b) asserts that one of the most conspicuous effects of financial development and recent international financial deregulation is that countries have been permitted to sustain larger current account deficits over extended periods. The United States and other Anglo-Saxon countries have exemplified credit-driven consumption boom growth models, where the median working-class household experiences stagnant wages while consumption norms grow faster than median wages, resulting in escalating household debt. These countries have typically exhibited current account deficits (Stockhammer, 2012a).

4.3.4 Imbalances

Therefore, although financialization has led to debt-led growth models relying on debt-financed consumption to compensate for depressed demand when wage shares fall, some economies may adopt different strategies to adapt to weaker domestic demand.

A decrease in wage share not only reduces domestic demand but also shifts income from poorer households with a higher marginal propensity to consume to richer households with a lower marginal propensity to consume. Consequently, different countries may respond to the lack of domestic demand in various ways.

Instead of increasing household debt, several countries have accepted stagnation in domestic demand and focused on exports to achieve growth. These economies choose to export products that cannot or are not well-suited for domestic markets to stimulate growth. This type of growth is referred to in the literature as export-driven growth (Stockhammer, et al., 2015). Therefore, export-led growth models rely on exports as the driver of aggregate demand (Detzer, 2018).

As a result, countries whose populations are unable to respond to falling wages by borrowing often opt for export-driven economic models. Additionally, credit restrictions and imperfect markets that limit credit accessibility for lower-income classes further necessitate an export-led economic model due to weak domestic consumption.

As a consequence, if investment is positively affected by financialization while consumption increases at a slower rate, then an export-led growth model becomes a possibility (Detzer, 2018; Stockhammer, 2012a). Countries like Germany, Japan, China, and the Netherlands have adopted this export-driven growth strategy, with lower domestic demand but higher exports (Belabed & Treeck, 2017; Detzer, 2018; Behringer & Treeck, 2018; Zeman, 2019). Economies such as Germany, Japan, or China have chosen this export-led model as a solution to the deficiency in domestic demand caused by falling wage shares (Onaran, 2019).

Furthermore, countries that adopt an export-led growth model often end up with current account surpluses. This phenomenon is particularly evident in the cases of China and Germany, where current account surpluses can be attributed to a weak aggregate domestic demand and consumption compared to domestic output. This imbalance is a consequence of low wage shares and a lack of credit-financed consumption (Belabed & Treeck, 2017; Detzer, 2018; Behringer & Treeck, 2018).

Furthermore, these countries' current account surpluses have been mirrored by current account deficits and increasing debt burdens in other nations. Thus, while under debt-led growth models, income inequality tends to result in current account deficits, in economies where individuals are constrained from responding to declining wages through borrowing, income inequality often translates into current account surpluses (Kumhof, et al., 2012).

As a result, the combination of export-driven growth, weak domestic demand, and low wages can contribute to income polarization and increased inequality. Thus, while export-oriented models can be viewed as a response to demand challenges stemming from inequality, they may inadvertently perpetuate these inequalities. Consequently, countries opting for export-driven growth may find themselves accumulating significant current account surpluses alongside heightened levels of inequality.

Therefore, it has been suggested that under financialization, two extreme types of development can emerge: the 'debt-led private-demand boom' and the 'export-led mercantilist type' (Dodig, et al., 2016). Furthermore, it is argued that export-driven economies heavily depend on their trade partners due to their limited domestic financing capabilities (Karwowski, et al., 2017; Stockhammer & Kohler, 2019). It appears that economies pursuing export-led growth must amass substantial current account surpluses and maintain a positive international investment position, while their trading partners often contend with deficits financed through deregulated international capital markets and open capital accounts (Detzer, 2018). Consequently, debt-driven growth models are typically characterized by domestic household debt, whereas export-driven growth models are associated with external debt in trading partner nations (Stockhammer, 2011; Hein, 2013b; Thomas Goda, 2016). Thus, debt-led and export-driven growth models are interconnected because countries pursuing export-driven growth rely on the current account deficits of their trading partners (Stockhammer, et al., 2015; Thomas Goda, 2016).

As a result, an economy that chooses an export-driven growth model often requires a trading partner with a debt-driven growth model. Moreover, while both debt-led and export-led growth models may result in economic expansion, they typically coincide with increased debt levels, either within the domestic private sector, in debt-led regimes, or within the trade partner's economy, in export-led regimes (Stockhammer & Kohler, 2019). Additionally, income inequality appears to widen due to wage stagnation, as economic growth becomes less linked to income distribution and more associated with credit.

However, the specific factors that lead a country to opt for either a debt-driven growth model characterized by consumption booms and current account deficits or an export-driven growth model marked by subdued domestic consumption and current account surpluses remain somewhat unclear (Stockhammer, 2013; Belabed & Treeck, 2017). Nevertheless, it appears that more competitive countries have been better positioned to develop an export-driven demand regime, primarily due to financialization and easier access to foreign credit for countries with current account deficits (Naastepad & Storm, 2015).

As a result, with some countries running substantial current account deficits and others maintaining surpluses, financial integration has given rise to diverse economic trajectories across nations. The surge in current account imbalances is widely attributed to global and regional liberalization of international markets and capital accounts, particularly within the Eurozone (Stockhammer, 2010; Van Treeck & Sturn., 2012; Hein & Mundt, 2012; Stockhammer, 2012b; Stockhammer, 2012a).

Consequently, a global increase in inequality appears to be intrinsically linked to higher worldwide current account imbalances (Kumhof, et al., 2012). Given that income inequality can result in either an export-led or debt-led growth model, current account imbalances can be associated with varying levels of inequality due to the development of these two growth models. Thus, economic growth may be influenced by inequality under both models. Under debt-led growth models, growth is affected by financial liberalization, long-term current-account deficits, and growth models reliant on deficits

(Stockhammer, 2012b). Meanwhile, export-led growth models operate with little necessity for a growing domestic market, as there is no dynamic relationship between the domestic market and investors' benefits.

Furthermore, as suggested by Belabed & Treeck (2017), personal income inequality increases have been associated with debt-led, debt-financed consumption and current account deficits. They also proposed that a significant corporate or government veil would lead to weaker private consumption and current account surpluses due to decreased household income. Finally, they argued that both models may coexist within the same economy, making it challenging to predict which model dominates (Belabed & Treeck, 2017). Consequently, both current account surpluses and current account deficits may coincide with rising income inequality. Therefore, similar levels of inequality may be observed among countries with both models, even though their growth performance and drivers may significantly differ.

Kumhof, et al. (2012), argued that increasing inequality has led to worsening national saving-investment balances and increased household leverage. This evidence primarily emerged from advanced economies with developed financial systems, such as the US and the UK, where lower-income classes compensated for consumption with borrowed income from domestic and foreign lenders. Additionally, they posited that some emerging economies, like China, with less developed financial markets and limited access to credit for lower-income classes, experienced increased inequality alongside an export-oriented growth model and weak domestic demand (Kumhof, et al., 2012). Furthermore, Kumhof, et al. (2012) found evidence of the relationship between income inequality and current accounts, using a sample of 14 OECD economies spanning from 1968 to 2008, with top incomes serving as inequality indicators. The evidence supported a negative effect of top incomes on current account balances.

Moreover, the fact that debt and export-driven growth models are complementary often leads to high household debts, international imbalances, and international debt (Thomas Goda, 2016). Consequently, both models can be unstable, with debt-led models prone to unmanageable levels of debt and export-led models relying on imbalances in other economies.

The phenomenon of current account deficits has manifested in many English-speaking countries worldwide. Prolonged periods of current account imbalances can precipitate crises. As has been suggested, global current account imbalances were associated with the 2007 financial crisis (Caballero, et al., 2008; Obstfeld & Rogoff, 2009; Pivetti & Barba, 2009).

4.3.5 Crisis

Financial development has been identified as one of the primary causes of the crisis (Palley, 2007). As Palley (2007) argues, "the era of financialization has been associated with tepid real economic growth, and growth also appears to show a slowing trend... [as well as] ...increased financial fragility." Changes in financial norms and the introduction of new financial instruments that facilitate consumption through credit may stabilize aggregate demand and contribute to growth. However, there are serious concerns that this growth may prove unsustainable, resulting in financial fragility for the economy, primarily due to escalating household debt. Lending to households for consumption or housing can lead to unmanageable debts, resulting in housing bubbles and unstable growth (Manea & Wildauer, 2019). Additionally, inequality has been identified as one of the factors contributing to credit bubbles, thereby increasing the likelihood of financial crises (Bazillier & Hericourt, 2017).

It is commonly assumed that inequality can influence growth stability since it relates to the proportion of the population capable of consuming through borrowing or earning (Onaran & Galanis, 2012). Debt regimes arising from financialization, while initially improving inequality and growth, are expected to lead to weak long-term growth and heightened inequality, ultimately culminating in economic instability and crises. For instance, if inequality continues to rise due to stagnant wages, there is a risk that not all individuals will be able to repay their debts, potentially trapping them in a cycle of debt and perpetuating inequality while attempting to maintain social consumption norms.

Thus, rising inequality may be associated with increased financial risks when credit expansion coincides with increasing inequality. Consequently, financial development may lead to unsustainable economic growth and crises in the presence of inequality. The interaction of financial deregulation with the macroeconomic effects of rising inequality has led to economic imbalances (Stockhammer, 2013). Therefore, as changes in financial norms and growth coexist with increased inequality and debt, resulting in a debt-led growth model, higher debt growth is linked to greater instability and a higher probability of banking crises, contributing to further increases in inequality. The crisis triggered by debt-driven consumption and international imbalances is closely tied to financial liberalization combined with income distribution polarization (Stockhammer, 2012a). Thus, as inequality fosters increased borrowing, the likelihood of a crisis grows, suggesting a "virtuous relationship between income equality and financial stability," while inequality appears to be connected to greater financial risks (Martin Čihák, 2020).

Attempting to address inequality by granting access to credit for those with lower incomes can be counterproductive if the financial sector lacks proper regulation. Consequently, although aggregate demand and growth may rise due to debt-fueled consumption by lower-income groups, the economy may become more precarious, vulnerable to the threat of financial bubbles (Onaran & Galanis, 2012). Furthermore, these debt-related issues emerged as a result of unequal distributions during the recent financial crisis, where income inequality played a role in some literature (Galbraith, 2012; Stiglitz, 2015). Moreover, there is evidence that in Anglo-Saxon countries, debt-driven consumption became the primary driver of demand, often in conjunction with real estate bubbles (Stockhammer, 2012a).

In general, it appears that there is a trade-off between the short-term benefits of increased growth and the temporary reduction of inequality through debt, and the long-term costs of financial stability and persistent inequality. Therefore, if the chosen policy is to stimulate consumption through debt, the economy may eventually accumulate unsustainable levels of debt, leading to non-viable growth, especially in cases of high inequality. High debt levels can impact growth in various ways, often resulting in financial crises. Consequently, debt and export-oriented economic models can potentially lead to global imbalances, unsustainability, and economic crises in the long run (Zeman, 2019).

Since both debt and export-led growth models rely on increasing debt ratios, they may eventually prove unsustainable. This is primarily because governments have been permitted to run larger and larger current account deficits due to financial deregulation, while consumers have been driven into enormous and unsustainable levels of debt to sustain their living standards through credit.

The deregulation and liberalization of capital markets and capital accounts resulting from financialization have facilitated the running and financing of persistent current account deficits and foreign indebtedness problems, as well as speculative capital flows, exchange rate volatility, and related currency crises (Hein, 2014). Indicators such as excessive household leverage and current account imbalances have indicated financial fragility (Belabed & Treeck, 2017).

Furthermore, financialization appears to be associated with weaker long-term growth, while inequality tends to increase due to changes in the financial structure and the expansion of secular debt. Income is transferred from lower-income classes to higher-income classes, resulting in higher levels of household indebtedness. The increased access to credit, coupled with changes in the financial structure, has exacerbated inequality by transferring income "from high marginal propensity to spend debtors to lower marginal propensity to spend creditors" (Palley, 2007). This implies that future consumption may decrease, as the income transfer between creditors and borrowers affects demand due to differences in debtors' and rentiers' propensities to consume and save. Thus, while financial liberalization may prevent an immediate reduction in consumption by lower-income classes and temporarily correct inequality, it does so at the cost of domestic debt, higher debt servicing, and reduced future consumption (Kumhof, et al., 2012).

Moreover, there is evidence that investment may decline due to financialization (Stockhammer, 2004; Orhangazi, 2008; Tori & Onaran, 2018). This is mainly because rentiers have a lower propensity to invest and prefer to lend their income from profits rather than invest. Additionally, there is evidence that rising inequality leads to higher labor debt, which is ultimately financed by savings generated from profits (Kumhof & Ranciere, 2010; Kumhof, 2015).

Therefore, it appears that financialization promotes consumption through debt while potentially leading to reduced investment in the real economy. Furthermore, there is evidence that the marginal propensity to consume from profit income of rentiers is higher than the marginal propensity to consume from profit income of investors, while both are lower than the propensity to consume from wages (Manea & Wildauer, 2019). Consequently, lower-income classes continue to consume at similar levels while borrowing from higher-income groups, who may opt to lend their income rather than invest. Furthermore, if investors borrow to invest, they may have less income to invest in the future due to the burden of future debt. Therefore, in a debt-driven regime, the stimulative effects of consumption need to outweigh the contractionary effects of reduced real investment in order to achieve growth. Consequently, financialized economies may be associated with greater output growth volatility and macroeconomic instability.

Financial deregulation has been linked to the 2008 financial crisis, in which financialization and rising inequality interacted in complex ways, contributing to the crisis (Stockhammer, 2012a). Both personal and functional inequality had been on the rise before the financial and economic crisis in most developed and developing countries (Dodig, et al., 2016). Furthermore, it is widely asserted that inequality contributed to the financial crisis in the USA, particularly due to household indebtedness (Rajan, 2010; Morelli, 2012). It has been argued that the relationship between income inequality and household indebtedness played a role in the 2007/8 financial crisis in the US, as increased borrowing allowed lower-income classes to maintain their consumption standards amid falling incomes (Rajan, 2010; Reich, 2010).

Moreover, it appears that the excessive credit that contributed to the 2007-08 crisis in the United States resulted from the credit expansion observed during the era of financialization, fueled by political interventions aimed at supporting the consumption of individuals experiencing declining incomes and thus exacerbating inequality (Martin Čihák, 2020). For instance, as Martin Čihák (2020) contends, mortgages to low-income households played a significant role in the subprime crises of 2007-08 in the USA. In the period leading up to the 2008 financial crisis, lower and middle-income groups in the United States were able to maintain their relative consumption levels compared to wealthier households, mainly due to government credit expansion policies (Rajan, 2010; Behringer & Treeck, 2018).

Furthermore, there is evidence that the years preceding the 2008 crisis, income inequality, as reflected in top incomes, was linked to household savings and current account balances (Kumhof, et al., 2012; Behringer & Treeck, 2015). For example, increasing inequality in the USA and its interaction with institutions contributed significantly to reduced national savings and a substantial portion of unsustainable personal debt and rising current account deficits (Rajan, 2010; Belabed & Treeck, 2017; Behringer & Treeck, 2018; Detzer, 2018). A similar pattern was observed in the UK (Kumhof, et al., 2012; Behringer & Treeck, 2018), as well as in several European countries such as Greece, Portugal, and Spain (Zeman, 2019). Additionally, because the US dollar maintained its global status, the US current account deficit contributed to global financial fragility (Kumhof, et al., 2012). Consequently, rising income inequality has been identified as the root cause of the rapid growth of the non-prime mortgage market in the USA and the global payment imbalances that contributed to the 2008 crisis (Stiglitz, 2012; Kumhof, et al., 2012).

Moreover, financial crises appear to have long-term effects on income distribution in emerging nations (Onaran, 2009). While the ongoing global financial crisis has confirmed the instability of newly developed financial systems, there is a high probability that lower-income households will suffer the consequences of the crisis. Additionally, during a financial crisis, there is a possibility that losses are distributed unequally, exacerbating inequality (Kuttner, 2007; Wray, 2007). For instance, in the United States, unemployment increased, reaching 8.5% in March 2009, while financial elites continued to earn high incomes, including "retention bonuses" (Zalewski & Whalen, 2010).

5 Model

The theoretical framework presented in this chapter relates inequality to major issues, such as technological changes, openness, financialization and their impact on growth. To begin with, it is assumed that an economy under oligopoly, where total output, $Y = f(K, L)$, develops over time as the capital stock (K) and the labor force (L) of the economy increase. Furthermore, the total population of the economy, N, consists of the economically active population, T, and the unemployed population, U[2]. It is assumed that the unemployed population has no participation in the economic process and hence has no income. Additionally, the total income, pY, is distributed among the economically active population, which consists of workers, denoted as L, and capital owners, denoted as Ξ. It is also assumed that every worker owns one unit of labor (L), while every capital owner possesses ζ units of capital (K)[3].

[2] $N = T + U$
[3] $K = \zeta \Xi$

Furthermore, it is assumed that capital owners organize firms while providing capital (K) to the production process. Hence, the income of capital owners comes out of profit, Π, which is mainly used for investment. Furthermore, firms hire workers so that they can utilize their labor power, while they provide the materials and machinery necessary to be combined with labor in order to produce goods. Finally, workers contribute their labor (L) to the production process and receive income from wages, denoted as W, which they mainly use for consumption. Additionally, it is assumed that labor is unlimited, while the capital stock is determined by the savings that mainly stem from profits. Therefore, the total domestic income of the economy (pY)[4] is distributed between profits and wages as presented in equation (5.1):

$$pY = \Pi + W \tag{5.1}$$

Additionally, the profit rate, denoted as r, is set according to equation (5.2), and the average wage, denoted as w, is set according to equation (5.3):

$$r = \frac{\Pi}{K} \tag{5.2}$$

$$w = \frac{W}{L} \tag{5.3}$$

Furthermore, it is assumed that the total product, Y, is determined by the demand and the factor productivities, namely labor and capital productivity. Factor productivities are presented in equations (5.4) and (5.5), where A_L represents labor productivity and A_K represents capital productivity:

$$A_L = \frac{Y}{L} \tag{5.4}$$

$$A_K = \frac{Y}{K} \tag{5.5}$$

Moreover, it is assumed that firms set the product price, denoted as p, based on their monopolistic power, primarily defined by the bargaining power between the firms and workers, as well as the degree of price competition. Hence, initially, the price, p, is set

[4] p is the product price and Y the total product

by unit labor costs, $\frac{W}{Y}$, and unit gross profits, $\frac{\Pi}{Y}$, which are assumed to be the only costs of the firm, according to equation (5.6):

$$p = \frac{\Pi}{Y} + \frac{W}{Y} \tag{5.6}$$

By combining equation (5.6) with equations (5.2), (5.3), (5.4), and (5.5), the price can be set according to equation (5.7):

$$p = \frac{r}{A_K} + \frac{w}{A_L} \tag{5.7}$$

Thus, prices are determined by the profit rate, r, the nominal wage, w, and the factor productivities, A_K and A_L. Finally, according to the post-Keynesian literature, capacity utilization, denoted as u, is set as the ratio of actual output to potential output of the economy, as expressed in equation (5.8):

$$u = \frac{Y}{Y^*} \tag{5.8}$$

Following the approach described above, income inequality will be presented in the following sectors.

5.1 Factor Inequality – Factor Distribution

Firstly, the income inequality driven by factor distribution will be defined. Focusing on the effect of factor distribution on personal inequality, it is assumed that personal inequality emerges from the way that total income is distributed among investors and workers. Setting up the distribution, the proportions of workers and investors to total employment are denoted by "l" and "ξ" respectively, as presented in relations (5.1.1) and (5.1.2).

$$l = \frac{L}{T} \tag{5.1.1}$$

$$\xi = \frac{\Xi}{T} \tag{5.1.2}$$

Furthermore, wage shares, "λ", will be determined by real wage, "w^r"[5], and productivity of labor, "A_L", according to equation (5.1.3). Additionally, this relation can be presented in terms of growth according to equation (5.1.4).

$$\lambda = \frac{W}{pY} = \frac{w^r}{A_L} \tag{5.1.3}$$

$$\dot{\lambda} = \dot{w^r} - \dot{A} \tag{5.1.4}$$

As a result, since wage share is determined by real wage and productivity growth rates, if productivity rises faster than real wages, wage shares will fall (Giovannoni, 2010; Dünhaupt, 2013). When labor productivity improvements are not passed on to workers, the wage share falls while the profits share rises (Giovannoni, 2010). Respectively, profit shares, "h", are determined by profit rate and productivity of capital as presented in relation (5.1.5).

$$h = \frac{\Pi}{pY} = \frac{rK}{Y} = \frac{r}{A_K} \tag{5.1.5}$$

In growth terms relation, the growth rate of profit shares will be determined by the difference of the growth rates of profit rate and capital productivity as can be seen in equation (5.1.6).

$$\dot{h} = \dot{r} - \dot{A_K} \tag{5.1.6}$$

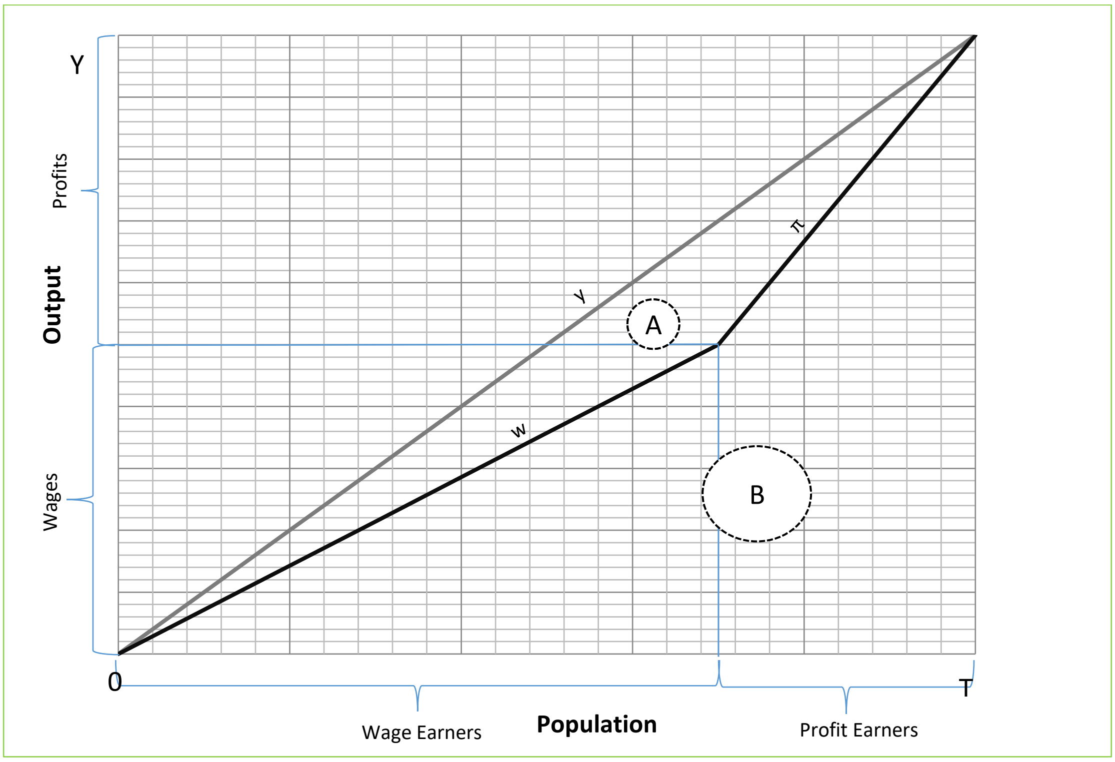
Furthermore, it is assumed an economy of two classes where the lower income class consists of workers while the higher income class consists of investors. Moreover, it is assumed that the population of employed workers is larger than the population of investors, (l>ξ). Additionally, it is assumed that every worker receives the same average wage, "w", while every investor possesses the same amount of capital, "ζ", and hence receives the same average income from profits, "π". In addition, it is assumed that the returns on capital are higher than returns to labor, so that the average income that one person receives from profits is bigger than the average income from wages, (π>w). Hence the total income of equation (5.1) can be presented according to equation (5.1.7).

[5] $w^r = \frac{w}{p}$

$$pY = \pi\Xi + wL \tag{5.1.7}$$

Therefore, the share of investors, ξ, earns the profit share "h", and the share of workers, "l", earns the wage share, "λ". Setting the Lorenz curve between two income classes, investors and workers, it emerges that the share of workers in the total employment is larger than the wage share, l > λ, while the opposite stands for the group of capital owners, where their population share of total employment is smaller than their profit income, ξ < h. Consequently, the personal inequality that emerges due to factor distribution, can be presented according to the Lorenz curve of figure 2.

Figure 2 Lorenz curve



In the Lorenz curve the horizontal axis represents total employment from the poorer to the richer individual while the vertical axis represents total output. The grey line is the average income, "y", and implies total equality, where average wage and average income from profits are equal to average income. In this case, every individual would earn equal income from wages and profits. The first part of the black line is the average income from wages, "w", and its slope is smaller than the average income. Respectively, the rest of the line is the average income from profits, "π", and its slope is larger than the average income.

Inequality is calculated according to the famous GINI index as presented in relation (5.1.8). Using the calculation formula of areas, it arises that inequality in a two-class economy of workers and investors is determined by the income shares of the two classes, profit share, "h", and wage share, "λ", and their employment shares, ξ and "l" as it is presented in equations (5.1.8), (5.1.9), and (5.1.10):

$$Inequality_F = \frac{area\ A}{area\ A + area\ B} \tag{5.1.8}$$

$$Inequality_F = h - \xi \tag{5.1.9}$$

$$Inequality_F = l - \lambda \tag{5.1.10}$$

Therefore, income inequality due to factor distribution is determined by the difference between labor employment and the wage share, or the difference between the profit share and the proportion of capital owners to total employment. Therefore, as it emerges, due to this equation, income inequality is related to functional distribution; however, it is not the only factor. Additionally, employment of both classes, hence the population that shares total income, is a fundamental determinant of factor inequality.

Furthermore, relations (5.1.9) and (5.1.10) can be presented in growth terms according to relations (5.1.11) and (5.1.12) respectively.

$$\dot{Inequality}_F = \frac{h}{h-\xi}\dot{h} - \frac{\xi}{h-\xi}\dot{\xi} \tag{5.1.11}$$

$$\dot{Inequality}_F = \frac{l}{l-\lambda}\dot{l} - \frac{\lambda}{l-\lambda}\dot{\lambda} \tag{5.1.12}$$

Therefore, Gini is positively related to profit share growth, and the growth of the employment share of workers, while it is negatively related to wage share growth and the growth of the employment share of investors.

Hence, for instance, according to relation (5.1.12) inequality will decrease if wage shares increase faster than relative employment of workers. Similarly, if the population of capital owners increases faster than profit share then inequality will decrease according to relation (5.1.11).

This, on the one hand, indicates that economic growth can increase with decreasing inequality only in a wage-led growth regime. On the other hand, if relative employment of labor grows faster than wage share, then inequality will increase. Hence, although an increasing wage share seems to be essential and a wage-led regime is a fundamental requirement, it is not enough for decreasing factor income inequality accompanied by increasing economic growth. Therefore, the difference in changes in relative employment of workers and wage shares, as well as the difference in changes in relative employment of investors and profit shares, will determine the change in factor inequality.

Furthermore, as it is generally accepted, wages are related to labor employment. However, as it seems, there is not a consensus as regards the sign of the impact. According to classical economic theory, it is assumed that higher levels of wages decrease employment due to lower labor demand as a result of lower profits and hence a lower budget to invest. On the contrary, mostly Keynesian theoretical approaches argue that a higher level of wages will increase labor employment due to an increase in aggregate demand as a result of the higher consumption that may emerge (Palley, 2016).

Therefore, under the classical theoretical perspective, a change in factor distribution will have a stronger impact on inequality since wage shares are negatively related to labor employment. While under a Keynesian theoretical perspective, the effect may not be as strong, given that the relation between wage shares and labor employment is positive. Hence the effects of wage share and labor employment will neutralize each other.

However, given that the growth of factor inequality is determined by the difference between the growth of relative employment of labor and wage share growth, the factor inequality index (5.1.12) can be applied in both theoretical perspectives.

Thus, if policy could focus on negative changes in factor inequality due to factor distribution, changes in the level of wage shares should be higher than changes in the employment share of labor. Similarly, profit share changes should be lower than changes in the population of capital owners. These relations are presented in equations (5.1.13) and (5.1.14).

$$\dot{Inequality_F} < 0 \rightarrow d\lambda > dl \quad (5.1.13)$$

$$\dot{Inequality_F} < 0 \rightarrow dh < d\xi \quad (5.1.14)$$

Additionally, combining relations (5.1.10) and (5.1.3), wage share, λ, can be expressed in terms of real wage and labor productivity. Thus, factor inequality can be presented according to relation (5.1.15). As a consequence, the growth rates of factor inequality can be presented as in relation (5.1.16).

$$Inequality_F = l - \frac{w^r}{A_L} \quad (5.1.15)$$

$$\dot{Inequality_F} = \frac{l}{l-\lambda}\dot{l} - \frac{\lambda}{l-\lambda}\left(\dot{w^r} - \dot{A_L}\right) \quad (5.1.16)$$

As emerges, in order to reduce factor inequality growth, the following condition should hold.

$$\dot{Inequality_F} < 0 \rightarrow \frac{l}{\lambda}\dot{l} < \dot{w^r} - \dot{A_L} \quad (5.1.17)$$

Relation (5.1.17) implies that the difference between changes in nominal wage and labor productivity determines factor inequality due to wage share growth. Given that wage share increases could come from increases in employment or increases in real wages, as it emerges from relation (5.1.17), in order to reduce factor inequality, the wage share should increase due to real wage increases.

Therefore, while rising productivity, A_L, and relative employment of labor, l, are legitimate for economic growth, the real average wage, w^r, will be the major policy instrument for controlling factor inequality. As a result, in order to reduce factor inequality, policymakers should emphasize boosting the average wage, w^r, while also improving labor productivity A_L and labor employment, l.

Additionally, every increase in growth that comes due to increases in labor productivity or increases in labor employment needs two conditions in order to decrease inequality. The first condition is that the real average wage, w^r, must grow faster than labor productivity, A_L, so that wage share growth, $\dot{\lambda}$, will be positive according to equation (5.1.4). While the second condition is that wage shares, λ, should grow faster than labor employment, l, as presented by equation (5.1.12).

Finally, assuming that there is further inequality among individuals of the same class, it is assumed that inequality due to factor distribution is the minimum inequality that can be observed in the economy.

5.2 Wage inequality – Kuznets hypothesis

However, distinguishing distribution between two classes might be misleading given that labor compensation can be separated among basic and skilled production workers or managers, while profits can be divided among self-employed, small or large business profits, and earnings from interest and dividends. As usual reality is much more complex than our assumptions. One of the main problems that prevent us from exploring how distribution impacts income inequality is that not all workers are paid the same. In fact, the distribution of wage and salary levels differs among economies, as does the distribution of profit earners.

The difference in labor income among workers may arise from several factors. For example, as noted by García-Peñalosa (2010), variations in wages may result from worker heterogeneity in terms of education or skill level (García-Peñalosa, 2010). In Kuznets' framework, differences in income exist due to distinct sectors, with industrial workers receiving higher incomes than agricultural workers.

Hence, firstly, it is assumed that there are two different types of labor[6] with varying labor productivities. There is basic labor, denoted as L_b, consisting of workers with basic education and corresponding labor productivity $A_b = \frac{Y}{L_b}$. Additionally, there is skilled labor, denoted as L_s, comprising highly educated workers with labor productivity $A_s = \frac{Y}{L_s}$. Differences in labor productivity among workers may depend on factors such as their education, experience, or the sector in which they work. Consequently, it is assumed that these two types of labor receive different wages (w_b, w_s), resulting in the average income of basic labor being lower than that of skilled labor $(w_b < w_s)$.

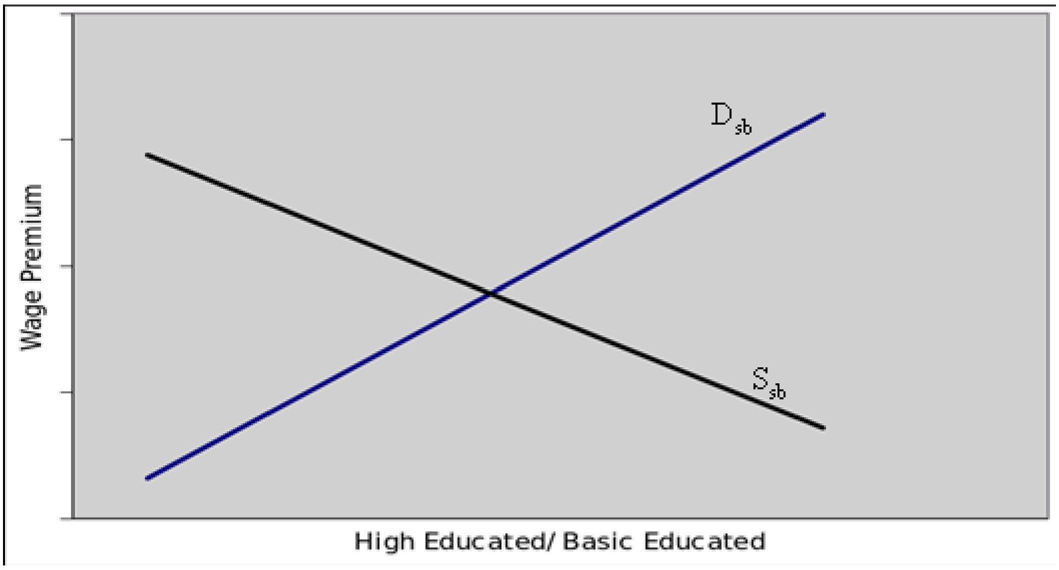
[6] $L = L_b + L_s$

Thus, assuming that a skilled labor worker receives a higher income than a basic worker, the relationship between the average wage of the skilled class and the basic class is defined as the wage premium, denoted as q_L, as presented in Equation (5.2.1):

$$q_L = \frac{w_s}{w_b} \tag{5.2.1}$$

The wage premium, q_L, is determined by the relative supply and relative demand for skilled and basic labor, as illustrated in Figure 3.

Figure 3 relative Demand/relative Supply



The wage premium is assumed to have a negative relationship with relative supply and a positive relationship with relative demand, as illustrated in Figure 3.

Relative supply of skilled labor, denoted as S_{sb}, is defined as the ratio of high-skilled labor supply (S_s) to basic skilled labor supply (S_b), expressed as ($S_{sb} = \frac{S_s}{S_b}$). Similarly, relative demand for skilled labor, denoted as D_{sb}, is determined by the ratio of the demand for highly educated labor (D_s) to the demand for basic educated labor (D_b), represented as ($D_{sb} = \frac{D_s}{D_b}$).

Furthermore, it's worth noting that both relative demand/supply and the wage premium can be influenced by exogenous factors such as technological advancements, globalization, and bargaining power.

Basic labor workers L_b, receive a total wage income denoted as W_b, while skilled labor workers L_s, receive a total wage income denoted as W_s.

The ratio of the total income of higher-paid labor to that of lower-paid labor, denoted as m_L, is defined by the relationship (5.2.2), and their labor employment is represented as Λ_L, based on the relationship (5.2.3).

$$m_L = \frac{W_s}{W_b} = \frac{q_L}{\Lambda_L} \tag{5.2.2}$$

$$\Lambda_L = \frac{L_b}{L_s} \tag{5.2.3}$$

Furthermore, since each type of labor has different productivities and receives different wages, the unit costs also vary. Equations (5.2.4) and (5.2.5) present the unit costs of skilled and basic labor, respectively.

$$\frac{w_s L_s}{Y} = \frac{w_s}{A_s} \tag{5.2.4}$$

$$\frac{w_b L_b}{Y} = \frac{w_b}{A_b} \tag{5.2.5}$$

Moreover, while most skilled and basic labor can be substituted for each other, certain job positions demand either exclusively basic or skilled labor. Consequently, each firm's output requires a mix of both skilled and basic labor. Therefore, the total labor costs for each firm comprise two distinct labor costs based on the combination of these two labor types. Additionally, the relationship between the unit costs of the two labor types is defined as the relative cost, as shown in equation (5.2.6):

$$Relative\ cost = \frac{\frac{w_s}{A_s}}{\frac{w_b}{A_b}} = \frac{q_L}{\frac{A_s}{A_b}} \tag{5.2.6}$$

The relative cost of workers in the two labor classes depends on their productivities and nominal wages. Additionally, firms strive to minimize production costs to enhance competitiveness, and relative cost plays a crucial role in determining the relative labor employment Λ_L. Firms seek to optimize the composition of basic and skilled labor based on considerations of relative cost.

As a result, when the relative cost falls below unity, firms tend to demand more skilled labor, leading to a decrease in relative labor employment (Λ_L). Conversely, if the relative cost exceeds unity, employers will seek less skilled labor, resulting in an increase in relative employment Λ_L. Therefore, the determination of relative labor employment is predicated on the relative cost. Additionally, we assume that relative employment directly influences the total productivity of the economy because it reflects the composition of different labor types with varying labor productivities. Consequently, if we assume that skilled labor is more productive than basic labor $A_s > A_b$, a lower relative employment Λ_L, corresponds to higher overall productivity.

Furthermore, the income share of total wages for skilled labor, denoted as ω_s, is determined by relation (5.2.7). Correspondingly, ω_b, represents the income share of total wages for basic labor, calculated as shown in relation (5.2.8).

$$\omega_s = \frac{W_s}{W} \tag{5.2.7}$$

$$\omega_b = \frac{W_b}{W} \tag{5.2.8}$$

Furthermore, by combining (5.2.1) and (5.2.3) into relations (5.2.7) and (5.2.8), the income shares of total wages can be expressed as shown in relation (5.2.9) and (5.2.10).

$$\omega_s = \frac{W_s}{W} = \frac{1}{1 + \frac{1}{\frac{q_L}{\Lambda_L}}} \tag{5.2.9}$$

$$\omega_b = \frac{W_b}{W} = \frac{1}{\frac{q_L}{\Lambda_L} + 1} \tag{5.2.10}$$

Hence, as observed, income shares of wages are determined by wage premium and relative labor employment. Moreover, the proportions of skilled and basic workers in the total labor population are denoted as γ_s and γ_b, respectively, as shown in equations (5.2.11) and (5.2.12).

$$\gamma_s = \frac{L_s}{L} \tag{5.2.11}$$

$$\gamma_b = \frac{L_b}{L} \tag{5.2.12}$$

Additionally, by combining equation (5.2.3) with equations (5.2.11) and (5.2.12), the proportion of each labor type to the total labor force can be expressed using relative employment, as shown in equations (5.2.13) and (5.2.14).

$$\gamma_s = \frac{L_s}{L} = \frac{1}{\Lambda_L + 1} \tag{5.2.13}$$

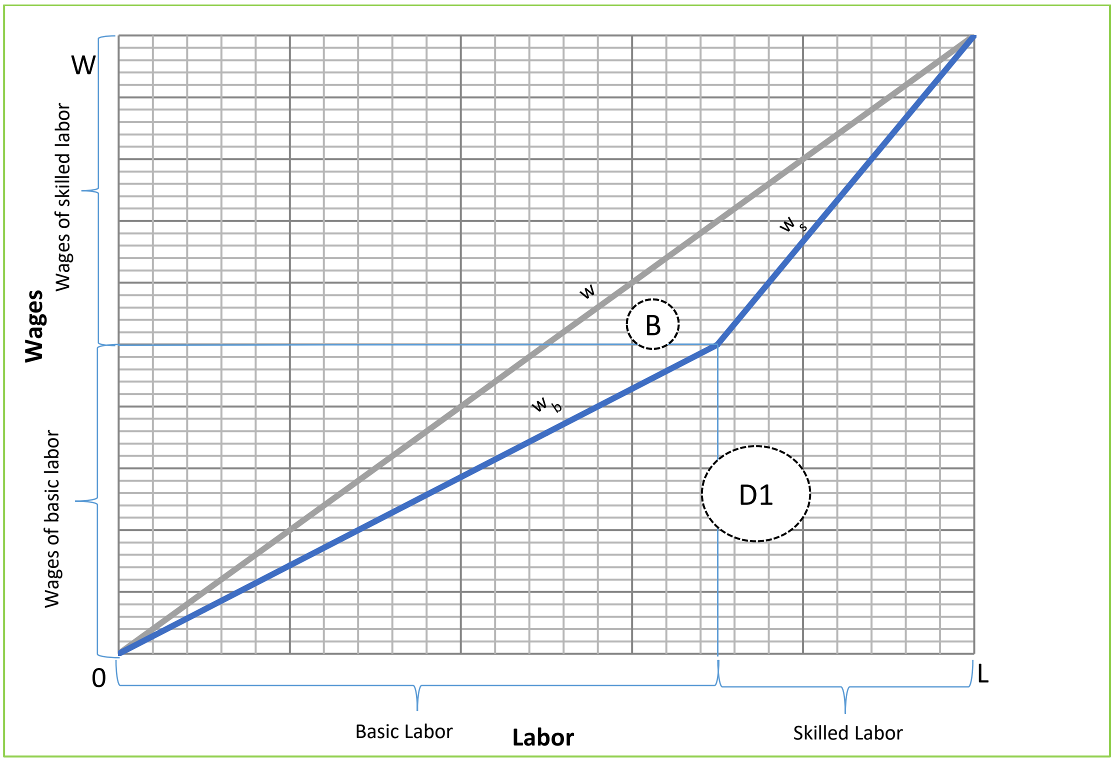
$$\gamma_b = \frac{L_b}{L} = \frac{1}{\frac{1}{\Lambda_L} + 1} \tag{5.2.14}$$

Hence, labor proportions in relation to the total labor force can be determined through relative labor employment. Furthermore, the average wage can be expressed using equation (5.2.15).

$$w = w_s\gamma_s + w_b\gamma_b \tag{5.2.15}$$

Consequently, assuming that each individual receives the same average income as the other members of their class, and that the average wage income for skilled labor is greater than the average wage income for basic labor, the Lorenz curve for labor inequality will be presented as shown in Figure 4.

Figure 4 Lorenz curve



The green line is the slope of average wage income, w, while the area B between the green and the blue line denotes wage inequality. Moreover, using the same calculation formula for the GINI index as before, the inequality between skilled and basic labor workers is given by the relation (5.2.16):

$$Inequality_L = \frac{area\ B}{area\ B + \text{area}\ D_1} \tag{5.2.16}$$

Therefore, labor inequality can be represented as a function of income shares from wages and employment shares, as seen in equations (5.2.17) and (5.2.18).

$$Inequality_L = \omega_s - \gamma_s \tag{5.2.17}$$

$$Inequality_L = \gamma_b - \omega_b \tag{5.2.18}$$

Hence, according to equations (5.2.17) and (5.2.18), it emerges that changes in income shares from wages of skilled and basic labor will affect inequality positively and negatively, respectively[7]. Additionally, the proportions of skilled and basic workers in the total labor force will affect wage inequality positively and negatively, respectively8.

Furthermore, by combining equations (5.2.17) and (5.2.18) with equations (5.2.11), (5.2.12), (5.2.13), and (5.2.14), wage inequality can be expressed as shown in equation (5.2.19).

$$Inequality_L = \frac{q_L - 1}{\left(\frac{q_L}{\Lambda_L} + 1\right)(1 + \Lambda_L)} \tag{5.2.19}$$

Hence, as observed, labor inequality is determined by wage premium, q_L, and relative labor employment, Λ_L. Specifically, changes in wage premium have a positive relationship with changes in wage inequality, as seen in equation (5.2.20). Conversely, as shown in equation (5.2.21), the impact of changes in relative employment on labor inequality is uncertain and depends on whether the term $(m_L - \Lambda_L)$ is positive or negative.

---

7 $\frac{\partial Inequality_L}{\partial \omega_s} = 1, \frac{\partial Inequality_L}{\partial \omega_b} = -1$

8 $\frac{\partial Inequality_L}{\partial \gamma_s} = -1, \frac{\partial Inequality_L}{\partial \gamma_b} = 1$

$$\frac{\partial Inequality_L}{\partial q_L} = \frac{\left(1+\frac{1}{\Lambda_L}\right)}{\left(\frac{q_L}{\Lambda_L}+1\right)^2 (1+\Lambda_L)} > 0 \tag{5.2.20}$$

$$\frac{\partial Inequality_L}{\partial \Lambda_L} = \frac{(q_L-1)\frac{1}{\Lambda_L}(m_L-\Lambda_L)}{\left(\frac{q_L}{\Lambda_L}+1\right)^2 (1+\Lambda_L)^2} \tag{5.2.21}$$

Furthermore, the total growth in labor inequality is determined by changes in wage premium and relative employment growth, as shown in equation (5.2.22).

$$\dot{Inequality_L} = \frac{q_L\left(1+\frac{1}{\Lambda_L}\right)}{\left(\frac{q_L}{\Lambda_L}+1\right)(q_L-1)}\dot{q_L} + \frac{\left(\frac{q_L}{\Lambda_L}-\Lambda_L\right)}{\left(\frac{q_L}{\Lambda_L}+1\right)(1+\Lambda_L)}\dot{\Lambda_L} \rightarrow$$

$$\rightarrow \dot{Inequality_L} = \frac{q_L+m_L}{(m_L+1)(q_L-1)}\dot{q_L} + \frac{m_L-\Lambda_L}{(m_L+1)(1+\Lambda_L)}\dot{\Lambda_L} \tag{5.2.22}$$

Therefore, as observed in equation (5.2.22), labor inequality is influenced by two terms, each representing changes resulting from the growth of wage premium and relative labor employment, respectively.

Furthermore, as previously mentioned, the impact of relative labor employment growth is ambiguous. To elaborate, the second term suggests that the effect of relative employment growth on labor inequality is positive when their relative incomes m_L are higher than their relative labor employment Λ_L,$(m_L-\Lambda_L>0)$; otherwise, it is negative[9]. Hence, the influence of changes in the relative employment of labor on wage inequality appears to peak when $\Lambda_L=m_L$.

Furthermore, as relative employment decreases when the population of higher-paid workers increases, an increase in skilled labor will heighten inequality only when their relative incomes, m_L, are lower than their relative labor employment, Λ_L[10]. Conversely, if their relative incomes, m_L, surpass their relative employment Λ_L[11], inequality will diminish as a consequence of the growth in the skilled labor population relative to basic

[9] $\frac{\partial Inequality_L}{\partial \Lambda_L} > 0 \rightarrow m_L > \Lambda_L$ and $\frac{\partial Inequality_L}{\partial \Lambda_L} < 0 \rightarrow m_L < \Lambda_L$

[10] $m_L < \Lambda_L$

[11] $m_L > \Lambda_L$

labor. Thus, the outcome regarding relative labor employment growth rates may differ across economies, contingent on their labor composition.

Moreover, assuming that relative labor employment decreases over time as the economy expands alongside the skilled labor population, an inverted "U" relationship between growth and labor inequality, akin to Kuznets' hypothesis, would inevitably emerge.

Hence, assuming that in the early stages of economic growth, the labor force primarily consists of basic labor, relative labor employment (Λ_L) will be high, while relative income (m_L) will be low. As technology advances and labor gains skills through education and experience, more productive labor and sectors emerge. If policymakers choose to increase labor productivity by employing skilled workers with higher wages, Λ_L will decrease – in other words, it will have a negative growth as labor productivity increases.

In the early stages, where Λ_L is still higher than m_L, $(m_L - \Lambda_L < 0)$, an increase in the population of skilled labor relative to basic labor will lead to higher inequality, as shown in equation (5.2.22). However, as the economy continues to reduce relative labor employment (Λ_L) by employing more productive and higher-paid workers, labor inequality will reach a maximum point where Λ_L is no longer higher than relative income m_L. As the economy surpasses this maximum point, a scenario emerges where $(m_L - \Lambda_L > 0)$. In this scenario, the introduction of more productive labor with higher wages leads to a reduction in labor inequality, as indicated by equation (5.2.22). Consequently, the economy experiences simultaneous growth and increasing labor inequality during its early stages, characterized by a higher relative labor employment, Λ_L, compared to relative income, m_L[12]. However, when this situation reverses due to economic progress, the economy continues to grow while labor inequality reduces[13]. This pattern suggests a Kuznets curve trajectory. Therefore, the second term of the equation implies that the relationship between labor inequality and economic growth aligns with the Kuznets hypothesis when the composition of the labor force shifts toward a workforce that is more skilled, productive, and better compensated. In light of this, policymakers should prioritize the reduction of relative labor employment by

[12] $(m_L - \Lambda_L) < 0$

[13] $(m_L - \Lambda_L) > 0$

promoting higher productivity through a workforce that is more educated, skilled, and better remunerated. This phase, $(m_L - \Lambda_L > 0)$, where inequality becomes inversely related to growth, can be achieved by fostering a labor force composed of highly educated and well-paid workers.

Moreover, the first term of the equation indicates that the impact of the growth in wage premium on labor inequality will consistently be positive, as wage premium always exceeds unity, expressed as $(q_L - 1 > 0)$.

Furthermore, according to relation (5.2.22), labor inequality remains unchanged when relation (5.2.23) is satisfied.

$$\frac{\dot{q}_L}{\dot{\Lambda}_L} = \frac{(\Lambda_L - m_L)(q_L - 1)}{(1 + \Lambda_L)(q_L + m_L)} \qquad (5.2.23)$$

Thus, considering that growth changes in relative labor employment, Λ_L, can follow either a positive or negative trajectory, in line with the Kuznets hypothesis, changes in wage premiums can either amplify or mitigate these shifts. Therefore, during the initial stages $(m_L - \Lambda_L < 0)$, in order to maintain low levels of labor inequality, changes in wage premiums should be positively associated with changes in relative employment. Conversely, in later stages $(m_L - \Lambda_L > 0)$, an increase in skilled labor could be accompanied by increases in wage premiums and decreases in labor inequality.

On one hand, in general, the growth of wage premiums can serve as a useful tool for controlling levels of labor inequality, irrespective of the stage of the economy. On the other hand, considering that wage premiums also determine the relative income between the two labor classes (m_L), they can either amplify or dampen the inverted U-shaped relationship between labor inequality and economic growth, as described earlier.

5.3 Profit inequality – market openness

Furthermore, it is assumed that profit income differs among investors, implying that additional income inequality can be observed among profit earners. Additionally, as argued, profit income may be more unequally distributed than wages; hence, a shift from wages to profits may increase inequality (Piketty, 2014).

In the present theoretical approach, it is assumed that the income class of capital owners consists of two different income classes with varying profit incomes: the high-class investors, Ξ_h, and the middle-class investors, Ξ_m[14].

In this theoretical framework, it is assumed that the population of high-class investors, Ξ_h, remains relatively stable over time and represents the dominant group of investors.

This implies that high-income investors can create barriers for new investors seeking to enter the market, while they can also invest in new sectors or technologies more easily than middle-class investors, Ξ_m. Conversely, it is assumed that the population of middle-class investors, Ξ_m, can either increase or decrease over time. Changes in the population of middle-class investors, Ξ_m, depend on factors such as market openness, barriers set by other firms, or the required initial capital needed to establish a firm.

As a result, it is expected that the larger the population of middle-class investors, Ξ_m, in comparison to the population of high-class investors, Ξ_h, the fewer barriers new investors will face, leading to a weaker monopolistic power held by high-class investors, Ξ_h. The relationship between middle-class investors, Ξ_m, and high-class investors, Ξ_h, is defined in equation (5.3.1).

$$\Lambda_K = \frac{\Xi_m}{\Xi_h} \tag{5.3.1}$$

Thus, equation (5.3.1) can be regarded as a monopoly index, where a lower value of, Λ_K, implies that fewer middle-class investors, Ξ_m, can enter the market. Conversely, a higher value of Λ_K, indicates a more open economy with greater opportunities for investors.

Furthermore, we assume that K_h represents the total capital stock of high-class investors in Ξ_h, with a corresponding profit rate of, r_h, and profit income Π_h[15]. Similarly, middle-class investors in Ξ_m possess a capital stock of K_m and receive profits amounting to Π_m, with a profit rate denoted as r_m[16].

---

[14] $\Xi = \Xi_h + \Xi_m$

[15] $r_h = \frac{\Pi_h}{K_h}$

[16] $r_m = \frac{\Pi_m}{K_m}$

As there are two classes of investors with varying personal endowments in capital stock, the total capital stock is the sum of the capital holdings of each class[17]. Additionally, each profit income class receives different levels of profit income depending on the amount and characteristics of capital they supply, as well as the bargaining power of their respective firms. Hence, total profits are calculated as the sum of the profit amounts of each class, as presented in equation (5.3.2).

$$\Pi = \Pi_h + \Pi_m = r_h K_h + r_m K_m \tag{5.3.2}$$

Furthermore, it is assumed that each individual from the high-income class of profit earners owns a certain amount of capital denoted by ζ_h. Similarly, each individual from the middle-income class of profit earners owns an amount of capital denoted as ζ_m as shown in equations (5.3.3) and (5.3.4).

$$\frac{K_h}{\Xi_h} = \zeta_h \tag{5.3.3}$$

$$\frac{K_m}{\Xi_m} = \zeta_m \tag{5.3.4}$$

Additionally, the average income of high-class and middle-class capital owners will be denoted as π_h and π_m respectively, as presented in equations (5.3.5) and (5.3.6).

$$\pi_h = \frac{\Pi_h}{\Xi_h} = \frac{\Pi_h}{\frac{K_h}{\zeta_h}} = r_h \zeta_h \tag{5.3.5}$$

$$\pi_m = \frac{\Pi_m}{\Xi_m} = \frac{\Pi_m}{\frac{K_m}{\zeta_m}} = r_m \zeta_m \tag{5.3.6}$$

Therefore, it is assumed that the incomes of high- and middle-class profit earners are determined by the capital they have invested, denoted as ζ_i, and their respective profit rates, r_i.

Furthermore, the relationship between the two profit rates is denoted as ρ, and the relationship between their capital stocks is denoted as k, as described in equations (5.3.7) and (5.3.8).

[17] $K = K_h + K_m$

$$\rho = \frac{r_h}{r_m} \tag{5.3.7}$$

$$k = \frac{K_h}{K_m} \tag{5.3.8}$$

Furthermore, as described in equations (5.3.7) and (5.3.8), the total income from profit depends on the relationship between the two profit rates and the relationship between their capital stocks, as shown in equation (5.3.9). In terms of growth, the ratio of total income for high-class investors, Ξ_h, to that of middle-class investors, Ξ_m, is presented in equation (5.3.10).

$$m_K = \frac{\Pi_h}{\Pi_m} = \frac{r_h K_h}{r_m K_m} = \rho k \tag{5.3.9}$$

$$\dot{m_K} = \dot{\rho} + \dot{k} \tag{5.3.10}$$

Additionally, as previously mentioned, individuals possess different personal capital stocks, and their personal relative capital stock is defined as the ratio of their personal capital stock, κ, as shown in equation (5.3.11). Furthermore, by combining relation (5.3.1) with relations (5.3.3), (5.3.4), and (5.3.8), the relationship between their populations can be expressed as shown in equation (5.3.12). Additionally, equation (5.3.12) can be presented in growth terms using equation (5.3.13).

$$\kappa = \frac{\zeta_h}{\zeta_m} \tag{5.3.11}$$

$$\Lambda_K = \frac{\Xi_m}{\Xi_h} = \frac{\frac{K_m}{\zeta_m}}{\frac{K_h}{\zeta_h}} = \frac{\kappa}{k} \tag{5.3.12}$$

$$\dot{\Lambda_K} = \dot{\Xi_m} - \dot{\Xi_h} = \dot{\kappa} - \dot{k} \tag{5.3.13}$$

Furthermore, their personal relative average income from profits is defined as the profit premium, as presented in relation (5.3.14). The profit premium, denoted as q_K, is determined by both their relative profit rates, ρ, and their personal relative capital stock, κ. This relationship can be expressed in growth terms using equation (5.3.15).

$$q_K = \frac{\pi_h}{\pi_m} = \frac{r_h \zeta_h}{r_m \zeta_m} = \rho\kappa \tag{5.3.14}$$

$$\dot{q_K} = \kappa\dot{\rho} + \rho\dot{\kappa} \tag{5.3.15}$$

Assuming that the average profit income of the high-income class is greater than that of the middle-income class, it follows that the profit premium, denoted as q_K, is always greater than unity, $q_K > 1$.

Furthermore, the income shares of each class of investors in terms of total profits are described by equations (3.16) and (3.17). Specifically, the relationship representing the profit income of high-class capital owners relative to total profit income is represented as k_h, while the relationship for the profit income of middle-class capital owners relative to total profit income is denoted as k_m.

$$k_h = \frac{\Pi_h}{\Pi} \tag{5.3.16}$$

$$k_m = \frac{\Pi_m}{\Pi} \tag{5.3.17}$$

Furthermore, by combining equations (3.16) and (3.17) with equations (5.3.12) and (5.3.14), it becomes evident that income shares from profits are determined by two key factors: the profit premium, denoted as q_K, and the relation of their population, which signifies market openness and is represented as Λ_K. This relationship is illustrated in equations (5.3.18) and (5.3.19).

$$k_h = \frac{\Pi_h}{\Pi} = \frac{1}{1 + \frac{1}{\frac{\Pi_h}{\Pi_m}}} = \frac{1}{1 + \frac{1}{\frac{q_K}{\Lambda_K}}} \tag{5.3.18}$$

$$k_m = \frac{\Pi_m}{\Pi} = \frac{1}{\frac{q_K}{\Lambda_K} + 1} \tag{5.3.19}$$

Moreover, the proportion of high-income class population to total profit earners population is denoted by η_h, while respectively, the proportion of middle-income class population to total profit earners population is denoted by η_m according to relations (5.3.20) and (5.3.21).

$$\eta_h = \frac{\Xi_h}{\Xi} \tag{5.3.20}$$

$$\eta_m = \frac{\Xi_m}{\Xi} \tag{5.3.21}$$

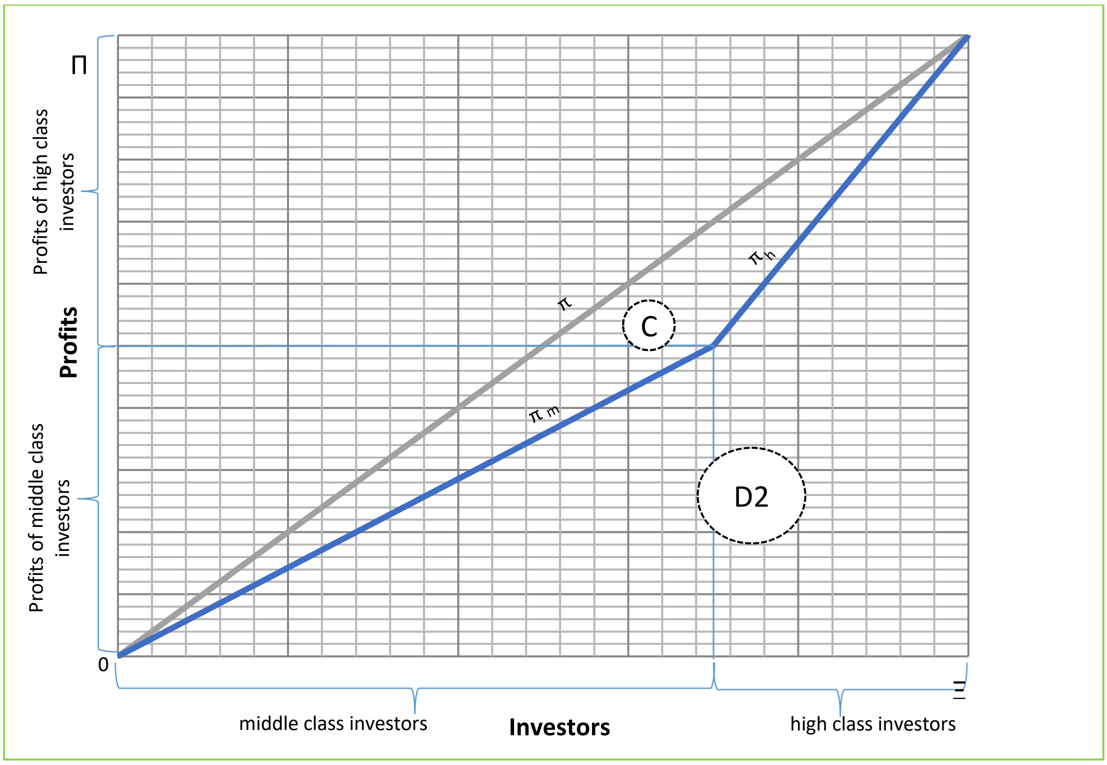
Furthermore, when equations (3.18) and (3.19) are combined with equation (5.3.12), it becomes evident that the proportion of each class of capital owners to the total population of capital owners can be expressed by their relation to market openness, denoted as Λ_K. This relationship is demonstrated in equations (5.3.22) and (5.3.23).

$$\eta_h = \frac{\Xi_h}{\Xi} = \frac{1}{1 + \frac{1}{\frac{\Xi_h}{\Xi_m}}} = \frac{1}{1 + \Lambda_K} \tag{5.3.22}$$

$$\eta_\mu = \frac{\Xi_m}{\Xi} = \frac{1}{\frac{1}{\Lambda_K} + 1} \tag{5.3.23}$$

Additionally, to represent profit distribution, it is assumed that each individual within the high or middle class receives the same income as others in their respective class. As mentioned earlier, the average income of high-class investors exceeds that of middle-class investors, denoted as $\pi_h > \pi_m$. Therefore, following the same rationale as in previous sections, the Lorenz curve for profit earners is depicted in Figure 5.

Figure 5 Lorenz curve



The green line represents the slope of the average profit income, π, whereas the area C between the green and the blue line illustrates profit inequality. Employing the same formula for calculating inequality indices as previously, we can express the inequality between high- and middle-class capital owners through the relation (5.3.24).

$$Inequality_K = \frac{C}{C + D_2} \tag{5.3.24}$$

Moreover, as per equations (5.3.25) and (5.3.26), profit inequality is influenced by the income shares of profits for each class and their proportion of the population.

$$Inequality_K = k_h - \eta_h \tag{5.3.25}$$

$$Inequality_K = \eta_m - k_m \tag{5.3.26}$$

On one hand, increases in the high class's share of income from profits relative to total profits, along with increases in the proportion of middle-class investors in the overall population of investors, are positively associated with inequality[18]. On the other hand, increases in the middle-class's share of income from profits relative to total profits and in the proportion of high-class investors in the overall population of investors would have a negative impact on profit inequality.[19]

Furthermore, according to relations, (5.3.18), (5.3.19), (5.3.22) and (5.3.23), profit inequality can be expressed according to relation (5.3.27).

$$Inequality_K = \frac{q_K - 1}{(m_K + 1)(\Lambda_K + 1)} \tag{5.3.27}$$

Thus, profit inequality is determined by profit income premium, q_K, their relative income shares, m_K, and the relative employment of capital owners, Λ_K. As can be easily observed, the impact of profit premium, q_K, on profit inequality will always be positive, as presented in equation (5.3.28). Regarding the impact of Λ_K, which has been assumed to measure the monopolistic power of the high class of investors, on profit inequality, it is uncertain, as can be observed through equation (5.3.29). Finally, equation (5.3.30) presents total changes in profit inequality in growth terms.

---

[18] $\frac{\partial Inequality_K}{\partial k_h} = 1, \frac{\partial Gini_{\Xi_h,\Xi_m}}{\partial \eta_m} = 1$

[19] $\frac{\partial Gini_{\Xi_h,\Xi_m}}{\partial \eta_h} = -1, \frac{\partial Inequality_K}{\partial k_m} = -1$

$$\frac{\partial Inequality_K}{\partial q_K} = \frac{\left(1+\frac{1}{\Lambda_K}\right)}{\left(\frac{q_K}{\Lambda_K}+1\right)^2 (1+\Lambda_K)} > 0 \tag{5.3.28}$$

$$\frac{\partial Inequality_L}{\partial \Lambda_K} = \frac{(q_K-1)\frac{1}{\Lambda_K}(m_K-\Lambda_K)}{\left(\frac{q_K}{\Lambda_K}+1\right)^2 (1+\Lambda_K)^2} \tag{5.3.29}$$

$$\dot{Inequality_K} = \dot{q_K}\left(\frac{(q_K+m_K)}{(q_K-1)(m_K+1)}\right) - \dot{\Lambda_K}\left(\frac{(\Lambda_K-m_K)}{(m_K+1)(1+\Lambda_K)}\right) \tag{5.3.30}$$

Therefore, as can be observed through equation (5.3.30), profit inequality is determined by two terms. Each of these terms expresses the changes caused by the growth of profit premium and relative investors' employment, respectively. The first term in relation (5.3.30) represents the effect of profit premium q_K on profit inequality, which is always positive.

The second term in relation (5.3.30) represents the effect of monopoly on changes in profit inequality, which, as already mentioned, is ambiguous. When there is a high level of monopoly, and hence a small Λ_K and a high m_K, changes in monopoly, ($\dot{\Lambda_K}$), are positively related to changes in profit inequality, as seen in relation (5.3.31).

$$\frac{\partial Inequality_K}{\partial \Lambda_K} > 0 \rightarrow m_K > \Lambda_K \tag{5.3.31}$$

On the contrary, in cases of a low level of monopoly, which implies a larger Λ_K and a lower m_K, changes in monopoly, ($\dot{\Lambda_K}$), are negatively related to changes in profit inequality, as seen in relation (5.3.32).

$$\frac{\partial Inequality_K}{\partial \Lambda_K} < 0 \rightarrow m_K < \Lambda_K \tag{5.3.32}$$

Moreover, following relation (5.3.30), profit inequality changes are equal to zero when the relation (5.3.33) holds.

$$\dot{Inequality_K} = 0 \rightarrow \frac{\dot{q_K}}{\dot{\Lambda_K}} = \frac{(\Lambda_K-m_K)}{(1+\Lambda_K)}\frac{(q_K-1)}{(q_K+m_K)} \tag{5.3.33}$$

Hence, as can be observed in relation (5.3.31), in cases with high monopoly level, in order to decrease profit inequality, a monopoly reduction due to Λ_K increases must be accompanied also by decreases in growths of profit premium, q_K. In contrast, in cases of low monopoly level, in order to decrease profit inequality, increases of Λ_K could be accompanied by increases in growths of profit premium, q_K up to certain level.

5.4 Technology

5.4.1 Technology and factor inequality

It is assumed that technological change affects all types of inequality and is strongly related to economic growth. Firstly, technological change and inventions are assumed to be positively related to investment demand, as argued by Lima (2000), Hein (2012), and Parui (2018) (Lima, 2000; Hein, 2012; Parui, 2018). In addition, since at any given level of profit rate, higher technological change results in the installation of new machinery and increased investment in general, following the ideas of Dutt (1994) and Lima (2004), it is assumed that the innovation rate positively affects incentives to invest (Dutt, 1994; Lima, 2004). This analysis aligns with both the Schumpeterian view, which argues that firms' incentives for investment are driven by innovation, and the neo-Schumpeterian view that investment is fueled by technical change (Schumpeter, 1942; Nelson R., 1982; Lima, 2004).

Furthermore, it is frequently assumed that technological changes improve productivity, and as a consequence, it is believed that technological change affects growth due to its influence on productivity. For instance, when productivity costs fall as a result of technological change, firms are expected to increase their investments and profits. This has a significant impact on factor distribution and pricing, as increased labor productivity allows for higher nominal wages and profits. Therefore, changes in inequality are determined by the bargaining power of both labor and capital. Thus, technological changes lower product costs and encourage shifts in wage and profit shares, depending on policymakers' objectives and the economic regime. Hence, technological change can result in changes in nominal wages, profit rates, product prices, and factor inequality. As argued by Lima (2000), lower unit costs favor bargaining, so in the case of technological changes, labor-saving innovations will affect distribution by reducing unit labor costs and, consequently, the share of wage income (Lima, 2000). As a result, if wage shares decrease due to labor productivity growth through technological changes, factor inequality will increase, as shown in equations (5.1.10) and (5.1.15).

Furthermore, it is assumed that inequality affects technological change through its influence on incentives to innovate. According to Lima (2000) and Lima (2004), technological innovation (τ) is not given exogenously but is non-linearly related to income distribution, as described by the following innovation function: $\tau = \lambda - \lambda^2$ (Lima, 2000; Lima, 2004). This function, proposed by Lima (2000) and Lima (2004), suggests that the level of profit distribution that maximizes the rate of technological innovation is when the wage share, λ, corresponds to half of the total income, with the other half as the profit share, denoted as h. This innovation function, as presented by Lima, attempts to capture the impact of wage share on firms' propensity to innovate, particularly in adopting labor-saving innovations. Additionally, it reflects the non-linear influence of concentration on firms' innovation propensity, in line with Schumpeterian-based theories (Lima, 2000).

Consequently, a low wage share and a high profit share create an environment where, despite the availability of funding for innovation, the incentives for firms to innovate are diminished. Conversely, when the profit share is lower, there are stronger incentives to innovate as firms seek to enhance their profit income. However, in such cases, the capacity to fund innovation may be limited (Lima, 2004). Lima's model suggests that high levels of inequality, characterized by substantial disparities in profit and wage shares, provide little motivation for innovation, indicating a negative relationship between factor inequality and investment in new technologies.

Nonetheless, it's important to recognize that the ability to implement innovation requires a certain level of capital stock. Thus, even if profits are available for investing in new technologies, successful innovation is contingent on having the requisite capital. Conversely, when profit levels fall below this critical threshold, despite the incentives for innovation, firms may be unable to invest in new technologies due to insufficient profits. Consequently, factor inequality is positively correlated with innovation. According to Lima (2004), this critical threshold is reached when the profit share equals the wage share.

5.4.2 Technology and profit inequality

In this theoretical approach, following Lima (2000) and Lima (2004), innovation is presumed to be influenced by profit distribution rather than factor distribution.

The reason for using profit distribution is to account for competitiveness among firms, driven by innovation. Firms that can leverage new technologies to reduce production costs gain a significant advantage over others. Consequently, it is posited that profit income inequality shapes the demand for investment in new technologies due to capital concentration and competitiveness.

Initially, it is assumed that investing in new technologies requires a minimum income threshold, which is beyond the reach of medium profit earners (Ξ_m). Therefore, barriers exist for the medium class (Ξ_m), primarily leading them to imitate and follow technological norms established by the high class (Ξ_h). So, it is assumed that while the income of medium-profit earners is π_m, the income required for investment in new technologies is $\pi_m + \alpha > \pi_m$, where $\alpha > 0$.

Likewise, it is considered that the higher the income of high-class investors compared to middle-income profit earners is, the lesser is the motivation to innovate. Therefore, it is assumed that high-class investors choose to innovate when profit inequality decreases in order to maintain their economic leadership. Hence, higher profit inequality indicates lower incentives to invest in new technologies, while, in contrast, falling profit inequality means that high-class firms will try to innovate in order to regain the profit distribution advantage.

However, if high-class average profit income falls below a critical income level ($\pi_m + \alpha$), although their personal income may remain higher than the middle-class personal income ($\pi_m < \pi_h < \pi_m + \alpha$), then despite the high incentives to innovate, high-class firms will not afford innovation. Hence from that point, if inequality keeps decreasing, investing in new technologies will also decrease, implying a positive relation of inequality and technological change. Thus, it is assumed that there is a certain level of profit inequality that implies a maximum level of demand for innovation. If inequality levels differ from that level, then innovation has a decreasing trend.

In cases characterized by high monopolistic power, characterized by low levels of Λ_K and high levels of m_K[20], middle-class investors will face barriers when trying to adopt technological changes. Therefore, only high-class investors will benefit from higher profit rates due to innovations, leading to a higher income premium from profits, q_K, and an increase in relative incomes, m_K. Thus, according to equation (5.3.30), profit inequality will increase due to the influence of the first term, which rises as the income premium from profits grows, q_K[21]. The second term implies that in cases where the population of middle-class investors increases, income profit inequality will also increase[22]. Thus, in cases of high monopolistic levels, technological changes through innovation will lead to increases in profit inequality, which will result in future declining incentives for innovation.

In contrast, in cases of open markets, characterized by high levels of Λ_K and low levels of m_K[23], middle-class capital owners will tend to adopt technological changes depending on the levels of ρ. However, as previously mentioned, high-class investors are the first to be able to use new technology. Therefore, the income premium from profits will rise in the early stages of technological changes. Once middle-class investors are able to use technological change by imitating high-class investors and achieve higher profit rates, their income premium from profits will start decreasing[24] due to decreases in ρ, according to equations (5.3.14) and (5.3.15). Furthermore, higher incentives to invest due to higher profit rates and low levels of monopoly will result in higher market openness[25]. Therefore, according to equation (5.3.30), on the one hand, the second term implies that profit inequality decreases. On the other hand, profit inequality will increase according to the first term in the early stages, where technological change can be used only by the leading class, while in later stages profit premium will decline, resulting in negative effects on profit inequality.

Hence, if a technological change leads to rises in the income of the richer class of innovators in the short run, then the relationship between profit inequality and

---

[20] $\Lambda_K < m_K$

[21] $\frac{dq_K}{q_K} > 0$

[22] $\frac{d\Lambda_K}{\Lambda_K} > 0$

[23] $\Lambda_K > m_K$

[24] $\frac{dq_K}{q_K} < 0$

[25] $\frac{d\Lambda_K}{\Lambda_K} > 0$

productivity will be positive in the initial stages of the technological change. After a certain period, as imitators start to benefit from technological diffusion, income profit inequality will start decreasing as growth continues to increase due to productivity resulting from innovation. Hence, a negative relationship between profit inequality and growth will emerge in the long run.

Finally, as mentioned before, this decline in profit inequality will result in future incentives for innovation by the leading class to retain leadership in the market. This will result in a similar inequality path due to new technological changes, implying a cyclical relationship between profit inequality and economic growth through innovation in a low monopolistic environment, while the economy follows a Schumpeterian innovation growth path.

Thus, innovation, on the one hand, is affected by profit inequality depending on the incentives and the availability of investors to invest based on their income levels. On the other hand, innovation affects profit inequality, depending on the diffusion levels of innovations, which is determined by the monopolistic power of the leading class, Λ_K. Therefore, if policymakers can control the diffusion of innovation, they may be able to control profit inequality and future demand for innovation. Since productivity due to innovation has been assumed to positively affect economic growth, profit inequality seems to be related to economic growth because of the dispersion of new technology among investors. The diffusion of innovation can be regulated through patent control or economic incentives.

5.4.3 Technology and labor inequality

Technological changes and innovation are expected to be related to labor inequality, mainly due to the change in the composition of the employed labor force. Firstly, it is considered that technological changes and innovation are skill-biased since higher-educated workers can use new technologies and information more efficiently. Thus, since skilled labor tends to adapt more easily to technological changes, it is assumed that every innovation firstly increases the employment of skilled labor. As a result, according to relation (5.2.3), relative labor employment, Λ_L, will decrease.

Moreover, as previously assumed, skilled labor is more productive than basic labor. Consequently, the relative cost, as demonstrated in relation (5.2.6), will decrease. Consequently, the reduction in relative cost will lead to an increased demand for skilled labor and, as a result, decreases in relative labor employment, Λ_L. Furthermore, as a result of innovation, the growth of the skilled labor population will be accompanied by increases in total average productivity. Hence, while technological changes are considered to boost labor productivity, total labor productivity will be determined by relative labor employment, Λ_L, as a result of technological changes.

Furthermore, changes in relative labor employment (Λ_L) that emerge due to technological changes also imply changes in labor inequality according to relation (5.2.22). As innovation decreases the relative cost and firms try to decrease their product costs, the demand for skilled labor will increase relative to basic labor. As a result, following equation (5.2.22), relative labor employment will change in favor of skilled labor ($\dot{\Lambda}_L < 0$) implying changes in wage inequality.

The impact of these changes, ($\dot{\Lambda}_L < 0$), could be reflected by the second term of equation (5.2.22). Therefore, for instance, if the impact of the second term is negative[26], implying that there is much more basic labor related to skilled labor in the economy, an increase in demand for skilled labor ($\dot{\Lambda} < 0$) will increase labor inequality. In contrast, if the impact of the second term is positive[27], implying an economy driven by skilled labor, then an increase in demand for skilled labor ($\dot{\Lambda} < 0$) will have a negative impact on wage inequality.

Furthermore, as mentioned in previous chapters, innovation could result in a relationship between labor inequality and growth characterized by a Kuznets curve, as demonstrated in section 5.2. For instance, if we assume that the initial relative labor employment Λ_L is large, while the total skilled labor income is low in relation to the total basic labor income, an increase in skilled labor employment will lead to increased inequality, as described in equation (5.2.22). Consequently, as innovation initiates technological change and encourages greater investment requiring skilled labor, the demand for skilled labor will rise. As a consequence, relative employment (Λ_L) will decline, and the relative total incomes between skilled and basic labor (m_L) will start

[26] when $m_L - \Lambda_L < 0$
[27] when $m_L - \Lambda_L > 0$

increasing. The velocity of these changes in relative total income (m_L) will depend on changes in the wage premium (q_L), as discussed in Chapter 5.2.

With innovation driving more investment, whether by innovators (h) or imitators (m), relative employment (Λ_L) will keep decreasing while total earnings of skilled labor will keep increasing in relation to total earnings of basic labor. As long as the economy remains in the first phase, ($m_L - \Lambda_L < 0$), labor inequality will keep increasing as skilled employment increases relative to basic employment. As this process continues, total earnings of skilled labor will eventually exceed total earnings of basic labor, and the economy will enter the second phase, ($m_L - \Lambda_L > 0$), where inequality begins to decline while Λ_L continues to fall.

Therefore, as more and more firms replace their old technology with new, requiring more skilled labor, it eventually leads to a period in which labor inequality begins to decline. This indicates a Schumpeterian process of creative destruction in which more and more firms replace their old technology with innovation, resulting in a rising demand for skilled labor, ultimately leading to an inverted U-shaped labor inequality path as income keeps increasing accompanied by increases in skilled labor. Consequently, the relationship between economic growth and labor inequality, from a Schumpeterian perspective where technological change is driven by innovation, can be described by the Kuznets hypothesis. Technological changes due to innovation, therefore, result in an inverted U-shaped relationship of labor inequality with economic growth over time, as presented in Chapter 5.2.

Furthermore, a decrease in relative cost also implies a decrease in nominal wage growth compared to labor productivity growth, resulting in a declining wage share. Consequently, a technological change will have a positive impact on factor inequality due to its effects on nominal wages and relative employment, as described in equations (5.1.15) and (5.1.16).

Therefore, policymakers should prioritize initiatives aimed at enhancing the acquisition of skills by the labor force. Combined with technological changes, this can stimulate the economy and swiftly move it to the right side of the Kuznets curve, where a decrease in labor inequality contributes positively to economic growth.

5.5 Trade Openness

Trade openness, a fundamental aspect of globalization, is believed to exert a significant influence on both economic growth and inequality. Initially, its impact on net exports, and consequently economic growth, is considered due to international competitiveness. Following Hein (2014), net exports (NX) are assumed to be dependent on international competitiveness, represented by the real exchange rate (e^r), domestic capacity utilization (u) reflecting domestic demand, and foreign capacity utilization (u_f) representing foreign demand (Hein, 2014). This relationship is presented in Equation (5.5.1), with the assumption that ν, φ, ζ > 0.

$$b = ve^r(h) - \varphi u + \zeta u_f \tag{5.5.1}$$

Furthermore, we assume that the net exports rate to capital stock is determined by Equation (5.5.2).

$$b = \frac{NX}{pK} \tag{5.5.2}$$

Furthermore, following Hein (2014), we assume that international competitiveness, denoted as e^r, is determined by the real exchange rate, e, and domestic prices, p, relative to foreign prices, p_f. This relationship is expressed in Equation (5.5.3). In growth terms, the same equation can be expressed as shown in Equation (5.5.4).

$$e^r = \frac{ep_f}{p} \tag{5.5.3}$$

$$\hat{e}^r = \hat{e} + \hat{p}_f - \widehat{p} \tag{5.5.4}$$

Thus, as evident from Equations (5.5.3) and (5.5.4), international competitiveness is positively correlated with real exchange rates, while the relationship between the growth rates of domestic prices appears to be negatively associated with international competitiveness.

Thus, the fact that, according to relations (5.5.3) and (5.5.4), an open economy and international competitiveness are negatively correlated with the domestic product price growth rate sets a downward pressure on domestic markets, as described in previous chapters by relation (5.7). According to the price equation, (5.7), a downward pressure on prices leads to downward pressures on both the profit rate, r, and nominal wages, w.

Therefore, as it becomes evident, since profit rates and wages have diverse effects on factor inequality, the impact of international competitiveness on factor inequality is uncertain. Consequently, the relationship between international competitiveness and factor inequality is ambiguous, as both profit rates and nominal wages are negatively related to international competitiveness. Hence, international competitiveness can be negatively or positively related to inequality depending on the drivers of distributional changes.

Furthermore, by combining equation (5.7) with equation (5.5.3), it emerges that changes in the profit rate, r, and wage, w, are both negatively related to international competitiveness, as can be observed in equations (5.5.5) and (5.5.6).

$$\frac{\partial e^r}{\partial \mathrm{r}} = \frac{-ep_f\frac{K}{Y}}{p^2} < 0 \qquad (5.5.5)$$

$$\frac{\partial e^r}{\partial w} = \frac{-ep_f\frac{1}{A}}{p^2} < 0 \qquad (5.5.6)$$

For instance, a higher profit rate tends to raise prices, reducing international competitiveness while increasing the profit share. Consequently, the income share of investors is negatively related to international competitiveness, implying wage-led international competitiveness. Additionally, since profit share changes are positively related, as described in previous chapters and equation (5.1.11), higher inequality appears to be associated with lower international competitiveness.

Furthermore, if changes in product pricing result from changes in nominal wages, international competitiveness appears to be positively related to factor inequality. For example, if nominal wages increase, product prices rise, resulting in decreasing international competitiveness[28] accompanied by a decreasing profit share. Changes in profit share caused by changes in nominal wages and the relationship between product prices and unit labor costs can be positively related to international competitiveness. Hence, in this case, profit shares are positively related to international competitiveness,

28 $\frac{\partial e^r}{\partial h} > 0$

and a lower inequality is positively related to lower international competitiveness according to equations (5.1.11) and (5.5.6).

Thus, if distribution changes because of a change in nominal wages, then profit share will be positively related to international competitiveness, which is compatible with a profit-led demand regime where inequality will be positively related to international competitiveness. However, given that prices can decrease due to either declines in profit incomes, resulting in lower inequality, or due to decreases in wage income, resulting in higher inequality, the cause of international competitiveness will determine the relationship of inequality with net exports and, hence, growth due to trade openness and international competitiveness. Therefore, while inequality affects international competitiveness through the relationship between distribution and price level, the effect depends on the cause of the change in distribution. Hence, if profit share decreases in a wage-led demand regime, then the total effect on net exports will be positive because of the decreasing factor inequality. On the contrary, if wage share increases in a profit-led demand, then factor inequality will be negatively related to net exports.

Thus, following Hein (2014), distribution, and hence factor inequality, affects net exports due to international competitiveness, as can be seen in the first term of equation (5.5.7).

$$\frac{\partial b^*}{\partial h} = \nu \frac{\partial e^r}{\partial h} - \varphi \frac{\partial u^*}{\partial h} \tag{5.5.7}$$

Thus, on the one hand, as presented above, the sign of the first term of equation (5.5.7) can be positive or negative depending on the cause of the change in profit shares. Furthermore, factor inequality affects net exports due to capacity utilization, as indicated by the second term in equation (5.5.7), denoted as $\left(\varphi \frac{\partial u^*}{\partial h}\right)$. This second term shows that factor inequality influences net exports through its impact on capacity utilization, u^*. Consequently, following Bhaduri & Marglin (1990), since a profit-led demand regime is associated with profit increases, while a wage-led regime is associated with profit decreases, in a profit-led demand regime, changes in distribution, and hence factor inequality, are negatively related to net exports. Conversely, a change in factor inequality is positively related to net exports when the demand regime is wage-led. Thus, if, for instance, inequality decreases in a profit-led regime due to a declining profit rate, then both terms will be negative, resulting in an ambiguous total effect on the equilibrium net exports rate. If inequality decreases because of a higher nominal wage, then a declining profit share will be associated with a positive outcome, while the first term will be positive and the second term will be negative, potentially shifting the regime toward a wage-led one. However, the overall impact of changes in factor inequality on the equilibrium net exports rate would remain ambiguous under both regimes, primarily due to the uncertain influence of the first term.

Thus, on the one hand, the impact of international competitiveness has an ambiguous effect on factor inequality, as it exerts pressures on both wage and profit incomes due to price competition. On the other hand, factor inequality affects net exports due to the relationship between distribution and international competitiveness, as well as capacity utilization. However, the overall effect will depend on the cause of distributional changes and the nature of the demand regime.

Furthermore, following the Heckscher-Ohlin theory[29], it is assumed that openness affects labor inequality and growth through its influence on relative labor employment, Λ_L, and labor productivity, A_L. For instance, according to the Heckscher-Ohlin theory, if the abundant factor in an economy is skilled labor, leading to an excess supply of highly educated workers, it is assumed that foreign direct investment will be attracted to sectors requiring skilled labor. This process would result in a decrease in relative labor employment, Λ_L, and a decline in labor productivity as more productive labor enters the market. Therefore, since relative labor employment, Λ_L, affects labor inequality and is indicative of labor productivity, the level of trade openness is assumed to impact labor inequality and growth primarily through its effects on productivity and foreign direct investments. Additionally, trade openness can promote the diffusion of technological changes, mainly through foreign direct investments. Consequently, further relationships with both labor and profit inequality will emerge through the channel of technological change, as described in Chapter 5.4.

In summary, international competitiveness can either increase or decrease factor inequality and profit share, with the overall outcome determined by the causes of distributional shifts. Therefore, while trade openness tends to exert downward pressure on prices, the total impact on inequality will primarily hinge on the interplay between

[29] Heckscher-Ohlin theory has been presented in section 4.2.

profits and wages. Moreover, trade openness can influence labor inequality by affecting the relative demand for basic labor versus skilled labor. Additional effects may manifest in both labor and profit inequality due to the diffusion of technology that may arise as a result of increased trade openness.

In conclusion, as international competitiveness tends to drive prices lower, the bargaining power of all classes, including investors, becomes constrained. Consequently, policymakers should place more emphasis on assessing the overall effect of relative labor demand on inequality.

5.6 Financialization-credit

As mentioned in previous chapters, financialization has a significant impact on income changes and distribution. Therefore, it is hypothesized that personal income and inequality are influenced by financialization primarily through shifts in distribution resulting from lending and borrowing activities. Moreover, it is posited that these alterations in personal distribution have repercussions on the broader economy, particularly due to the influence of personal income on consumption and investment.

In this context, firms are considered to be organizations consisting of one or more investors. To investigate the effects of financialization on inequality, it is assumed that firms can be categorized into two types based on the sectors in which they operate.

Firms are categorized into two distinct sectors: the real sector and the financial sector. Real sector firms employ a combination of skilled and unskilled labor along with capital stock to engage in production. Their primary source of income is derived from profits, which are subsequently reinvested by the investors to sustain their production activities.

In contrast, financial sector firms utilize their capital resources for lending purposes, generating profits from these lending activities. These firms are predominantly composed of individuals known as rentiers, who provide capital with the aim of earning income from debt, a concept initially articulated by Keynes (1936). Consequently, financial sector firms thrive by lending capital, while real sector firms prosper through investments in both human and physical capital to drive production.

This framework operates under the assumption that individuals have the capacity to save and borrow for consumption or investment purposes. Furthermore, profit earners are subdivided into two distinct groups: investors, who earn profits through investments in the real sector, and rentiers, who provide capital for lending and receive income in return.

5.6.1 Financialization and factor inequality

Initially, we assume that the profit share is apportioned between two distinct categories: investor profits and rentier profits, a concept in line with the work of Parui (2018) and Hein & van Treeck (2008) (Parui, 2018; Hein & van Treeck, 2008). In accordance with the profit inequality model elucidated in Chapter 5.3, we denote Π_h as the aggregate profits of rentiers and Π_m as the aggregate profits of investors. Their respective profit rates are denoted as r_h and r_m, while their personal income derived from profits is represented as π_h and π_m, as explicated by equations (5.3.5) and (5.3.6).

Additionally, we make the assumption that rentiers lend a specific portion of their income in each time period, represented as B. This sum, (B_Ξ), is allocated to investors to facilitate their investment activities, while workers access another portion, (B_L), to sustain consumption and potentially ameliorate income inequality. Consequently, in each time period, B signifies the total credit extended, and β is the ratio of overall credit to total income, as delineated in equations (5.6.1) and (5.6.2).

$$B = B_L + B_\Xi \tag{5.6.1.1}$$

$$\beta = \frac{B_L + B_\Xi}{pY} \tag{5.6.1.2}$$

Moreover, a portion of the labor debt that stems from credit in prior time periods is repaid each period and is labeled as X_L. Therefore, given that r_h represents the profit rate of rentiers, the labor debt that is reimbursed as income to rentiers is equal to $r_h X_L$. Correspondingly, the fraction of the debt settled by investors each time period is represented as X_K. Consequently, rentiers' income from investors amounts to $r_h X_K$ in each period. Hence, during any given time period, the total disposable income of workers relies on their aggregate wages, W, augmented by the borrowed sum, B_L, and reduced by the portion of debt repayment in that period, $r_h X_L$. The total income of workers is expressed in equation (5.6.1.3).

$$Y_L = W - r_h X_L + B_L \tag{5.6.1.3}$$

Subsequently, the overall income of investors is contingent upon their aggregate profits, Π_m, supplemented by the borrowed sum, B_m, and reduced by the portion of debt that is settled during the period, $r_h X_m$, as delineated in equation (5.6.1.4).

$$Y_m = \Pi_m - r_h X_m + B_m = r_m K_m - r_h X_K + B_K{}^{30} \tag{5.6.1.4}$$

Hence, the disposable income of both investors and workers will rise or fall depending on the proportion of debt settled during that period and their borrowed income.

Furthermore, given that a portion of the total borrowed amount returns as profits to rentiers, their income encompasses the debts paid by workers, $r_h X_L$, and investors, $r_h X_K$, less the sum lent, B, to these categories, as depicted in equation (5.6.1.5).

$$Y_h = r_h X_L - B_L + r_h X_K - B_\Xi = r_h X - B \tag{5.6.1.5}$$

Therefore, the overall disposable income of rentiers in the current period comprises their income from lending, $r_h X$, minus the amount that is lent. Thus, the total disposable income from profits is outlined in equation (5.6.1.6).

$$Y_\Xi = r_m K_m + r_h X_L - B_L \tag{5.6.1.6}$$

Furthermore, real debt, which represents the gap between the borrowing income and the debt repayment of each income class in each time period as a proportion of total income, is denoted as δ_i[31], as shown in equations (5.6.1.7) and (5.6.1.8).

$$\delta_\Xi = \frac{r_h X_K - B_K}{pY} \tag{5.6.1.7}$$

$$\delta_L = \frac{r_h X_L - B_L}{pY} \tag{5.6.1.8}$$

[30] Since it is assumed that m class is the only class of profit earners that borrow to invest $B_m - r_h X_m = B_\Xi - r_h X_K$.

[31] $i = L, \Xi$

Consequently, δ is determined as the real debt share of total income and consists of the real debt share of investors, δ_{Ξ}, and the real debt share of workers, δ_L[32].

Therefore, as emerges from combining equations (5.6.1.7) and (5.6.1.8) with equation (5.6.1.5), the share of rentiers' income to total income, $\frac{Y_h}{pY}$, equals the total real debt share, δ, as presented in equation (5.6.1.9).

$$\frac{Y_h}{pY} = \frac{r_h X - B}{pY} = \frac{r_h X_K + r_h X_L - B_K - B_L}{pY} = \frac{r_h X_K - B_K}{pY} + \frac{r_h X_L - B_L}{pY} = \delta_{\Xi} + \delta_L = \delta \quad (5.6.1.9)$$

Hence, the total profit share can be represented by equation (5.6.1.10), and the total wage share can be represented by equation (5.6.1.11).

$$\frac{Y_{\Xi}}{pY} = k_m h - \delta_K + \delta = k_m h + \delta_L \quad (5.6.1.10)$$

$$\frac{Y_L}{pY} = \lambda - \delta_L \quad (5.6.1.11)$$

Thus, factor inequality as described in relations (5.1.15) and (5.1.16) can be represented by equations (5.6.1.12) and (5.6.1.13):

$$Inequality_F = l - \frac{\mathrm{w}^r}{A} + \delta_L \quad (5.6.1.12)$$

$$\dot{Inequality_F} = \frac{l}{l-\lambda}\dot{l} - \frac{\lambda}{l-\lambda}\left(\dot{w} - \dot{A}\right) + \frac{\delta_L}{l-\lambda}\,\dot{\delta}_L \quad (5.6.1.13)$$

Therefore, as derived from equation (5.6.1.13), the labor real debt share is positively correlated with factor inequality. Consequently, if we assume that credit is utilized to "correct" inequality, changes in real debt shares will be influenced by shifts in factor inequality. Therefore, in situations where inequality is on the rise, there will be a demand for credit from the lower-income classes to maintain their income levels. This will lead wage earners to seek loans to preserve income inequality, resulting initially in negative changes in net debt shares, $\dot{\delta}_L < 0$.

[32] $\delta = \delta_{\Xi} + \delta_L$

This initial borrowing will "correct" inequality in the early stages. However, if factor inequality continues to rise, and the same income classes keep borrowing to "correct" inequality, their total debt, and consequently their real debt shares δ_L, will increase. Thus, as it becomes evident, there is a risk that in the long run, their real debt share will begin to grow positively $\dot{\delta_L} > 0$, leading to an increase in factor inequality in accordance with equation (5.6.1.13).

Furthermore, as argued earlier, household debt has two effects on consumption. On one hand, since debt serves as a source of finance, it has a positive impact on consumption. On the other hand, repaying debts reduces disposable income, resulting in reduced consumption (Dutt, 2006; Nishi, 2012; Hein, 2012b).

Hence, the ability of workers to borrow initially increases their consumption, leading to short-term increases in aggregate demand and decreases in factor inequality. However, in the long run, their income will decrease as δ_L turns positive while their debt is increasing. Consequently, their debt will lead to lower levels of consumption and higher levels of inequality in the long run, posing the risk of an unsustainable debt crisis in the future.

Borrowing to "correct" inequality may seem beneficial in the short run, but it carries the potential for unsustainable growth and a debt crisis in the long term. Conversely, if factor inequality decreases after the initial stages, workers will borrow less as they pay off their debt from previous periods ($\dot{\delta_L} > 0$). Therefore, it is argued that wage earners will temporarily "sacrifice" their inequality position to repay their debt. This is the preferable scenario where workers can pay off their debt while inequality tends to decrease. This scenario is also favorable for growth because aggregate demand through consumption will be boosted both in the short run and the long run. In the short run, consumption is expected to increase due to the additional income from credit, while in the long run, consumption will remain at high levels due to wage increases that have been achieved.

5.6.2 Financialization and profit inequality

It is assumed that profit inequality is primarily influenced by financialization, driven by disparities in profit rates between investing and lending. Additionally, it is assumed that profit inequality is linked to growth as a result of financialization.

Assuming that income from rent is higher than the personal income of investors[33], inequality can be described according to relation (5.6.2.1). This relation is presented in growth terms in equation (5.6.2.2).

$$Inequality_K = \frac{q_K - 1}{(m_K + 1)(\Lambda_K + 1)} + \frac{\delta_K}{h} \tag{5.6.2.1}$$

$$\dot{Inequality_K} = \dot{q_K}\left(\frac{(q_K + m_K)}{(q_K - 1)(m_K + 1)}\right) - \dot{\Lambda_K}\left(\frac{(\Lambda_K - m_K)}{(m_K + 1)(1 + \Lambda_K)}\right) + \frac{(m_K + 1)(\Lambda_K + 1)\delta_K}{q_K - 1}\dot{\delta_K} \tag{5.6.2.2}$$

At first, profit inequality is determined by the first term, which implies that profit inequality is positively related to the income premium from profits, q_K. Thus, according to equations (5.3.14) and (5.3.15), the relation of their profit rates is assumed to be a strong determinant of profit inequality.

Furthermore, the second term implies that a sectoral shift can affect profit inequality, depending on the sign of the relation $\Lambda_K - m_K$. In cases where individuals, instead of borrowing, choose to invest in the financial sector where there is a higher profit rate[34], there will be a sector shift affecting profit inequality.

Additionally, on the one hand, seeking higher profitability leads to a sector shift where capital is transferred from the real to the financial sector. On the other hand, this shift will affect growth negatively, since it has been assumed that growth comes only from investments in the real sector. In other words, a dominance of rentiers due to increased personal incomes $(\dot{q_K} > 0)$ and sectoral shift $(\dot{\Lambda_K} < 0)$ will increase profit inequality[35], while this is related to weak growth due to a decline in investments. As

[33] $q_K > 1$
[34] $\rho > 1$
[35] given that $\Lambda_K - m_K < 0$

has been argued, distributed profits (i.e., dividends and interest payments to rentiers) reduce the available internal funds, affecting investment demand negatively. Additionally, as has been assumed, rentiers have different propensities to save, as presented in several post-Keynesian models (Dutt, 1992; Hein & van Treeck, 2008). Furthermore, distributed profits may generate restrictions on access to external funds, as argued by Kalecki (1937).

Finally, the third term implies that debt shares are positively related to profit inequality. Hence, a decreasing δ_K in the early stages could be good for growth and profit inequality. In this stage, middle-class investors will either borrow to "correct" inequality or invest in a sector with higher profit rates, like an advanced technological sector as described in the previous chapter.

Thus, if they earn a higher income in the long run, they will pay off the debt that has been created in previous periods while profit inequality will tend to decrease. This will result in lower profit inequality in the long run due to a lower income premium, while growth will also be positively affected due to investment increases. On the contrary, if the future income of middle-class investors decreases, there is a risk of increased debt and unsustainable growth, which would be followed by increased inequality in the long run.

Therefore, policymakers should focus on controlling credit accessibility in order to avoid a debt crisis and give lower-income classes the opportunity to achieve a better income position in the long run.

5.7 Growth and inequality

As already assumed, the presented model describes an open economy where growth is driven by investment decisions and productivity resulting from technological changes, with the potential for credit access for both investors and workers.

Moreover, similar to Hein (2014), it is assumed that growth adheres to Kalecki's principle of effective demand. In this framework, an economy's output and employment levels are chiefly determined by aggregate demand, while aggregate supply adjusts accordingly (Hein, 2014). Consequently, aggregate income is determined by independent investment and saving choices.

Furthermore, the model posits that all income classes have the capacity to save. This saving is comprised of savings from profits (S_{Π}) and savings from wages (S_W). More precisely, total savings encompass savings from high-class profits (S_{Π_h}), middle-class profits (S_{Π_m}), skilled labor wages (S_{W_s}), and basic labor wages (S_{W_b}). The respective propensities to save for each income group are denoted as $s_{\Pi_h}, s_{\Pi_m}, s_{W_s}$, and s_{W_b}. Total savings are presented in equations (5.7.1) and (5.7.2). Furthermore, it is posited that each income class exhibits distinct propensities to save, and consequently, different propensities to consume.

$$S = S_{\Pi_h} + S_{\Pi_m} + S_{W_s} + S_{W_b} \tag{5.7.1}$$

$$S = s_{\Pi_h} Y_h + s_{\Pi_m} Y_m + s_{W_s} Y_s + s_{W_b} Y_b \tag{5.7.1}$$

Following Stockhammer (2014), the model assumes that the personal distribution of income impacts growth through consumption due to two factors. The first factor is that varying income groups exhibit different marginal and average propensities to save. Consequently, the assumption that lower-income groups possess a higher propensity to consume relative to wealthier groups implies a negative influence of inequality on consumption. The second factor is that as households follow their peers' consumption patterns, increasing inequality positively affects consumption (Stockhammer, 2014). As a result, the model assumes that wealthier segments of the economy save a greater portion of their income[36].

Additionally, in accordance with Bhaduri and Marglin's growth model, as in Hein (2014), it is postulated that investment decisions and, consequently, capital accumulation primarily depend on animal spirits (α_0), capacity utilization (u), and profit share (h). Moreover, growth is assumed to be inversely related to interest rates and is also driven by technological advancements and financialization, following Lima (2000) and Lima (2004). Consequently, growth is driven by capital accumulation, expressed through the rate of investment, as described by equation (5.7.3).

---

[36] $s_{\Pi_h} > s_{\Pi_m} > s_{W_s} > s_{W_b}$

$$g = \frac{I}{K} = \alpha_0 + \alpha_1 u + \alpha_2 h - \alpha_3 r_R + \alpha_4 \tau \quad (5.7.3)$$

The model posits that animal spirits α_0, capacity utilization (u), and profit shares (h) have a positive impact on investment decisions. Furthermore, α_1 and α_2 indicate the relative significance of demand and cost considerations in investment choices. Moreover, α_3 reflects the influence of the profit rate (r_R) of rentiers, while α_4 reflects the effect of technological changes and innovation (τ) on growth.

5.7.1 Growth and factor inequality

As previously discussed, income distribution, and consequently factor inequality, impact capital accumulation and growth due to varying saving propensities. The total saving rate is depicted by equations (5.7.1.1) and (5.7.1.2).

$$\sigma = \frac{S}{pK} = (s_w + (s_\Pi - s_w)h)\frac{u}{v} \quad (5.7.1.1)$$

$$\sigma = \frac{S}{pK} = \left(\left(s_{W_s} - s_{W_b}\right)\omega_s + s_{W_b} + \left(\left(s_{\Pi_h} - s_{\Pi_m}\right)k_h + s_{\Pi_m} - \left(s_{W_s} - s_{W_b}\right)\omega_s - s_{W_b}\right)h\right)\frac{u}{v} \quad (5.7.1.2)$$

Furthermore, following Hein (2014) and the post-Keynesian literature, it's assumed that for short-term stability in the goods market equilibrium, the responsiveness of saving to changes in capacity utilization must exceed the combined responsiveness of investment and net exports. Thus, the stability condition ($\psi > 0$) is necessary, as per equation (5.7.1.3).

$$\psi > 0 \rightarrow \psi = \frac{\partial \sigma}{\partial u} - \frac{\partial g}{\partial u} - \frac{\partial b}{\partial u} > 0 \rightarrow \psi = (s_w + (s_\Pi - s_w)h)\frac{1}{v} - \alpha_1 > 0 \quad (5.7.1.3)$$

Equation (5.7.1.3) represents the stability criteria for a two-class economy with workers and investors. For a four-class economy, which includes basic skilled workers, highly skilled workers, middle-class investors, and high-class investors, the stability condition equation (5.7.1.3) transforms into equation (5.7.1.4).

$$\psi = \Big(\big(s_{W_s} - s_{W_b}\big)\omega_s + s_{W_b} + \Big(\big(s_{\Pi_h} - s_{\Pi_m}\big)k_h + s_{\Pi_m} - \big(s_{W_s} - s_{W_b}\big)\omega_s - s_{W_b} \Big) h \Big) \frac{1}{v} - \alpha_1 + \varphi > 0 \rightarrow \psi = \big(s_{W_s}\omega_s + s_{W_b}\omega_b + \big(s_{\Pi_m}k_m - s_{W_s}\omega_s - s_{W_b}\omega_b\big)h + \big(s_{\Pi_h} - s_{\Pi_m}\big)\delta_{\Xi} + s_{\Pi_h}\delta_L\big)\frac{1}{v} - \alpha_1 + \varphi > 0 \qquad (5.7.1.4)$$

This stability equation implies that the saving rate's marginal response to changes in capacity utilization must outweigh the responses of the investment rate and net exports. Thus, the equilibrium condition that emerges from this stability equation is presented as relation (5.7.1.5):

$$\sigma = g + b \rightarrow (s_W + (s_\Pi - s_W)h)\frac{u}{v} = \alpha_0 + \alpha_1 u + \alpha_2 h - \alpha_3 r_R + \alpha_4 \tau + \nu e^r(h) - \varphi u + \zeta u_f \qquad (5.7.1.5)$$

Hence, the total saving rate must equal the rates of capital accumulation and net exports. Consequently, from equation (5.7.1.5), the equilibrium values of capacity utilization (u^*), growth (g^*), and profit rate (r^*) are described by equations (5.7.1.6), (5.7.1.7), and (5.7.1.8), respectively:

$$u^* = \frac{\alpha_0 + \alpha_2 h - \alpha_3 r_R + \alpha_4 \tau + \nu e^r(h) + \zeta u_f}{\psi} \qquad (5.7.1.6)$$

$$g^* = \alpha_0 + \alpha_1 u^* + \alpha_2 h - \alpha_3 r_R + \alpha_4 \tau \qquad (5.7.1.7)$$

$$r^* = h u^* \qquad (5.7.1.8)$$

Additionally, the equilibrium value of the net exports rate, as presented in equation (5.5.1) in Chapter 5.5, can be rewritten as follows:

$$b^* = \nu e^r(h) - \varphi u^* + \zeta u_f \qquad (5.5.1)$$

From the equilibrium values, it is evident that an improvement in animal spirits (α_0) will lead to increased equilibrium rates of capacity utilization (u^*), capital accumulation (g^*), and profit rates (r^*), while the equilibrium net export rate (b^*) decreases.

Furthermore, as functional distribution determines equilibrium values through income shares, such as the profit share (h), factor inequality will impact economic growth. However, the effect of the profit share on equilibrium values is not uniform. The impact of changes in functional income distribution on equilibrium capacity utilization (u^*) and capital accumulation (g^*) is ambiguous, as observed in equations (5.7.1.9) and (5.7.1.10).

$$\frac{\partial u^*}{\partial h} = \frac{\alpha_2 - (s_\Pi - s_w)\frac{u^*}{v}}{\psi} = \frac{\alpha_2 + v\frac{\partial e^r(h)}{\partial h} - \frac{\partial \sigma}{\partial h}}{\psi} \tag{5.7.1.9}$$

$$\frac{\partial g^*}{\partial h} = \alpha_2 + \alpha_1 \frac{\partial u^*}{\partial h} = \alpha_2 + \alpha_1 \frac{\alpha_2 + v\frac{\partial e^r(h)}{\partial h} - \frac{\partial \sigma}{\partial h}}{\psi} \tag{5.7.1.10}$$

The way income is distributed between capital and labor determines factor inequality, influenced by labor employment levels and wage share. Therefore, before exploring the relationship between inequality and growth, it's essential to determine whether profits or wages are the primary drivers of the economy. Assuming a positive ψ through stability conditions, the overall effect of redistribution on equilibrium capacity utilization (u^*) and capital accumulation (g^*) depends on the positive impact of investment demand (α_2), the negative impact of consumption demand $\frac{\partial \sigma}{\partial h}$[37], and the ambiguous effect of net exports $v\frac{\partial e^r(h)}{\partial h}$[38]. Consequently, functional distribution inequality will impact equilibrium capacity utilization based on which effect prevails in the economy.

If investment demand dominates, the economy is profit-led[39]; conversely, if consumption demand dominates, the economy is wage-led[40], as per equation (5.7.1.9). Similar results apply to the equilibrium value of capital accumulation according to equation (5.7.1.10). Changes in equilibrium capital accumulation depend on the positive direct impact of improved profitability and the negative impact of redistribution due to consumption demand and equilibrium capacity utilization. Thus,

[37] Consumption demand, $\frac{\partial \sigma}{\partial h} = (s_\Pi - s_w)\frac{u}{v}$. The smaller the $\frac{\partial \sigma}{\partial h}$ the larger the consumption demand.

[38] The effect of distribution on net exports are presented in section 5.5

[39] $\frac{\partial u^*}{\partial h} > 0 \rightarrow \alpha_2 > \frac{\partial \sigma}{\partial h}$

[40] $\frac{\partial u^*}{\partial h} < 0 \rightarrow \alpha_2 < \frac{\partial \sigma}{\partial h}$

accumulation and growth can be profit-led[41] or wage-led[42] depending on the dominant distribution changes.

In an overall wage-led regime, a substantially higher propensity to save from profits compared to wages is needed, along with a low impact of the profit share and a strong effect of capacity utilization on investment. In contrast, in a wage-led economy, redistributing in favor of wages stimulates growth, suggesting that lower factor inequality enhances growth—a negative relation with inequality.

On the contrary, in a profit-led economy where the gap between propensity to save from profits and wages is smaller, a strong effect from the profit share exists, while capacity utilization has a weak impact on capital accumulation and investment rates. In such a domestically profit-led economy, increased profit share drives expansion, making factor inequality positively correlated with growth. Consequently, reducing inequality by favoring workers with higher nominal wages could negatively impact growth.

Moreover, in a scenario where the demand regime is wage-led but capital accumulation is profit-led, due to a limited impact of capacity utilization on capital accumulation, an intermediate conflict regime arises.

Therefore, while inequality increases lead to decreased aggregate demand and consumption due to poorer income groups with higher propensities to consume, a potential solution lies in raising wages, which reduces inequality and concurrently stabilizes economic growth (Onaran & Galanis, 2012)

Hence, it emerges that growth is positively affected by personal income inequality resulting from factor distribution in profit-led regimes, while in wage-led regimes, growth is likely negatively linked to factor inequality. However, this may not be a consistent pattern. Redistribution in income shares doesn't always lead to factor inequality changes, as discussed in previous sections, given that factor inequality changes result from a combination of changes in income shares and population proportions, as it has been presented in equations (5.1.9) and (5.1.11). Therefore, the impact of inequality due to factor distribution on demand and growth may be

---

[41] $\frac{\partial g^*}{\partial h} > 0 \rightarrow \alpha_2 + \alpha_1 \frac{\partial u^*}{\partial h} > 0$

[42] $\frac{\partial g^*}{\partial h} < 0 \rightarrow \alpha_2 + \alpha_1 \frac{\partial u^*}{\partial h} < 0$

ambiguous, considering that an increase in wage share could stem from increased labor employment rather than nominal wage hikes.

5.7.2 Growth labor and profit inequality

Moreover, it's postulated that labor and profit inequality are associated with growth owing to the dissimilarities in saving tendencies among various income classes. As indicated in equation (5.7.1.2), equilibrium values are influenced by the income shares of each income class, as illustrated in equations (5.7.2.1), (5.7.2.2), (5.7.2.3), and (5.7.2.4).

$$\frac{\partial u^*}{\partial \omega_s} = -\frac{\frac{\partial \sigma}{\partial \omega_s}}{\psi} < 0 \tag{5.7.2.1}$$

$$\frac{\partial g^*}{\partial \omega_s} = \tau + \beta \frac{\partial u^*}{\partial \omega_s} = \tau - \beta \frac{\frac{\partial \sigma}{\partial \omega_s}}{\psi} \tag{5.7.2.2}$$

$$\frac{\partial u^*}{\partial k_h} = -\frac{\frac{\partial \sigma^*}{\partial k_h}}{\psi} \tag{5.7.2.3}$$

$$\frac{\partial g^*}{\partial k_h} = \tau + \beta \frac{\partial u^*}{\partial k_h} = \tau - \beta \frac{\frac{\partial \sigma^*}{\partial k_h}}{\psi} \tag{5.7.2.4}$$

Hence, labor and profit inequality adversely impact capacity utilization, capital accumulation, and consequently growth, due to varied saving tendencies across different income classes. This implies that growth is positively linked to the income shares of less affluent classes, including basic workers and middle-class capitalists, due to disparities in saving propensities.

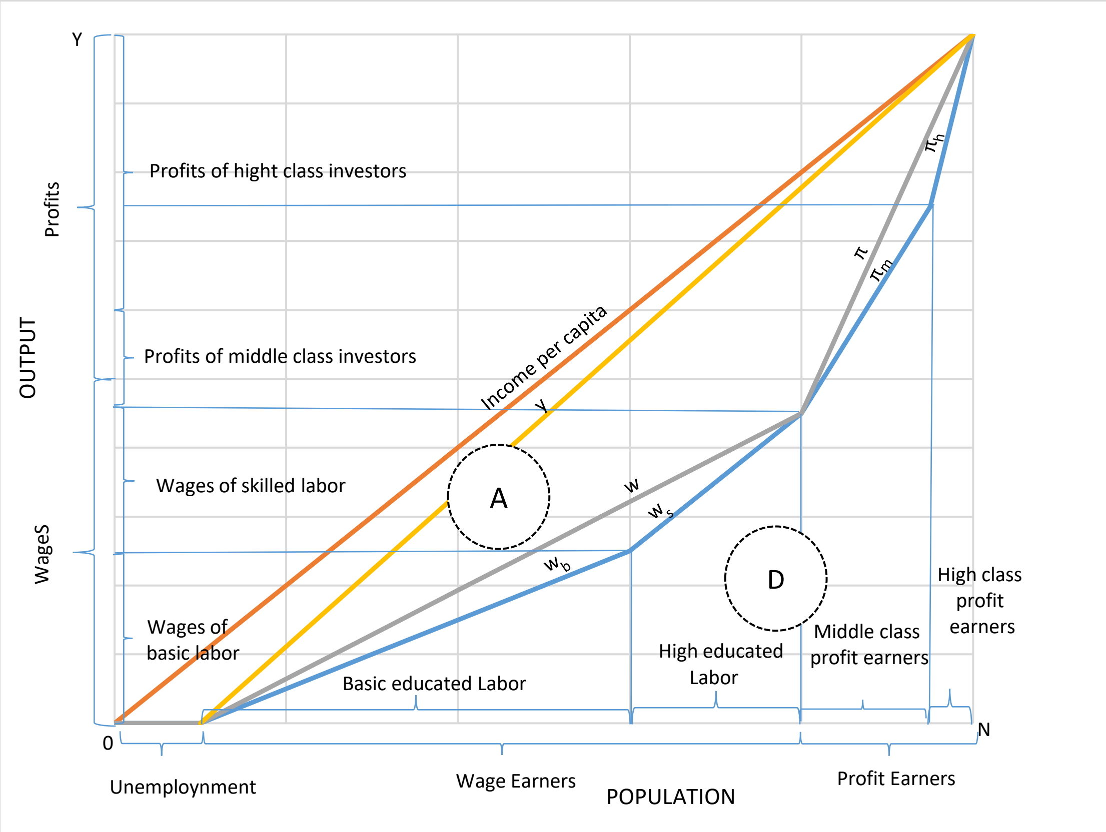
Thus, the relationship between inequality and growth is manifested through savings, where the impact of inequality on growth hinges on the differences in saving tendencies. The influence of savings on consumption and investment underscores that any redistribution favoring the income shares of the less prosperous population will lead to higher equilibrium values.

Consequently, as inequality can shape the economy's saving choices, alterations in income distribution impact economic growth due to distinct saving propensities among classes. However, the direction of this impact depends on the growth framework, with changes in income shares needing to outpace variations in employment growth.

5.8 Estimating total inequality

Total inequality is computed as a combination of factor inequality, labor inequality, profit inequality, and unemployment. Moreover, the amalgamation of their respective Lorenz curves results in the distribution curve of total inequality, as illustrated in Figure 6. The inequality index is determined by calculating the area A, which lies between the red and blue lines, and the sum of area D, which exists between the red line and the axes of the diagram, in addition to area A.

Figure 6 Income Distribution

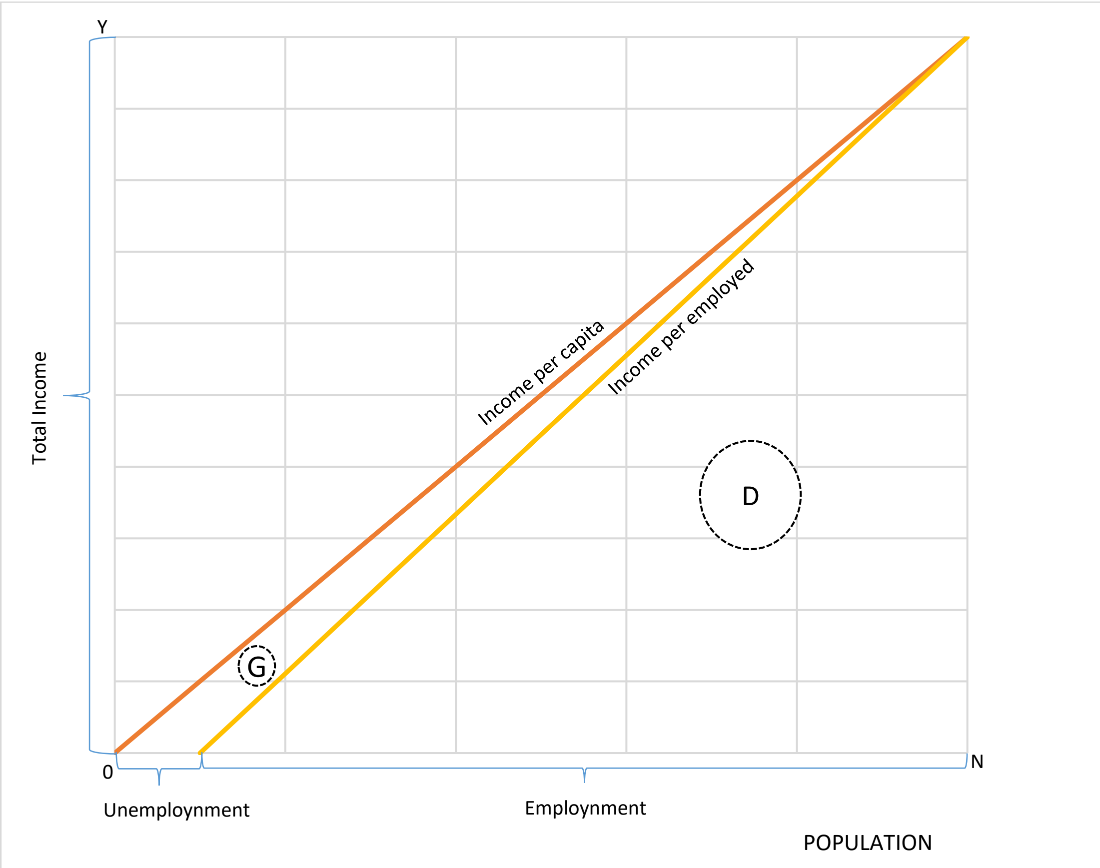


Initially, assuming that all employed individuals earn an identical personal income, and the unemployed population earns no income, the inequality index can be computed using the same formula as presented in Chapter 5.

From Figure 7, we can deduce that the inequality index between the employed and unemployed populations is determined by the relationship between area G and area D[43]. This leads to the formulation given by equation (7.4.4.1.1), which establishes the inequality index for the employed and unemployed populations as the unemployment rate:

$$InequalityU = \frac{\frac{Unemployment*Y}{2}}{\frac{N*Y}{2}} = Unemployment\ rate \qquad (7.4.4.1.1)$$

Figure 7 Income Distribution



Furthermore, the assumed hierarchy of income distribution among classes is as follows: high-class profit earners are wealthier than middle-class profit earners, and skilled labor workers have higher earnings than basic labor workers, i.e., $w_s \geq w \geq w_b$ and $\pi_h \geq$

43 $InequalityU = \frac{\text{area G}}{\text{area G+area D}}$

$\pi \geq \pi_m$. Additionally, it is assumed that middle-class profit earners are wealthier than skilled labor workers, i.e., $\pi_m \geq w_s$.

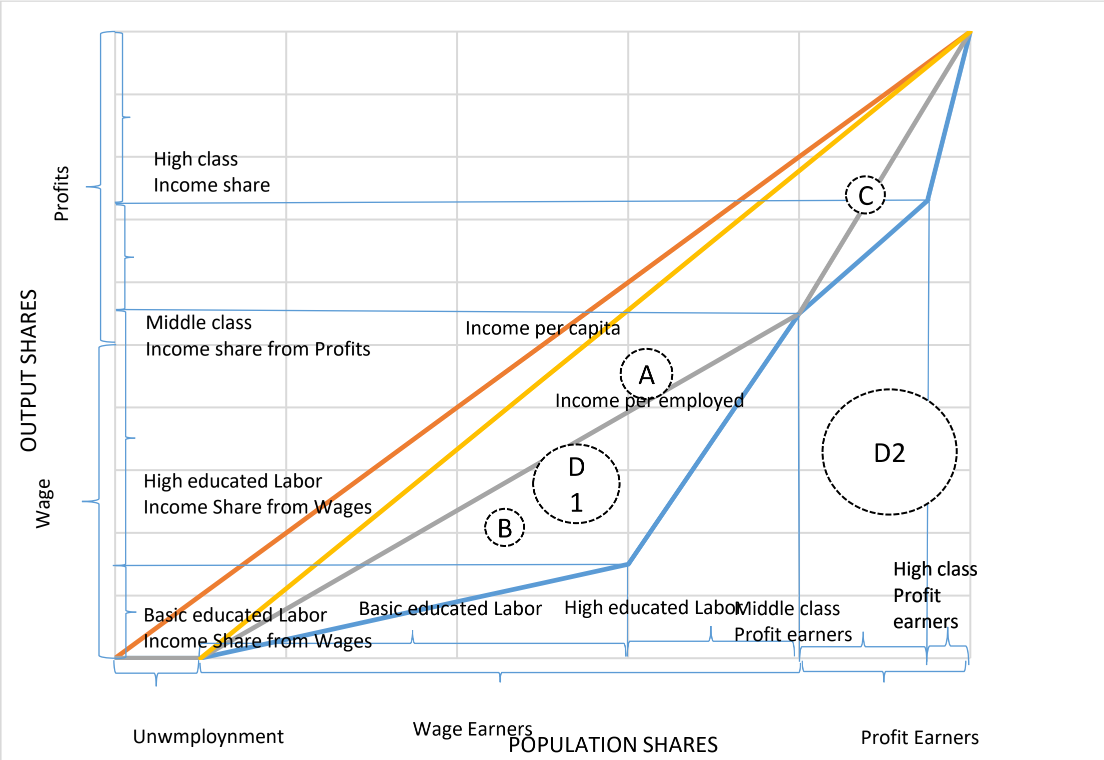
Given these assumptions and referring to Figure 6, the total inequality can be computed using equation (7.4.4.1.2). Combining equation (7.4.4.1.2) with the factor, labor, and profit inequality equations (5.1.15), (5.2.19), and (5.3.27), the inequality index can be calculated according to equation (7.4.4.1.3):

$$\begin{aligned} Inequality &= \frac{area\ A}{area\ A + area\ D} \\ &= \text{U}nemployment\ rate \\ &\quad + employment\ rate(Inequality_F + \lambda l Inequality_L \\ &\quad + h\xi Inequality_K) \end{aligned} \tag{7.4.4.1.2}$$

$$\begin{aligned} Inequality &= \left(1 - \frac{T}{N}\right) \\ &\quad + \frac{T}{N}\left(l - \frac{w^r}{A} + \lambda l\left(\frac{q_L - 1}{\left(\frac{q_L}{\Lambda_L} + 1\right)(1 + \Lambda_L)}\right)\right. \\ &\quad \left. + h\xi\left(\frac{q_K - 1}{(m_K + 1)(\Lambda_K + 1)}\right)\right) \end{aligned} \tag{7.4.4.1.3}$$

However, this assumption may not universally hold, as in some economies middle-class investors might not earn higher income than skilled workers. In such cases, assuming that middle-class investors are less affluent than skilled labor workers ($\pi_m < w_s$), the distribution of total inequality differs. Total distribution is presented following figure 8. Notably, this distribution does not form a Lorenz curve since higher-paid workers are wealthier than middle-class investors, contrary to the typical assumption that a Lorenz curve progresses from the poorer to the richer.

Figure 8 Income Distribution



Hence, if it is assumed that middle class investors and skilled labor workers form an additional income class, the middle class, isolating the distribution of the middle class, their distribution will look like the following Figure 9.

Figure 9 Income Distribution

The orange line represents the equality line for the middle class. As previously mentioned, this configuration does not constitute a Lorenz curve due to the fact that the population is not arranged from the poorest to the richest. Consequently, this leads to the Gini coefficient not being constrained within the range of zero to one. To establish a Lorenz curve, the order of the income classes within the middle class must be rearranged, as illustrated in Figure 10

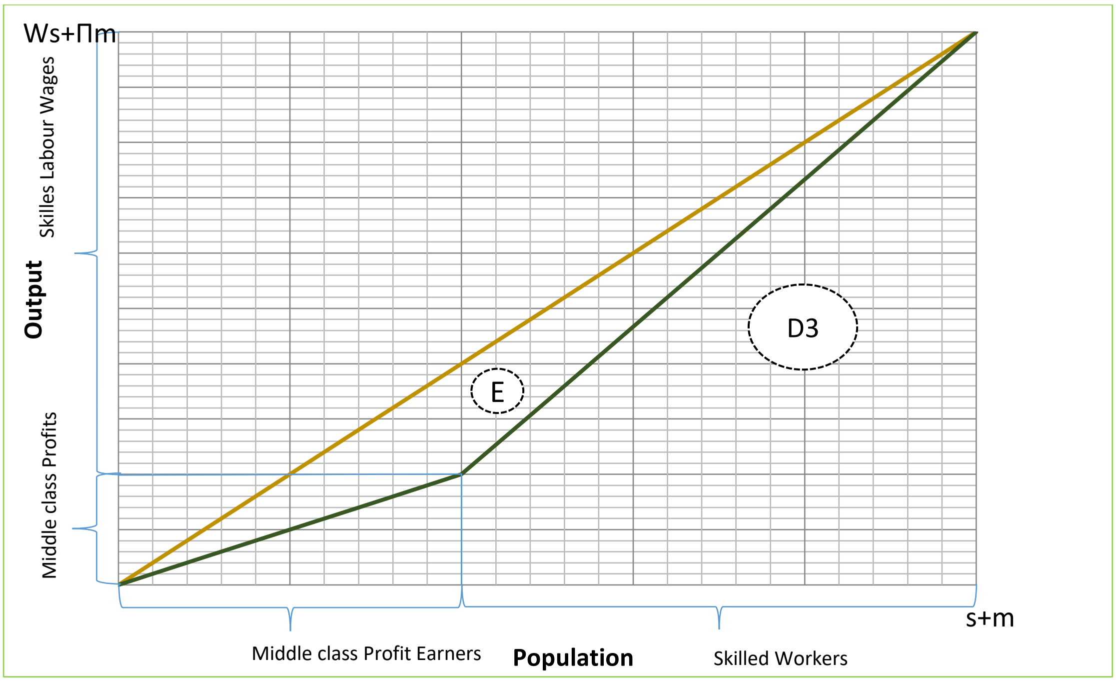
In the scenario where $\pi_m < w_s$, the inequality index of the middle class can be expressed using the equations (7.4.4.1.4), (7.4.4.1.5), and (7.4.4.1.6) as follows:

$$InequalityM = \frac{E}{D_3} \tag{7.4.4.1.4}$$

$$InequalityM = \left(\frac{W_s}{W_s + \Pi_m} - \frac{L_s}{L_s + \Xi_m}\right) \tag{7.4.4.1.5}$$

$$InequalityM = \left(\frac{\Xi_m}{L_s + \Xi_m} - \frac{\Pi_m}{W_s + \Pi_m}\right) \tag{7.4.4.1.6}$$

Figure 10 Income Distribution



In the scenario where $\pi_m < w_s$, the inequality index of the middle class can be expressed using the equations (7.4.4.1.4), (7.4.4.1.5), and (7.4.4.1.6) as follows:

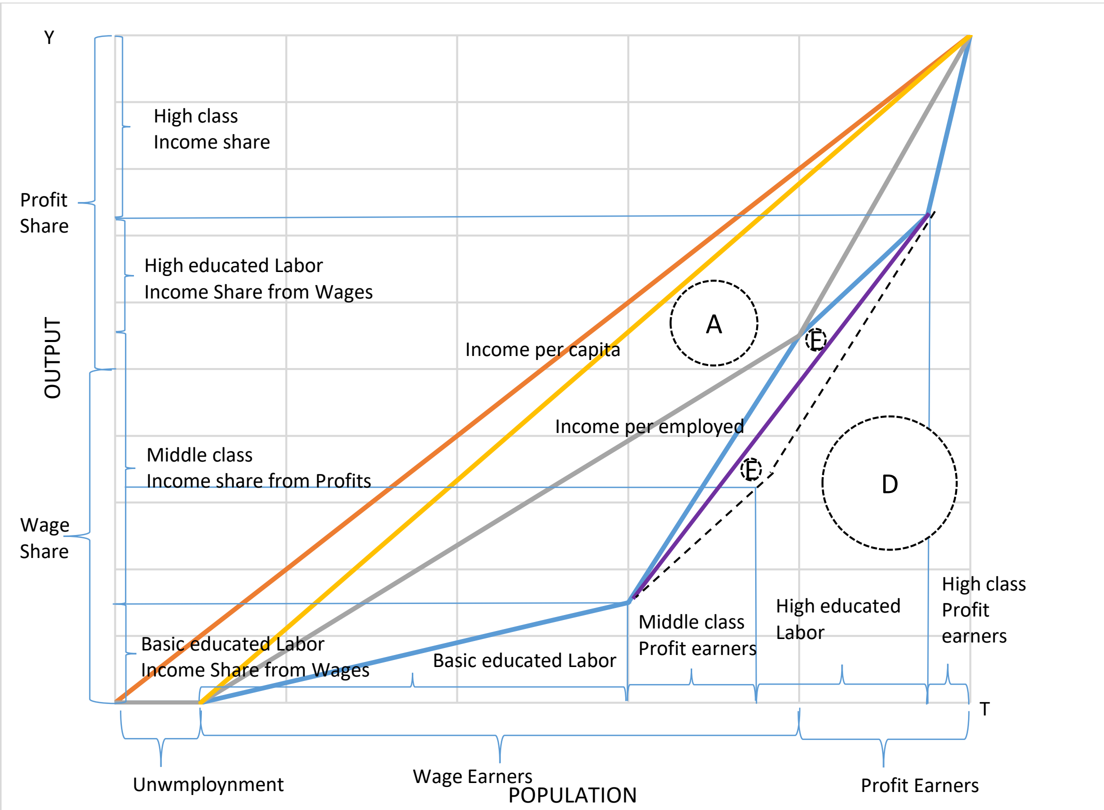
$$InequalityM = \frac{E}{D_3} \tag{7.4.4.1.4}$$

$$InequalityM = \left(\frac{W_s}{W_s + \Pi_m} - \frac{L_s}{L_s + \Xi_m}\right) \tag{7.4.4.1.5}$$

$$InequalityM = \left(\frac{\Xi_m}{L_s + \Xi_m} - \frac{\Pi_m}{W_s + \Pi_m}\right) \tag{7.4.4.1.6}$$

In this case, in order to compute the overall inequality of the economy, the arrangement of the skilled labor and middle-class capitalist classes can be modified. By doing so, the resulting Lorenz curve would resemble the one depicted in Figure 11.

Figure 11 Lorenz curve



However, it's important to note that area E remains constant regardless of the order of classes, as evidenced in both figures 9 and 10. As a result, the distribution curve of total inequality, when higher-paid workers are wealthier than middle-class owners, will resemble the pattern in figure 10. The inequality index can then be calculated using the equation (7.4.4.1.7):

$$Inequality = \frac{area\ A + 2areaE}{area\ A + 2areaE + area\ D} \tag{7.4.4.1.7}$$

Thus, in cases where the class of skilled workers is more affluent than the class of middle-class capital owners, the calculation of total inequality follows the equations (7.4.4.1.8) and (7.4.4.1.9):

$$Inequality = Unemployment\ rate + employment\ rate\left(Inequality_F + \lambda l Inequality_L + h\xi Inequality_K + 2\frac{(W_s + \Pi_m)}{Y}\frac{(L_s + \Xi_m)}{T} InequalityM\right) \qquad (7.4.4.1.8)$$

$$Inequality = \left(1 - \frac{T}{N}\right) + \frac{T}{N}\left(l - \frac{w^r}{A} + \lambda l\left(\frac{q_L - 1}{\left(\frac{q_L}{\Lambda_L} + 1\right)(1 + \Lambda_L)}\right) + h\xi\left(\frac{q_K - 1}{(m_K + 1)(\Lambda_K + 1)}\right) + 2\frac{(W_s + \Pi_m)}{Y}\frac{(L_s + \Xi_m)}{T}\left(\frac{W_s}{W_s + \Pi_m} - \frac{L_s}{L_s + \Xi_m}\right)\right) \qquad (7.4.4.1.9)$$

Therefore, to compute the total inequality index, either equation (7.4.4.1.3) or (7.4.4.1.9) has been utilized, contingent on whether the average income of highly paid workers, w_s, is lower or higher than the average income of middle-class capital owners, π_m. For the determination of total inequality, the demographic variables and the variables related to income and distribution, as presented in Table 6, have been employed. It's noteworthy that all inequality indexes have been calculated using income before any transfers or adjustments.

6 Empirical evidence from the literature

The relation between inequality and economic growth has been a famous research subject among economic researchers. Hence, there are numerous of empirical studies searching for the relation between inequality and growth from which we can deduct useful information. Among these studies, the causality has been checked in both directions, while the Kuznets hypothesis has also been investigated. Hence, some researchers study the impact of inequality on growth, some others the growth effects on inequality while there are also studies that investigate both. However, since these studies are based on different theoretical perspectives and econometric techniques, not all of them reach the same conclusions. Thus, among the literature, there are studies that indicate a negative relationship between inequality and growth, others that imply a positive relationship, and yet others that find no relationship. The Kuznets hypothesis have also been characterized by similar disagreements.

6.1 Determinants of inequality

Firstly, economic growth, financialization and technological changes seems to be the main determinants of inequality according to the literature, while, additionally, various studies have been conducted to determine the validity of the Kuznets hypothesis, either rejecting or approving it.

For instance, Williamson & Lindert, (1980) found evidence of the Kuznets hypothesis arguing that inequality in the USA has been rising during the second half of the 19^{th} century, remaining high during the first part of the 20^{th} century, and then decreasing until the 60s (Williamson & Lindert, 1980).

Among these studies, Matyas, et al., (1998) found no evidence supporting the Kuznets's hypothesis by using two unbalanced panel data sets consisted of 47 countries for the first and 62 countries for the second set (Matyas, et al., 1998). Both data sets are referred to the period 1970-1993, and the econometric technics they used is the two-way fixed and random effects models trying to include the special characteristics of the country and time endogeneity. Through their findings they suggested that there are no statistically significant indications for the existence of the Kuznets's hypothesis and that instead of the GDP per capita, the factors that really affect inequality levels are the special characteristics of the society, like the social structure, the political system, physical sources and the time period. Thus, as they conclude, inequality is determined more by specific factors than by growth levels.

Another study trying to re-examine if the Kuznets hypothesis is true, was that of Huang, et al., (2012), who used annual data of USA of the period of 1917-2007. Using a test introduced by Lind & Mehlum, (2010), they supported that there is no evidence of an inverted-U or a monotone relationship between inequality, represented by top income share, and economic growth, represented by real income per capita. In contrast they propose that the relationship seems like a U-shaped, where inequality first improves and then worsens as growth increases (Huang, et al., 2012).

Furthermore, financial integration seems to have a strong impact to inequality mainly due to technology, financialization and globalization. Seeking for the impact of globalization on distribution, Harrison, (2002) has used a data of 100 countries for the period of 1960-1997. Among the indicators, openness, capital controls, trade openness and exchange rates have been used for globalization while capital labor-ratio has been used for technological change. The results indicate a positive effect of technological change and a negative effect of globalization. (Harrison, 2002)

International Monetary Fund, (2007a) used a panel of 18 countries of OECD for the period of 1983-2002 seeking for the impact of globalization, technological change and labor institutions on labor income. The indicators that have been used are offshoring, immigration and relative import and export prices. Technological changes have been represented by ICT capital stock and capital-labor ratio. Further indicators that have been used is the union density and taxes. As emerges from the International Monetary Fund, (2007a) study, globalization and technological change have been contributed to the reduction of wage shares in advanced countries (International Monetary Fund , 2007a).

In addition, International Monetary Fund, (2007b) supports that inequality has risen since the income of the highest quintile has been increased while income of the rest of the quintiles have been declined. The higher impact on income inequality increases has been due to the technological progress, while globalization has a smaller contribution. In addition, according to their findings trade openness has been negatively related while the impact of FDI is positive (International Monetary Fund, 2007b).

Furtheremore, European Commission, (2007) used a panel data of 13 OECD countries for the period 1983-2002. The variables that have been used by European Commission, (2007) are the capital-labor ratio, ICT services (per employee) and openness. The results of the European Commission, (2007) study suggest a positive effect of technological change and a negative effect of openness on wage shares (European Commission, 2007).

Searching for the effect of financial and trade openness on wage share, Jayadev, (2007) used a data of 80 countries for the period 1970-2001. Among the variable that has been used are openness, interest rates and a crisis dummy. According to their estimates, financial and trade openness are negatively related to wage shares. (Jayadev, 2007)

Furthermore, Zalewski & Whalen, (2010) found evidence of a simutaneously increase of financialziation and income inequality due a ten year period of 1995-2005. (Zalewski & Whalen, 2010). Additionally, Dabla-Norris, et al., (2015), investigated the determinants of inequality using a fixed effect model on a sample of almost 100 countries from 1980 to 2012, using a 5year average data controlling for initial per capita income and other variables. In their study, they used the GINI index and the disposable incomes of the poorest 10% of the population, the fifth decile, and the top 10% of the population as inequality indices. Among their explanatory variables they used the sum of export and import shares as a trade openness proxy, the sum of foreign assets and liabilities as financial globalization. Furthermore, as a proxy for technology the sum of ICT capital to total capital has been used, while private credit has been also among the explanatory variables. Finally, the average years of education in the population of 15 years old and older has been used as a skill premium. As they result, financial openness has been positively related to inequality, while the impact of trade openness is negative. Furthermore, technology and financial development are positively related to inequality. (Dabla-Norris, et al., 2015)

Stockhammer, (2012b) used a panel data analysis searching for the determinant of wage share, which is determinant of factor inequality, among 71 countries for the period of 1970-2007. In his study, among the indicators he uses variables of financial globalization, technology, trade openness. Capital-labor ratio and ICT services have been the proxies for technology. He also used union density and government consumption. The result the emerge support that there is a trend to higher inequality in OECD countries due to wage share declines. Wage share have also declined in emerging countries. Additionally, they support that wage share has been declined mainly due financialization, while globalization has also negative effect. Furthermore, technology has a positive effect in developing countries. The fact that globalization affects income distribution negatively in both advance and emerging economies is in contrast with the hypothesis of Stolper-Samuelson theorem. (Stockhammer, 2012c)

6.2 The impact of inequality on growth

In terms of the influence of inequality on growth, several authors in the literature argue that high inequality is connected with poor future growth and seems to be harmful to the lowest quantiles. Among these studies is the study of Alesina & Rodrik, (1994) who looked into the relation of initial income inequality and unequal land distribution with next period growth. Using a sample of 54 OECD countries for 25 years they found a significant negative relation between the initial land distribution inequality and growth that achieved the forthcoming period. The same result came up for the relationship between income inequality and growth as well, more specific initial income inequality affected negatively the economic growth for the next period. Their project was based on the traditional theory of endogenous growth (Romer, 1986; Lucas, 1988; Barro, 2000); while their main standpoint was the endogenous approach which assumes that the majority of the voters decide about the level of taxes in every period (Meltzer & Richard, 1981). According to their assumption, in societies where a large amount of the population has no access to the productive resources of the economy, there will be a strong demand for redistribution, which consequently is considered to be harmful for growth. This assumption has proved to be a fact according to their estimates, while as they proposed that voting decisions of every period are able to affect growth in subsequent periods. (Alesina & Rodrik, 1994)

Subsequently, Persson & Tabellini, (1994) came up with similar results finding a negative relation of income inequality and growth for 56 countries and 25 years. According to their findings, the effect is presented only in democracies, in contrast with the findings of Alesina & Rodrik, (1994), who supported that this relation does not differ between democracies and non-democracies. Their theoretical approach was founded on the assumptions that growth is driven by the concentration at productive components, with regulation and tax policies influencing incentive. Thus, inequality affects negatively growth due to pressures of redistributing income like taxes and allowances which is assumed that affect investment and growth-promoting activities negatively. In their study they used the income share of the third quintile as a proxy of inequality assuming that this is the variable that best approximates the relative position of the median income recipient. As inequality index, they also used the fifth quintile of income share. Additionally, they used proxy variables of average skills, political participation and initial GDP, assuming that they are strongly related to growth. Concluding, the main theoretical result that comes out from their empirical study is that inequality promotes policies that "do not protect property rights and do not allow full private appropriation of returns from the investment", thus it can be harmful for growth (Persson & Tabellini, 1994).

Similar results were presented by Panizza, (1995) using data from the USA for the years 1920-1980, who suggested that inequality is bad for growth. Panizza, (1995) also suggested that panel-data set should be preferred to cross-state models, because they can increase the number of observations and additionally give the ability of running fixed effects estimations. By running fixed effects estimations, it is allowed to control for unobservable special characteristics of each state or country that can be correlated with the explanatory variables. By using four alternative methods of measuring inequality, he tried to locate the affection of distribution on 10-year and 20-year periods. Inequality has been measured as the income share of the third quantile in his first model, in his second model he uses the summary of the income shares of the third and the fourth quintiles, in the fourth model he uses the income share of the first quintile divided by the income share of the fifth quintile while in the fourth model, GINI coefficient has been used as inequality measure. Through his findings although he supports the robustness of the negative relation of income inequality and economic growth that has been found in cross-section studies, that is income inequality affects negatively economic growth that follows next periods, he supported that the results may not be accurate by using only cross section data. Furthermore, as regarded the structural relationship between inequality and growth, the analysis is concentrated in two channels, the channel of the fiscal policy and the channels of the endogenous fertility. Thus, according to the fundamental relation between inequality and growth, most of the fiscal variables are related negatively with inequality, while inequality also seems to be negatively correlated with the economic growth of the sequent period. Additionally, according to his findings, as it seems, fiscal policy variables are often related positively with the level of political participation and inequality affect positively teenage pregnancy, which is negatively related to college enrollment, thus with human investment. (Panizza, 1995)

Another empirical research concerning the relation of inequality with economic growth made by Perotti, (1996) contributed on the findings of negative relation between income inequality and growth. His sample was referred to the period 1960-1985 and his models were consist of the depended variable of growth, represented by the average rate of GDP per capita growth, while the explanatory variables he used were the proportion of income that corresponds to the middle income class as a proxy of income inequality and four variables that are mostly found among the literature like the initial GDP per capita, representing economic convergence, the average enrolment in secondary schooling, representing human capital, the PPP value of the investment deflation related to that of USA in 1960. His results are similar with those of Alesina & Rodrik, (1994), Persson & Tabellini, (1994) and Panizza, (1995). Further, he also found that this relation is weaker in the poorer countries, but he could not find an impact of democracy in this relation. In addition, the Kuznets hypothesis seems to be confirmed through his findings. Concluding, Perotti, (1996), suggests that societies with lower levels of inequality also have lower fertility rates, thus higher rates of investment in human capital. In addition, they tend to be more political and social unstable, which prevent investments and growth. Finally, the idea that more equal societies due to democratic institutions leads increases in growth because of the decreases in demand for redistribution, which also means low levels of distortion in markets, seems that cannot be supported. (Perotti, 1996a)

In order to investigate the relation of growth and inequality Partridge, (1997) used a panel data study of the states of USA. The share of median income and GINI coefficient have been used as a proxy for inequality. According to their results, both indicators have been found to be positively related to growth. (Partridge, 1997)

Moreover, according to the findings of Deininger & Squire, (1998), apart from unequal distribution of income, initial distribution of land seems also to be associated with low levels of long-run growth. These findings are emerged from their study, who also question the reliability and the validity of the negative relation of growth and income inequality. In their studies they used an ordinary equation to describe the connection of inequality and growth, in which the depended variable is the growth of GDP, while the independent variables are, the initial inequality, initial income, the level of investments, black markets premium and the role of education. In addition, considering that some independent variables can be affected by other factors, they also included some models with investments, human and physical capital, as the depended variables. Deininger & Squire, (1998) reject the idea that there is a systematic contemporaneous link between inequality and income levels. Furthermore, as it seems initial land inequality is statistically significant for the poor, but this is not the fact for the rich. This finding is consistent with the theoretical approach that suggests that highly unequal distribution creates constraints in credit for some of the individuals from investing. Thus, as they claimed, initial distribution indeed affects future growth due to imperfect market approach, since the impact of initial inequality in land distribution in future growth has been found statistically significant. Furthermore, given that initial inequality can affect education but not investments in physical capital, they refer in results that concluded the effect of investments in physical capital and not in human capital, so they considered that education's impact acts due to the variable of inequality. In addition, due to their findings they suggest that the poor are likely to benefit disproportionately from aggregate investment, implying that increasing investment and boosting growth would not hurt the poor at least in the medium term, and growth boosting policies can be consistent with the aim of poverty alleviation. As emerges from their study, accumulation of new assets is likely to be more effective way of reducing poverty in contrast with redistributing the existing assets. Furthermore, Deininger & Squire, (1998) argued that there is weak evidence of the Kuznets hypothesis. Using a model with GINI levels representing inequality, as dependent variables and GDP per capita representing growth, as independent variables. Through their findings, it is supported that there are serious doubts firstly as regarded the Kuznets hypothesis and secondly as regarded the use of cross section data in order to interpret the relation between inequality and growth. More specific, in 80% of the countries of their sample show no relation of inequality and growth that looks like an inverted U. More general, as it seems there is no precise intertemporal relation between inequality and growth. Finally, they supported that government policy, which is related to income redistribution for different income groups of the population cannot affect income inequality (Deininger & Squire, 1998). Another important argument of Deininger & Squire, (1998) was that income inequality affects future growth in non-democratic countries but not in democratic countries challenging the endogenous fiscal approach, which claims that the median voter determines through elections the level of taxation, thus the level of sequent inequality and growth. Thus, concluding, they found that high initial inequality in land distribution is associated with lower growth in sequent years while at the same time the level of market imperfection has significant impact in future growth, especially those that are related to human and physical capital. (Deininger & Squire, 1998)

Generally, most of the literature suggest that high inequality is associated with low growth in the future while appears to be bad for the bottom quantiles. However, as it has been mentioned, the theories that support a negative relation of inequality and growth usually lay on political effect, which is expected to have long run implications (Rodríguez, 2000). Additionally, there are indications that inequality can also be associated with increasing growth, at least in short terms (Barro, 2000; Forbes, 2000; Li, et al., 1998).

Li, et al., (1998), for instrance, found evidence that income inequality is positively related to economic growth. They used a panel data of 2,480 observations on Gini of 112 developing and andvenced economies. Additionally, Barro, (2000), found evidence for a nonlinear relation between growth and inequality where inequality is positively related to growth at high levels of income and negatively related at low levels. Barro, (2000) found a weak relation between inequality and growth, while as it seems, inequality impedes growth in rich countries and encourages growth in poor countries. As regarded the estimation process, he suggested that if we do not apply models including fixed effects for the countries then there is danger that error problems will appear, especially when we deal with GINI. Searching for the impact of inequality on growth, Barro, (2000) used a model parted by two equations for the sub periods 1965-1975, 1975-1985, and 1985-1995. In the first equation he used GDP per capita growth rate as a depended variable while in the second equation the level of investments is being used as the depended variable. As explanatory variables, he included average rates of government expenditures as GPD proportion, investments as GDP proportion, inflation rate, total fertility, trade rate and indexes for democracy and rule of law. In both equation he also used GINI index as inequality among the explanatory variables. For his estimates he used the method of least squares in three stages, as instrumenting variables he uses. The results that he ends up is that the connection of GINI with growth, expressed by GDP growth rates, is not statistically significant when the variable of fertility is including in the model. In addition, the sign of the impact of inequality on growth changes is depended on the growth levels of the country. More specific he finds that inequality's affect is negative for richer countries while the opposite seems to happen for the poor countries, inequality affects growth positively. Furthermore, for testing the Kuznets hypothesis, real GDP per capita, real GDP per capita squared and the average participation in secondary and higher education in the beginning of every period have been used as explanatory variables. Additional explanatory variables that are being used is the level of participation in international trade and indexes for democracy and rules of law. He also used two dummy variables, the first for countries of Africa and Latin America and the second for GINI that originate from income or from spending data. Finally, his results verify Kuznets's hypothesis, since he finds that in poor countries inequality is positively related to growth while in rich countries the relation is being inverted. According to this fact he supports that "The Kuznets curve emerges as a clear empirical regularity" (Barro, 1990). However, as it is proposed, this relation cannot explain the amount of variation in inequality levels across societies. As it has been supported by Barro, (2000), the Kuznets curve emerges as a clear "empirical regularity" due their empirical results. However, although his results verify Kuznets's hypothesis, as it is proposed, this relation cannot explain the amount of variation in inequality levels across societies. (Barro, 2000)

Furthermore, challenging the belief that there is a negative relation of inequality with growth, Forbes, (2000) using panel data technique suggested that the relation between income inequality and subsequent economic growth seems to be positive in short and medium terms. In general, she criticizes the studies that propose that there is a negative relation between inequality and growth, and according to her suggestions there are three kinds of problem. Firstly, most of the estimates seems to be statistically insignificant. Second problem is that these studies usually have two econometric issues, the first issue is the difficulty of measuring inequality which leads to error measurements while the second issue is omitted-variable bias. Measurement errors on the one hand can generate biases that reduce the significant of the results, while on the other hand in cases where there are omitted variables, the relation of inequality and growth can be outweighed, generating biases. Finally, a third difficulty that emerges is that it is difficult to determine how a change in inequality levels in one nation would affect that country's economic development when using cross-country methods. Cross country surveys often show that countries with low levels of inequality tend to grow faster, which implies that if the economic policies of the government results to decrease inequality, then it is expected that in the long run growth will be improved. However, as she argues cross section studies cannot explain how a change in inequality levels within an economy is associated with growth in this economy, this can be improved by using panel estimation. In her model she used she estimates growth using as explanatory variables income inequality represented by GINI index, GDP per capita, human capital, expressed by average participation in secondary schooling. In the explanatory variables she also used the PPP value of investments as regarded the exchange rate related to USA, this is indicator widely used in literature. Her research uses a sample of 45 countries for the period 1965-1995, which is divided in six sub-periods. In fact, she investigates whether the explanatory variables in the first year of every period affects the growth path of the period. Forbes, (2000) also argues that, in order to choose which technic applies better to our estimates, we should consider three factors. First of all, there is a possibility that some of the variables may be related to special characteristics of the country. The second factor is the fact that one variable (income) may be lagged and endogenous and finally the third factor is the possible endogeneity of the rest of the explanatory variables. In order to estimate her model, she tried four different methods. In the first method she uses the random effect model, in the second method the fixed effect model, in the third method she uses the process of Chamberlain's π-matrix, while in the fourth method she uses GMM (generalized method of moments). By focusing on the method of GMM, she proposes that in the short and the medium term an increase in inequality levels has significant positive impact on subsequent growth. Although Forbes, (2000) found that there is a statistically significant positive relation between inequality and growth in short terms, she did not explain how these two variables are connected, in addition she cannot ensure that the sign of the relation will stay positive in the long run.

Furthermore, Dollar & Kraay, (2002) in their study, where they used a sample of 92 countries, they argued that the relation between poverty and growth does not differ in periods of normal growth and in periods of crisis, while the impact of poverty on growth has not changed in the last forty years. Additionally, as it seems, growth which is driven by trade and other macroeconomic policies benefits the poverty as much as benefits the classic average household while, pro-poor policies such as democratic institutions or public spending on health and education seems to have weak influence on the income of the poorer. Dollar and Kraay (2002) proposed that the approach of least squares that has been used for common observations of years and countries is most likely to lead to different estimates of the parameters for a number of reasons. According to their estimating process, in order to find the effect of growth on the income of the poor income classes, they used three kinds of method. The first two methods they used are the method of least squares and the method of two stages least squares on a panel dataset while, consequently they also used a third kind of method, the GMM method. As regarded the effect of income inequality on economic growth, the variables they used were, the GDP per capita, the income proportion that corresponds to the richest fifth of the population, the GINI index, the sum of imports and exports as a proportion of total GDP, government spending as a proportion of total GDP, a proxy for legal institutions and secondary schooling enrolment. Through their findings they suggested that secondary schooling, financial development, and better legal institutions are linked positively with growth while high government expenditures and inflation seems to be linked negatively with economic growth. They also found that pro-growth macroeconomic policies concerning the stabilization on inflation, the decrease of the government size, financial development, the rule of law, and the openness to international trade can increase the income proportion of the poorest fifth class of the population as much as the average income. Furthermore, Dollar & Kraay, (2002), investigating the Kuznets hypothesis, claim that there is not an obvious tendency that is biased as regarded the poor income classes in the initial levels of development. On the contrary, they found that, private rights, stability and transparency can generate a positive environment for income and productivity growth of the poorest parts of the economy. However, their main result is that policies and institutions as much as economic growth do not benefit the poorest much more that the rest of the society, hence, as they conclude, economic growth is not what poor income classes need in order to better of their life. (Dollar & Kraay, 2002)

Although there is different evidence regarding the relation of inequality and growth, in general it seems that the relationship between inequality and economic growth is non-linear (Banerjee & Duflo, 2003). Using non-parametric methods for a cross country data, Banerjee & Duflo, (2003), supported that growth will be reduced in the subsequent period if inequality changes in any direction. Furthermore, Banerjee & Duflo, (2003) think that the relation between income inequality and economic growth is not unique, while the choice of explanatory variable is very crucial given the fact that there are plenty of factors that can affect inequality. For their estimates they used a model with the same variables that have been used by Perotti, (1996) and Barro, (2000), where they reject the hypothesis of linearity. Although their findings are in agreement with the political economy model, they argued that this could also be a result of measurement errors. However, the main fact that emerges from their study is that the relation between inequality and growth is nonlinear and that the assumption of linearity may lead to false results.

Another panel data study made by Voitchovsky, (2005) argues that in order to define economic growth there should be given special focus on the shape of inequality. More specific due to her findings she claims that inequality at the top of the income distribution is positively related to total economic growth, while inequality at the lower income classes of the distribution is related negatively with growth. She also used a five-period model of panel dataset like (Forbes, 2000) and the GMM technique for a sample of 25 countries. In general, through her empirical research Voitchovsky, (2005) supported her main hypothesis that inequality can affect either positively either negatively economic growth, depended on the inequality on different part of income distribution. (Voitchovsky, 2005)

In general the use of panel dataset has been considered that reduces measurement errors and allows the comparisons across countries and time periods, for this reason it is preffered for several authors investigating the relation of inequality and growth. Iradian, (2005), for instance, using a panel dataset for a sample of 82 countries for the period of 1965-2003 found a positive relation between inequality and growth in short and medium terms, while in the long term there is the possibility that inequality will affect growth negatively. As regarded the depended variable, he uses growth expressed by GDP per capita while as regarded the explanatory variables he uses the GINI coefficient for inequality, the level of initial GDP per capita for every period, an index for the level of rules of law, an index for the level of democracy, inflation rate, total investment and a dummy variable for credit intermediation. Furthermore, Iradian, (2005), considering that the method of least squares is not the appropriate when we deal with panel datasets and trying to avoid inverted causality, he uses two additional econometric methods. In the first method he uses a fixed effect model, while in the second method he uses a model of generalized methods of moment (GMM). According to his estimates, initial inequality may have positive effects on the subsequent economic growth in short terms, which comes in contrast with the studies that use cross section analysis, who suggest that the relation of inequality and growth is positive. This positive link may be a cosequence of the credit market imperfection, however in the long erm there is the posibility that inequality could have an adverse impacts on growth. Furthermore, trying to confirm the validity of the Kuznets curve, he uses a model with inequality as a depended variable, and as explanatory variables he uses initial GDP per capita, the squared initial GDP per capita, government spending, population growth, secondary school enrolment, and dummy variables representing if the country is in a sub-saharian, a Latin-American or a former soviet region and whether inequality data is originated from income or spending data. Finaly he confirms the validity of the Kuznets hypothesis while in addition he supports the idea that higher per capita income is associated with poverty deacreases. (Iradian, 2005)

Further evidence that inequality can also affect economic growth positively found by Chambers, (2005), who used a panel dataset and semiparametric methods trying to identify the impact of past growth in current inequality. More specific, he found a positive relation of growth and inequality for the short run which, which, finally becomes negative in the long run. These findings strengthen the Kuznets hypothesis. His study involved 29 countries and 232 observations, while the variables he used were the exchange rate of the purchasing power (PPP), the average years of schooling over 15 years old, representing human capital and an index of trade levels. As regarded inequality, he used the GINI index as his main variable. Due to his findings, he supported Kuznets hypothesis; while additionally he supported that primary education decreases inequality while secondary and higher education tend to increase inequality. Thus, Chambers (2005) primarily supported that in the short run, there is a positive relationship between inequality and growth, which then flattens and results in a negative relationship in the long term, demonstrating evidence that supports the Kuznets hypothesis. Additionally, he suggests that countries that have more rapid growth tend to experience lower levels of inequality in subsequent periods. (Chambers, 2005)

Indications that the relationship between inequalty and growth could be positive are also found by Lopez, (2006). More specific, through his estimates he supported that there is not a clear relationship between inequality and growth since 1990, while there is a significant positive correlation between them in the 90s. For his estimates he used the method of least squares and the GINI index representing income inequality. (Lopez, 2006)

Moreover, Andrews, et al., (2010) using a panel data of 12 developed countries from the period 1905 to 2000 found no relation of top income shares and economic growth. However, similar to Voitchovsky, (2005), they found that after 1960 there is statistically significant evidence that higher inequality is related to higher economic growth. (Andrews, et al., 2010)

On another point of view, Grijalva, (2011) assumed that the effect of inequality on growth may have different sign, depending on the length of the time period. His hypothesis comes from the observation of the differences between the literature that corresponds to a long-run relationship and the literature that corresponds to short-run relationship. As regarded the short-run studies the relationships is found to be non-linear, so positive effect can be easily detected. Using restricted system-GMM estimators for a short-run period of 5 years, a medium-run period of 10 years and a long-run period of 20 years, finds evidence for an inverted-U relationship for the short and the medium-run period, while this evidence does not exist in the long-run. His estimates emerge from a database of 100 countries for the period 1950-2007. More specifically, it seems that inequality in poorer countries affects negatively economic growth, while in richer countries inequality has a positive effect on growth. He discovers that high levels of inequality lead to lower levels of growth during a 37-year period (1970-2007). His main argument is that that a part of economic inequality is affecting positively economic growth for the short-run and the medium-run, but in the long-run high levels of economic inequality tend to be negative to economic growth. (Grijalva, 2011)

Additionally, evidence found by Halter, et al., (2014), using a data of 106 countries for the period of 1965-2005 support that lower inequality affects positively growth in the long run while in the short run the effect is the opposite. Furthermore, they support that the studies that use cross sectional models find negative relation between growth and inequality while studies that use time-series variation methods find positive effects of inequality on growth. Thus, the choice of methodological models will determine the result since, as they argued, cross sectional models are detecting the long-term effects on growth while time-difference models detect the short-term effects on growth. (Halter, et al., 2014)

Testing for the relation between inequality and growth, Weide & Milanovic, (2014) used a panel data of the states of the USA for the period of 1960 to 2010. As a depended variable of economic growth, they used the growth of income instead of GDP while GINI has been used as an inequality index. Among their results they found that high inequality is associated with decreases on the income growth of the bottom income classes, and hence increases on the top of the distribution. (Weide & Milanovic, 2014)

Ostry, et al., (2014) supported that higher redistribution is related to higher inequality while is also related to economic growth. Furthermore, they found evidence that increased inequality is negatively related to growth and they suggested that redistributive policies that not affect negatively growth should be followed. (Ostry, et al., 2014)

Berg, et al., (2018) came with similar results using a panel data found that lower levels of inequality are related to higher growth. As in Ostry, et al., (2014), they used inequality and redistribution as the related factors with growth Berg, et al., (2018). As regarded the relation of inequality and growth, they argued that the impact of inequality on growth comes mainly due the channels of human capital accumulation and fertility. According to their estimates, equality is related to faster and more sustainable growth. (Berg, et al., 2018)

Furthermore, Jäggi, et al., (2021), developing a Schumpeterian growth model with heterogeneous households and non-homothetic quality preferences, they investigate how inequality and openness combine to shape emerging countries' long-run development potential. As they argued, inequality interacts with growth differently in closed economies than in open economies. More specifically, If the economy is close to the rate of technological progress, international competition may increase the positive demand impact of inequality on growth reported in closed-economy models. On the contrary, in economies with a larger gap to technological progress, richer households will reach their demand for higher technological products by importing leading to a weaker effect of inequality on growth in relation to closed economies. (Jäggi, et al., 2021)

Furthermore, inequality seems to affect growth due to savings. Several studies have related inequality with savings; however, the impact of inequality on savings seems to be ambiguous as they emerge in different evidence. (Edwards, 1996; Schmidt-Hebbel & Servén, 2000; Leigh & Posso, 2009; Gu, et al., 2014).

Additionally, when the accessibility of credit is considered, the evidence appears to be more complicated. For instance, Gu, et al., (2014) found evidence that the relation of savings and income inequality is negative in economies with deficit where consumption can be financed by credit. As regarded the surplus economies with underdeveloped financial systems and less credit, they find a positive relation. (Gu, et al., 2014)

Table 1 summarizes the most notable studies on the relationship between inequality and growth.

Table 1 review table

Author	relation	Inequality index	Dataset	Period	Sample	Kuznets Hypothesis
Alesina & Rodrik, 1994	negative	GINI	cross-country	1960-1985	54 countries	
Persson & Tabellini, 1994	negative	Q3 and Q5	cross-country	1960-1985	56 countries	
Panizza, 1995	negative	Q3, Q3+Q5,Q1/Q5, GINI	panel data	1920-1980	USA states	
Perroti, 1996	negative	Q3+Q4	cross-country	1960-1985	42 countries	yes
Partridge, 1997	positive	share of median income, GINI	panel data	1960-1990	48 USA states	
Deininger & Squire, 1998	negative	GINI	cross-country	1960-1992	66 countries	no
Li, et al., 1998	positive	GINI			2,480 observations	
Barro, 2000	positive on poor, negative on rich	GINI	panel data	1965-1995	100 countries	yes
Forbes, 2000	positive	GINI	panel data	1965-1995	45 countries	
Dollar & Kraay, 2002	no relation	GINI, Q5	panel data	1950-1999	92 countries	no
Banerjee & Duflo, 2003	no relation					
Voitchovsky, 2005	positive on the top of income distribution, negative on bottom income distribution	GINI, ratio of top to bottom incomes	panel data	1975-2000	25 counries	yes
Iradian, 2005	positive	GINI	panel data	1965-2003	82 countries	yes
Chambers, 2005	itive in the short run, negative in the long	GINI	panel data	1968-1987	29 countries	yes
Lopez, 2006	positive	GINI	panel data	1970-200	92 countries	
Andrews, et al., 2010	positive relation after 1960	GINI	panel data	1905-2000	12 countries	
Grijalva, 2011	positive on rich, negative on poor	GINI	panel data	1950-2007	50 countries	yes (for short and medium run)
Halter, et al., 2014	itive in the long run, negative in the short	GINI	panel data	1965-2005	106 countries	
Ostry, et al., 2014	negative	GINI	panel data			
Weide & Milanovic, 2014	f income distribution, negative on botton	GINI	panel data	1960 - 2010	USA states	
Berg, et al., 2018	negative	GINI	panel data			

7 Evidence

This chapter focuses on providing empirical evidence for the determinants of inequality and their relationship with economic growth, building upon the theoretical framework discussed in Chapter 5. The specific context for this analysis is the Eurozone, which is considered a suitable environment for testing the connection between inequality and growth in an integrated setting. The study employs panel data analysis, using data from Eurozone countries spanning the period from 1995 to 2020[44]. The objective of this

[44] Malta has been excluded

empirical investigation is to gather insights that can inform the development of economic policies aimed at mitigating the negative impact of inequality.

7.1. Methodology

For conducting the econometric estimations, a panel data methodology has been adopted as the most appropriate approach. Panel data analysis is particularly suitable when dealing with data heterogeneity and the need to control for time-invariant variables. The general model for panel data analysis is represented by equation (7.2.1), where Y_{it} stands for the dependent variable, and X'_{it} represents the set of explanatory variables. In this context, the subscript "i" corresponds to individual countries, and the subscript "t" pertains to time periods. The term b_i represents the unknown intercept for each country, and u_{it} signifies the error term.

$$Y_{it} = a_{1_{it}} + a_2 X'_{it} + b_i + u_{it} \qquad (7.2.1)$$

Panel data analysis is advocated by various researchers due to its ability to provide more efficient evidence compared to cross-sectional analysis. It offers increased variability, reduced collinearity, and more degrees of freedom, rendering it a favored approach for investigating relationships such as inequality and growth (Deaton, 1995; Baltagi, 2005; Schmidheiny, 2019). Furthermore, the use of panel datasets is advantageous in minimizing measurement errors and facilitating cross-country and cross-time comparisons, a feature particularly beneficial in studies exploring the link between inequality and growth (Iradian, 2005).

Both fixed and random effects methods for panel data have been applied to address potential heterogeneity arising from unobservable social and institutional variables. Additionally, the pooled ordinary least squares (OLS) method has been employed to augment the body of evidence. To account for endogeneity and potential dynamic effects, the Generalized Method of Moments (GMM) method, proposed by Arellano & Bond in 1991, has been employed. As it has been argued, GMM is advantageous in that it capitalizes on both cross-sectional and time dimensions, increases the number of observations, controls for country fixed effects, and addresses endogeneity of regressors (Steger, 2010).

The significance of the results has been corrected for heteroskedasticity and autocorrelation using a robust variance-covariance estimator (VCE) model. Furthermore, the appropriateness of the Fixed Random and Pooled OLS methods has been tested using the Hausman and Breusch-Pagan tests, which are detailed in the Appendix. Additionally, the presence of multicollinearity issues has been examined, and a collinearity matrix of coefficients is included in the Appendix.

The econometric analysis encompasses a range of panel data regressions utilizing various methods, including Pooled OLS, Fixed Effects, Random Effects, and the Arellano and Bond GMM approach.

7.2 Results

7.2.1 Factor inequality

To estimate the impact of the determinants of factor inequality, panel data econometric models (7.3.1.1) and (7.3.1.2) have been employed based on equations (5.1.12) and (5.1.16), respectively.

$$\Delta Inequality_{F_{it}} = a_{1_{it}} + a_2 \Delta l_{it} + a_3 \Delta \lambda_{it} + b_i + u_{it} \qquad (7.3.1.1)$$

$$\Delta Inequality_{F_{it}} = a_{1_{it}} + a_2 \Delta l_{it} + a_3 \Delta w_{it} + a_4 \Delta A_{it} + b_i + u_{it} \qquad (7.3.1.2)$$

In these models, the dependent variable is the growth of factor inequality, denoted as $\Delta Inequality_{F_{it}}$. The first model includes explanatory variables like the growth of the proportion of workers (Δl_{it}) and the growth of wage share ($\Delta \lambda_{it}$). The second model incorporates the proportion of workers (Δl_{it}), the growth of average personal income from wages (Δw_{it}), and the growth of labor productivity ($\Delta A_{L_{it}}$) as explanatory variables.

Here, l represents the proportion of employed labor population in relation to the total employed population. The average personal wage income is denoted as w, calculated as the total wages (W) divided by the total labor population (L). Additionally, labor productivity is calculated by dividing the Gross Domestic Product by the employed labor population.

The wage share (λ) signifies the total income of wage earners as a fraction of the total income of the entire population. The results of these models are presented in Table 2.

Table 2 results

	Depented variable: ΔInequalityF							
	(7.3.1.1)				(7.3.1.2)			
Variable	fixed	random	pooled	gmmest	fixed	random	pooled	gmmest
ΔWS	-2.8389191***	-2.8232209***	-2.8006095***	-2.8536332***				
Δw					-.82472426***	-.84522649***	-1.0605207***	-.79042558***
Δproductivity					.9083483***	.86782125***	1.0588542**	.68687105***
Δl	4.0685912***	4.1776805***	3.9363927***	4.0532853***	3.4081567***	3.4307379***	3.0187782***	3.0731965***
L. ΔInequalityF				-.01501685				-.11242281**
_cons	-.00119031	-.00143693	-.01042085	-.00122503	-.01668679*	-.01433682**	.04974844	-.01073604**
N	457	457	457	421	457	457	457	421
r2	.81811889		.83989876		.21354653		.37345393	
r2_a	.81731765		.82280057		.20833823		.304854	

Wage shares exhibit an expectedly negative sign, indicating a negative relationship with factor inequality, as discussed in Chapter 5.1. Consequently, factor inequality decreases when wage shares increase. Moreover, the relative employment of labor displays a positive association with factor inequality, consistent with the theoretical model in Chapter 5.1.

Further analysis must be conducted on the relationship between the growth rates of wage shares and the relative employment of labor, as prescribed by equation (5.1.13). This examination aims to understand whether factor inequality worsens or improves with changes in wage shares and relative employment. Consequently, based on the results from model (7.3.1.1) and equation (5.1.13), for factor inequality to not deteriorate, the growth rate of wage shares ($\Delta\lambda_{it}$) should increase 1.48 times faster than the growth rate of relative employment of labor (Δl_{it}), $\left(\frac{\Delta\lambda_{it}}{\Delta l_{it}} = 1{,}479756862\right)$[45].

Furthermore, decomposing wage share growth into nominal wage and labor productivity growth rates, as defined by relation (5.1.3), reveals that nominal wage growth must exceed productivity growth for wage shares to increase. Thus, the relationship between the growth rates of nominal wages and labor productivity emerges as a critical factor in determining inequality. As a result, the results from model (7.3.1.2) and equation (5.1.17) indicate that the growth rate of average wages Δw_{it} should

[45] $\Delta Inequality_{F_{it}} = 0 \to 4.1776805\frac{dl}{l} = 2.8232209\frac{d\lambda}{\lambda} \to \frac{d\lambda}{dl}\frac{l}{\lambda} = 1{,}479756862$

increase 0.97 times for every increment in labor productivity growth ($\Delta A_{L_{it}}$,), for wage shares to exert a negative impact on factor inequality$\left(\frac{\Delta w_{it}}{\Delta A_{it}} = 0.973963809\right)$[46].

In summary, the growth of factor inequality decreases when wage shares grow 1.48 times faster than the growth of relative employment of labor. Additionally, this positive effect of wage shares remains valid only when the growth rate of nominal wages is 0.97 times greater than the growth rate of labor productivity.

Furthermore, as elucidated in earlier chapters, average wages, labor productivity, wage shares, relative employment, and consequently factor inequality, are profoundly influenced by other factors such as technological change, trade openness, and financial integration. To delve into the impact of these factors, econometric models (7.3.1.3) through (7.3.1.7) are employed. Specifically, models (7.3.1.3), (7.3.1.4), (7.3.1.5), (7.3.1.6) and (7.3.1.7) focus on the growth rates of average wages, labor productivity, wage shares, and relative employment. These results are then compared with those obtained from model (7.3.1.7), which investigates the growth rate of factor inequality.

$$\begin{aligned}
\text{Wage growth}_{it} &= a_{1_{it}} + a_2 relative\ Labor\ Employment_{it} + a_3 bargaining\ power_{it} \\
&+ a_4 technological\ change_{it} + a_5 FDI\ oppenness_{it} + a_6 financial\ oppenness_{it} \\
&+ a_7 trade\ openness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} \\
&+ a_{10} house\ debth_{it} + a_{11} current\ account\ balance_{it} \\
&+ a_{12} eurozone\ \text{participation}_{it} + a_{13} 2008\ financial\ crisis_{it} + b_i \\
&+ u_{it} \qquad (7.3.1.3)
\end{aligned}$$

46 $\frac{dw}{dA}\frac{A}{w} = 0.973963809$

$$\begin{aligned} &\text{Productivity growth}_{it} \\ &= a_{1_{it}} + a_2 relative\ Labor\ Employment_{it} + a_3 bargaining\ power_{it} \\ &+ a_4 technological\ change_{it} + a_5 FDI\ oppenness_{it} + a_6 financial\ oppenness_{it} \\ &+ a_7 trade\ openness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} \\ &+ a_{10} house\ debth_{it} + a_{11} current\ account\ balance_{it} \\ &+ a_{12} eurozone\ \text{participation}_{it} + a_{13} 2008\ financial\ crisis_{it} + b_i \\ &+ u_{it} \end{aligned} \tag{7.3.1.4}$$

$$\begin{aligned} &\text{Wage Share growth}_{it} \\ &= a_{1_{it}} + a_2 relative\ Labor\ Employment_{it} + a_3 bargaining\ power_{it} \\ &+ a_4 technological\ change_{it} + a_5 FDI\ oppenness_{it} + a_6 financial\ oppenness_{it} \\ &+ a_7 trade\ openness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} \\ &+ a_{10} house\ debth_{it} + a_{11} current\ account\ balance_{it} \\ &+ a_{12} eurozone\ \text{participation}_{it} + a_{13} 2008\ financial\ crisis_{it} + b_i \\ &+ u_{it} \end{aligned} \tag{7.3.1.5}$$

$$\begin{aligned} &\text{Relative Labor Employment growth}_{it} \\ &= a_{1_{it}} + a_2 relative\ Labor\ Employment_{it} + a_3 bargaining\ power_{it} \\ &+ a_4 technological\ change_{it} + a_5 FDI\ oppenness_{it} + a_6 financial\ oppenness_{it} \\ &+ a_7 trade\ openness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} \\ &+ a_{10} house\ debth_{it} + a_{11} current\ account\ balance_{it} \\ &+ a_{12} eurozone\ \text{participation}_{it} + a_{13} 2008\ financial\ crisis_{it} + b_i \\ &+ u_{it} \end{aligned} \tag{7.3.1.6}$$

$$\begin{aligned} &\text{Factor Inequality growth}_{it} \\ &= a_{1_{it}} + a_2 relative\ Labor\ Employment_{it} + a_3 bargaining\ power_{it} \\ &+ a_4 technological\ change_{it} + a_5 FDI\ oppenness_{it} + a_6 financial\ oppenness_{it} \\ &+ a_7 trade\ openness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} \\ &+ a_{10} house\ debth_{it} + a_{11} current\ account\ balance_{it} \\ &+ a_{12} eurozone\ \text{participation}_{it} + a_{13} 2008\ financial\ crisis_{it} + b_i \\ &+ u_{it} \end{aligned} \tag{7.3.1.7}$$

Among the explanatory variables, the trade union density, derived from ILO, serves as an index of bargaining power. Relative Labor Employment represents the ratio of workers with up to secondary education or post-secondary, non-tertiary education to the population of workers with tertiary education, based on ILO data.

The Capital Innovation Ratio, indicating the ratio of capital services related to ICT to capital referred to as Non-ICT, is utilized as a proxy for technological change. This data is sourced from the EU KLEMS database. While variables such as time trends and capital-labor ratios have been employed as proxies for technological change, using ICT capital is considered a more reliable approach. This is attributed to its representation of implemented technical change irrespective of deployment motivations (Stockhammer, 2009).

As a measure of financial openness, the Chinn-Ito index, discussed in Chapter 7.1.3, is employed. The sum of exports and imports presented in logarithm values is adopted to quantify the degree of trade openness. Data for calculating this variable is sourced from the AMECO database[47]. Trade openness, commonly computed by the sum of imports and exports relative to GDP, is frequently used as an indicator of globalization (Harrison, 2002; Rodrik, 1997)

Regarding Foreign Direct Investment (FDI) Openness, the sum of FDI inflows and outflows as a percentage of GDP is employed. Furthermore, the GINI index of average personal income among the eurozone population is utilized as a proxy for convergence.

As a measure of financial development, we utilize the Financial Development Index, which is derived from the International Monetary Fund (IMF). This index ranges from zero to one, with values closer to zero indicating lower levels of financial development (International Monetary Fund, 2006).

Additionally, we employ household private debt in logarithm levels as the variable representing Household Debt, obtained from Eurostat. Furthermore, the current account balance as a percentage of GDP serves as an explanatory variable and is sourced from the United Nations database (UNCTAD).

[47] Exports, at current prices (UXGS), Imports, at current prices (UMGS)

Table 3 results

	Depented variable: Δw				Depented variable: Δproductivity				Depented variable: ΔWS				Depented variable: ΔI				Depented variable: InequalityF			
	(7.3.1.3)				(7.3.1.4)				(7.3.1.5)				(7.3.1.6)				(7.3.1.7)			
Variable	fixed	random	pooled	gmmest	fixed	random	pooled	gmmest	fixed	random	pooled	gmmest	fixed	random	pooled	gmmest	fixed	random	pooled	gmmest
relative labor employment	-.03023922	-.00755471	.02350617	-.0267871	-.02361914	-.00349656	.00395311	-.00701955	-.003246	-.00376445	.00783135	-.00490412	-.00357631	-.0023082	-.00521092	-.00343376	.00651168	.01229255	-.03784321	.00540998
bargaining power	.17119345	-.02242761	.35339412*	.28584672*	.15356596	-.03242772	.17663525	.17919599	-.05294938	-.00222716	.00968002	-.01140478	-.00961555	.00240279	-.01770902	-.0051638	.11807578	.0287777	-.13226786	.04604131
technological change	.35821583	.20245558	.07596906	.5662835**	.43355733*	.19414299	.32764301*	.71567581***	-.0405528	.04456705	-.08026374	.0509096	.03110225	.0009613	.04613261	.04989734	.36487045	-.10450149	.58049563	.13378973
FDI oppenness	.00539111	.00026888	.01016342*	.00818195*	.01614332**	.0089794	.01608806*	.017541**	-.00164495	.00043321	-.00015223	-.00008842	-.00122***	-.00077154	-.0014067**	-.00184097***	.00048142	-.00120107	-.00581026	-.00377932
financial oppenness	.0035409	.00456255	.00229362	.00953696	.0032794	.00220165	.00235108	.0061932	-.00399355	-.00032033	-.00323592	-.00308503	.00407665**	.00292508**	.00476026***	.00449911***	.03694834*	.00490904	.03701163*	.0459657*
trade openness	.04163294	.02311893*	.02252016	.06484378	.08902012***	.04267147***	.04266221	.11562317***	-.02623058*	.00002167	-.01382393	-.02299153	.00192132	.00213584	-.00015664	.00401187	.10379117*	-.00205707	.05137795	.10606024*
convergence	-.24067024*	-.19292917*	29.313037	-.12861217	-.10507176	-.02957511	10083202	-.143707	-.0028851	-.0004387	87885545	-.00881485	-.0164316	-.00978822	-12216237	-.0132769	.07145417	.11579489	-30750224	.05155081
financial development	-.04316618	-.02330073	-.12327373*	.00632188	-.03239156	.05011372*	-.10809667	-.08505653	.02727606	-.00140225	.01835177	.03436719	.02086286	.00839105*	.02608126	.03253886**	-.00831128	.03075689	.0228753	.02786207
house debth	-.00128491***	-.00049422*	-.00123927***	-.00103546***	-.00095243***	-.0006949***	-.00110805***	-.00085592***	-.00043877**	-.00018916*	-.00042833**	-.00043684***	-.00013835**	-.00006484	-.00010231	-.00012326*	.00074035**	.00043798	.00076769**	.00052998*
current account balance	-.00566978**	-.00268925	-.00550016**	-.00539308***	-.00375645**	-.00243128*	-.003521**	-.00447861***	-.0015097***	-.00111502***	-.0016944***	-.00152307***	-.00025993	-.00034635*	-.0001329	-.00030954*	.00355359***	.00123954	.00459007***	.00427958***
eurozone participation	.01588307	-.00980332	.01925214	.0173923	-.0270769	-.02991538	-.02415619	-.03241064*	.020013***	.01061416	.02026163***	.01881339***	-.00007726	.00052697	-.00139826	.00018848	-.07380244***	-.02970271*	-.07832446***	-.08547401***
2008 financial crisis	-.01079341	-.02173773***	-.25643279	-.00995789	-.02267187***	-.02371835***	-.00118282	-.02365584***	.00554259	.00090229	-.07232414	.0064429	-.00044407	-.00030976	.00816079	-.00033516	-.01669647	.00120325	.23784411	-.00828446
L1. Depended variable				.19089813***				-.19106462**				.05303931				.16617655				-.08498277
_cons	.04424056	.07814301**	-35368625	-.10823273	-.01107547	.02707972	-.14946436	-.04800482	.04899402	.00631577	-10099576	.02267238	-.00813369	-.00578486	.13325726	-.02266459	-.23035701	-.05415309	35039997	-.21443922
N	289	289	289	263	289	289	289	263	289	289	289	263	289	289	289	263	289	289	289	263
r2	.48042614		.69103078		.50116893		.70962214		.13679002		.29295833		.18345402		.43923343		.11982981		.28981107	
r2_a	.45783597		.63381426		.47948062		.65584846		.09925915		.16202468		.14795203		.33538776		.08156155		.1582946	

To account for the effects of the Economic and Monetary Union (EMU) and the 2008 financial crisis, we introduce two dummy variables. The first dummy, 'eurodumm,' signifies the period during which a country is a member of the EMU, taking a value of 1 for eurozone countries and 0 otherwise. The second dummy, 'crisisdumm,' covers the period from 2008 onwards and also takes a value of 1.

The results of the models are presented in Table 3. Relative labor employment, Λ_L, has been theorized to be inversely related to labor productivity, A_L, as discussed in Section 5.2. While relative employment has the expected sign in model (7.3.1.4), it is not statistically significant.

Bargaining power has the expected positive impact on nominal wage growth; however, this impact appears to be statistically significant only when using Pooled OLS and the GMM method. Consequently, the effect on factor inequality is not clear, as presented in Table 3.

The impact of technological change on labor productivity growth is statistically significant and has the expected positive sign. While the average wage seems to be positively affected by technological change, this impact is not statistically significant. Furthermore, the impact on wage share growth is negative, while the impact on relative labor employment is positive; both impacts are not statistically significant. Additionally, technological change has the expected positive sign regarding its influence on factor inequality; however, this impact is not statistically significant. These results are presented in Table 3.

The impact of FDI openness is found to be statistically significant in models (7.3.1.4) and (7.3.1.6), while in models (7.3.1.3), (7.3.1.5), and (7.3.1.6), the impact is not statistically significant. More specifically, FDI openness has a significant positive impact on labor productivity growth and a significant negative impact on the relative employment of labor, l. The sign regarding average wage and wage share is positive and negative, respectively; however, these impacts are not statistically significant. Additionally, the impact on relative employment of labor is negative and statistically significant. Hence, although the effect on factor inequality in model (7.3.1.7) is not statistically significant, it has the expected positive effect, mainly due to the effects on labor productivity and relative employment of labor.

The financial openness index seems to have a significant positive impact on the relative employment of labor. In addition, the signs on average wage and wage shares are positive and negative, respectively, but not statistically significant. Furthermore, the impact of financial openness on factor inequality is the expected positive and is statistically significant. The positive sign of the effect of financial openness on factor inequality is mainly through the impact on relative employment of labor, as observed in Table 3.

Labor productivity and average wage growth seem to be positively affected by trade openness. In addition, trade openness is negatively related to wage share and positively related to relative employment of labor. However, the impact on relative employment is not statistically significant. The impact of trade openness on factor inequality appears to be strongly positive. According to the evidence, this result is mainly due to the effect of wage shares.

European convergence has a statistically significant negative relationship with average wages in models (7.3.1.3). Additionally, the relationships with wage share and relative productivity of labor growth in models (7.3.1.4), (7.3.1.5), and (7.3.1.6) are negative but not statistically significant. The impact on factor inequality is positive but not statistically significant. The impact of financial development seems to be insignificant in all models. However, the sign of the variable is negative for nominal wage, while it is positive for labor productivity, wage shares, relative employment of labor, and factor inequality.

The factor of private debt is statistically significant and negative in models (7.3.1.3), (7.3.1.4), (7.3.1.5), and (7.3.1.6), implying a negative impact on average wage, wage shares, labor productivity, and relative employment of labor. Since the negative impact on wage share growth is greater than the negative impact on relative employment of labor, it appears that the final impact on factor inequality is positive; additionally, the impact appears to be statistically significant. Current account balances have a significant negative effect on nominal wage, labor productivity, and wage share growth. In addition, the effect on relative employment of labor is negative but insignificant. The effect on factor inequality is significant and positive, mainly due to the negative impact of current account balances on nominal wages and wage shares. Furthermore, the positive relationship of both private debt and current account balances with factor inequality is accompanied by a negative relationship with labor productivity. Hence, both factors indicate weak economic performance through their effects on both factor inequality and labor productivity.

The wage shares of Eurozone members are positively connected to their participation in the Eurozone, as observed in Table 3. Additionally, since the impact on average wages, labor productivity, and relative employment of labor is statistically insignificant, the impact on factor inequality will mainly occur through the influence on wage shares. Hence, as expected, the impact of participation in the Eurozone on factor inequality is negative and statistically significant, as shown in Table 3.

The dummy variable for the 2008 crisis has a negative and statistically significant impact in model (7.3.1.4), while its relationship seems to be statistically insignificant in the other models. Therefore, although the 2008 crisis negatively affected labor productivity, its impact on factor inequality is not statistically significant.

In conclusion, factor inequality is primarily positively affected by financial openness, trade openness, private debt, and current account balances, while participation in the Eurozone appears to have a negative impact. Furthermore, it is evident that both financial and trade openness, while positively associated with increases in labor productivity, also lead to increased factor inequality. Therefore, policymakers should consider the levels of financial and trade openness as crucial factors for achieving sustained economic growth. On the other hand, high levels of private debt and current account balances seem to have negative effects on both wages and labor productivity, exacerbating factor inequality. Hence, policymakers should aim to avoid high levels of both private debt and current account balances to achieve sustainable economic growth. Finally, participating in the Eurozone appears to be a prudent decision as it relates to higher wage shares and, consequently, lower factor inequality.

7.2.2 Labor inequality

In this chapter, we present the empirical evidence regarding the factors influencing labor inequality. To investigate these determinants, we employ a panel data econometric model (7.3.2.1) based on the relationship described in equation (5.2.19) and the theoretical framework outlined in Chapter 5.2.

$$\Delta Inequality_{L_{it}} = a_{1_{it}} + a_2 \Delta q_{L_{it}} + a_3 \Delta \Lambda_L Ldummy1_{it} + a_4 \Delta \Lambda_L Ldummy2_{it} + b_i + u_{it} \quad (7.3.2.1)$$

The dependent variable in this model is the growth of labor inequality, which has been calculated using data from the World Inequality Database (WID) and the Ameco database. The growth of wage premium (q), representing the average income for highly paid work divided by the average income for basic labor, is used to measure labor inequality, as explained in Chapter 7.1.2. Additionally, relative labor employment, which measures the population of basic educated workers in relation to the population of highly educated workers, is calculated using data from the ILO and Ameco database, as discussed in Chapter 7.1.1.

To account for the population distribution changes in line with the Kuznets hypothesis, two dummy variables, Ldummy1 and Ldummy2, have been included. Ldummy2 represents the first period of the Kuznets hypothesis, where the ratio of basic to skilled labor population is greater than the ratio of total skilled labor income to total basic labor income ($m_L < \Lambda_L$).

In this period, an increase in the skilled population leads to an increase in labor inequality. Therefore, if economic growth relies on a more skilled and productive labor force, it will be accompanied by a rise in labor inequality. Consequently, the first dummy variable, Ldummy1, takes the value 1 if relative labor employment Λ_L is smaller than their relative total incomes m_L, while the second dummy variable, Ldummy2, takes the value zero. Conversely, if relative labor employment Λ_L is larger than their relative total incomes m_L, the first dummy, Ldummy1, takes the value zero, while the second dummy, Ldummy2, takes the value 1, as presented in equation (7.3.2.2). The estimates of model (7.3.2.1) are presented in Table 4.

$$Ldummy1 = 1 \text{ if } (\Lambda_L - m_L) < 0 \text{ else } Ldummy1 = 0$$

$$Ldummy2 = 1 \text{ if } (\Lambda_L - m_L) > 0 \text{ else } Ldummy2 = 0$$

Table 4 results

	Depented variable: ΔInequalityL			
	(7.3.2.1)			
Variable	**fixed**	**random**	**pooled**	**gmmest**
ΔqL	1.0360858**	.98224568**	.9597293**	1.0918711***
ΔΛL*Ldummy1	1.8282078**	1.690398**	1.649792*	2.1048377***
ΔΛL*Ldummy2	-.39766549**	-.38928674**	-.45568441**	-.31572818*
L. ΔInequalityL				-.15324879
_cons	.00873933	.00907235	.05837631*	.01666114*
N	402	402	402	360
r2	.47097374		.52866841	
r2_a	.4669861		.46908998	

As observed, firstly, the impact of the wage premium on labor inequality is positive, as expected. Secondly, both variables of relative labor employment, restricted using the Ldummy1 and Ldummy2 dummies, have the expected signs and are statistically significant. This indicates that the Kuznets hypothesis for labor inequality, as described in Chapter 5.2, has been confirmed.

Therefore, according to equation (5.2.23), if the rate of basic to skilled labor population is larger than the rate of total skilled labor income to total basic labor income $(\Lambda_L - m_L) > 0$, for every negative growth of relative labor employment $\Delta\Lambda_{L_{it}}$, due to more skilled labor, wage premium growth $\Delta q_{L_{it}}$ should decrease by at least 0.38 times so that labor inequality will not increase $\left(\frac{\Delta q_{L_{it}}}{\Delta \Lambda_L Ldummy2_{it}} = 0{,}384411045\right)$[48]. As a result, if the economy is in the first phase of Kuznets' hypothesis, and policymakers are focused on reducing labor inequality, they should take the necessary measures to ensure that wage premium decreases more than 0.38 times concerning relative labor employment growth.

Controlling the wage premium can be achieved by either reducing the average income of skilled labor or increasing the average income of basic labor. However, a reduction in the average income of skilled labor might discourage individuals from investing in acquiring higher skills through education, potentially leading to a decrease in the supply of skilled labor. This would imply a slower transition to the second phase of the Kuznets hypothesis.

On the contrary, a reduction in the average income of skilled labor could increase the demand for skilled labor due to changes in relative labor costs, as described in equation (5.2.6). In such a scenario, the transition to the second phase of the Kuznets hypothesis would occur more rapidly, with a decrease in the relative labor force $\left(\dot{\Lambda} < 0\right)$.

It's important to note that reducing the average income of skilled labor raises concerns about the potential for lower wage incomes for both classes in the future, which could result in higher future factor inequality.

On the contrary, if the approach involves increasing the average wage of skilled labor, labor inequality will temporarily increase due to the impact of the wage premium. However, this increase in incomes for skilled workers will enhance incentives to invest in education, leading to higher rates of relative labor employment growth ($\dot{\Lambda}$<0) and thus a faster transition to the second phase of the Kuznets hypothesis.

Conversely, higher wage premium levels may influence relative labor employment by reducing the demand for skilled labor due to changes in relative costs, as described in equation (5.2.5). This suggests that the economy is progressing toward the second phase of the Kuznets hypothesis, but on a slower trajectory. Additionally, an increasing average wage implies a decrease in future factor inequality due to a general increase in

[48] $\left(1.0357795\,\frac{dq}{q} = 0.39816508\,\frac{d\Lambda}{\Lambda}\,\mathrm{dum2}\right)$

wages. Furthermore, in both approaches, labor productivity will continue to rise due to a larger pool of skilled and productive labor, leading to higher economic growth rates.

If the economy is in the second phase of the Kuznets hypothesis, this means that the rate of basic to skilled labor population is smaller than the rate of total skilled labor income to total basic labor income ($\Lambda_L - m_L < 0$), for every negative growth of relative labor employment ($\Delta\Lambda_{L_{it}}$), due to more skilled labor, wage premium growth ($\Delta q_{L_{it}}$) can increase up to 1.76 times without increasing labor inequality $\left(\frac{\Delta q_{L_{it}}}{\Delta\Lambda_L Ldummy1_{it}} = -1{,}764326963\right)$ [49]. Therefore, if the economy is in the second phase of the Kuznets hypothesis, policymakers can choose to increase wage premium by up to 1.76 times relative to relative labor employment decreases.

So, on one hand, if policymakers choose to implement these increases, labor inequality will not decrease, but it will provide more incentives to workers to acquire more skills, leading to faster economic growth. Additionally, this will decrease factor inequality due to an average wage increase resulting from employing more labor with higher wages. On the other hand, if policymakers choose to maintain wage premium, labor inequality will decrease, but fewer incentives will be provided for skilled labor, affecting the demand for skilled labor. Additionally, factor inequality may increase, while labor productivity may increase more than average wages.

As a result, policymakers should always focus on declining relative labor employment, aiming towards the second phase of the Kuznets curve, where labor inequality decreases as economic growth grows. Furthermore, wage premium may be used to manage the level of labor inequality as it approaches the second phase of Kuznets' theory.

Consequently, the following econometric models (7.3.2.3) and (7.3.2.4) have been used to find evidence about the factors that affect relative employment and wage premium. The independent variables used in these models include the lag of wage premium, gross domestic expenditure on R&D, technological changes, financial openness, trade openness, FDI openness, European convergence, expenditures on education, participation in the eurozone, and the 2009 financial crisis. The results are

---

[49] $\left(1.0357795 \frac{\mathrm{dq}}{\mathrm{q}} = -1.8274537 \frac{\mathrm{d}\Lambda}{\Lambda} \mathrm{dum2}\right)$

compared with the results of model (7.3.2.5), where the dependent variable is labor inequality. The results of estimations of models (7.3.2.3), (7.3.2.4), and (7.3.2.5) are presented in Table 5.

$$\begin{aligned} \Delta\Lambda_{L_{it}} = {} & a_{1_{it}} + a_2 wage\ premium_{it} + a_3 invest\ in\ R\&D_{it} \\ & + a_4 capital\ innovation\ ratio_{it} + a_5 financial\ oppenness_{it} \\ & + a_6 trade\ openness_{it} + a_7 fdi\ oppenness_{it} + a_8 convergence_{it} \\ & + a_9 education\ expenditure_{it} + a_{10} euro\ dummy_{it} \\ & + a_{11} 2008\ crisis\ dummy_{it} + b_i + u_{it} \end{aligned} \qquad (7.3.2.3)$$

$$\begin{aligned} \Delta q_{L_{it}} = {} & a_{1_{it}} + a_2 wage\ premium_{it} + a_3 invest\ in\ R\&D_{it} \\ & + a_4 capital\ innovation\ ratio_{it} + a_5 financial\ oppenness_{it} \\ & + a_6 trade\ openness_{it} + a_7 fdi\ oppenness_{it} + a_8 convergence_{it} \\ & + a_9 education\ expenditure_{it} + a_{10} euro\ dummy_{it} \\ & + a_{11} 2008\ crisis\ dummy_{it} + b_i + u_{it} \end{aligned} \qquad (7.3.2.4)$$

$$\begin{aligned} \Delta Inequality_{L_{it}} & \\ = {} & a_{1_{it}} + a_2 wage\ premium_{it} + a_3 invest\ in\ R\&D_{it} \\ & + a_4 capital\ innovation\ ratio_{it} + a_5 financial\ oppenness_{it} \\ & + a_6 trade\ openness_{it} + a_7 fdi\ oppenness_{it} + a_8 convergence_{it} \\ & + a_9 education\ expenditure_{it} + a_{10} euro\ dummy_{it} \\ & + a_{11} 2008\ crisis\ dummy_{it} + b_i + u_{it} \end{aligned} \qquad (7.3.2.5)$$

Firstly, as observed in Table 5, the lag of wage premium appears to be significant and positively related to relative labor employment. This indicates that a higher past wage premium results in less skilled labor, in line with equation (5.2.6) and the assumptions made in Chapter 5.2. Higher wage premiums reduce the relative demand for skilled labor. Furthermore, it is negatively related to wage premium growth. Both of these effects lead to a significant negative relationship with labor inequality.

Moreover, as seen in Table 5, gross domestic expenditure on R&D is significant and negatively related to relative labor employment, indicating a higher population of skilled labor. Hence, investing in new technologies seems to be related to having more skilled labor, as expected. The impact on wage premium and labor inequality appears to be positive but not statistically significant.

Table 5 results

	Depented variable: Relative employment growth ΔrelatL				Depented variable: Relative employment growth Δq				Depented variable: ΔinequalityL			
	(7.3.2.3)				(7.3.2.4)				(7.3.2.5)			
Variable	**fixed**	**random**	**pooled**	**gmmest**	**fixed**	**random**	**pooled**	**gmmest**	**fixed**	**random**	**pooled**	**gmmest**
wage premium lag	.11879201*	.00052348	.09107268*	.08774065	-.25790434***	-.00644427	-.24477***	-.35533234***	-.60149639**	-.06487312**	-.56851052**	-.68197869***
R n D	-.06054271*	.00062947	-.07782532*	-.01301101	.01637226	-.00219117	.02022057	.0179685	.07432758	-.00678444	.08748752	.05007922
technological change	.13608341	-.0032481	.08580011	.14458321	.36050954**	.05637253	.29225571**	.22808222	.72321621*	.23276016	.61978446*	1.4979191*
financial oppenness	.00528096	.00891722	.00140836	.01756714	.04113869	.01273743*	.03940963	.05518051	.061507*	.01991852	.05760094*	.07236799
trade openness	.1660144*	.01878482	.12927042	.12803815*	.08224537	.02203092**	.0339595	.09601026	.07566467	.01257978	-.00396444	.04287738
FDI oppenness	.00343046	.00247162	.00204216	.00621664	-.03707311***	-.03696971***	-.03561976**	-.04626999***	.00857765	-.01422769	.01106899	-.00920781
convergence	.03505421	.17166672	-69379105	.10252836	-.07651479	-.11275597	.08632446	-.10201112	.10417587	-.04868713	-20415092	-.00564224
expenditures on education	-.85148245	-.30649743	-.11561723	-.94480574	-3.2141589*	-.53726103	-13845667	-4.9539946**	-5.8816438*	-15926023	-31489029	-10.617865*
eurozone participation	-.00570193	-.0091896	.02930729	-.02663529	-.01089526	-.0023353	-.01290383	-.00861149	-.01496177	.00434698	-.01620793	.00557039
2008 financial crisis	-.00043721	-.01174009	-.02294805	-.01927783**	-.01593293	-.00614991	.01080942	-.01713946	-.0495597	-.01174714	-.05639723	-.03483818
L1. Depended variable				.05420576				-.0806407				-.20986787
_cons	.21925297	-.07397884**	13003362	-.1004417	.02719765	.02528313	-.08438431	.13173934	-.14089063	.13978113***	-.05116189	.28795686
N	361	361	361	329	359	359	359	323	359	359	359	323
r2	.08607221		.21262244		.2854321		.3737859		.16238401		.25134212	
r2_a	.05995999		.09439003		.26489854		.27914904		.13831459		.13820089	

Regarding technological changes, the variable ICT capital services to non-ICT capital services, derived from the EU KLEMS database as presented in section 7.1.3, is used. Technological changes are found to be statistically significant and positively related to wage premium, leading to a significant positive effect on labor inequality. Additionally, while the variables of technological changes and relative labor employment have positive relationships with wage premium, they are not statistically significant.

The impact of financial openness, represented by the Chinn-Ito index, on relative labor employment and wage premium is positive but not statistically significant. However, labor inequality appears to be positively affected by financial openness, and this relationship is statistically significant. Trade openness shows a positive relationship in all three models but is statistically insignificant in model (7.3.2.3). Hence, trade openness seems to decrease the proportion of skilled labor relative to basic labor. Furthermore, the factor of FDI openness is statistically significant in model (7.3.2.4), indicating a negative impact on wage premium. The effect is positive on relative labor employment and labor inequality, although it is not statistically significant.

Moreover, government expenditure on education appears to have a negative and statistically significant impact on wage premium and labor inequality, as observed in models (7.3.2.4) and (7.3.2.5) in Table 5. Hence, higher government expenditure on education is associated with a lower wage premium and a decrease in labor inequality. Additionally, although the effect is not statistically significant, government expenditure seems to be negatively related to relative labor employment.

Finally, European convergence, participation in the eurozone, and the impact of the 2008 crisis appear to be statistically insignificant in all three models.

Therefore, labor inequality is negatively related to past wage premium and expenditures on education, while it appears to be positively related to technological changes and financial openness. Consequently, while technological changes and financial openness cannot be avoided, policymakers should focus on increasing expenditures on education to control labor inequality.

Furthermore, to achieve a rapid reduction in relative labor employment Λ_L, policymakers should concentrate on factors such as wage premium, investment in new technologies, and trade openness to transition to the second phase of the Kuznets hypothesis.

More specifically, as trade openness may not be easily regulated and is positively associated with relative labor employment, pursuing policies focused on education and research and development, while also aiming for a lower wage premium, may be the most suitable strategy for sustaining economic growth. Moreover, wage premium can be managed through factors like technological advancements, FDI openness, and investments in education, as indicated by the findings in Table 5.

7.2.3 Profit inequality

The empirical evidence of the factors driving profit inequality growth is discussed in this chapter. Firstly, following Equation (5.3.27) and the theoretical approach of Section 5.3, we use the following panel data econometric model (7.3.3.1) to estimate the impact of the determinants of inequality among investors.

$$\Delta Inequality_{K_{it}} = a_{1_{it}} + a_2 \Delta q_{K_{it}} + a_3 \Delta \Lambda_{K_{it}} + b_i + u_{it} \qquad (7.3.3.1)$$

The dependent variable in this model is the growth of profit inequality, as calculated previously. Among the explanatory variables, $\Delta q_{K_{it}}$ represents the growth of the income premium of investors. The income premium, denoted as q_K , is the average income of the high-class capital owners divided by the average income of medium-level investors. The data used for these calculations is derived from the World Inequality Database (WID) and the Ameco database, as discussed in Section 7.1.2. Additionally, $\Delta \Lambda_{K_{it}}$ signifies the growth of relative employment of investors, Λ_K, which refers to the population of middle-class investors relative to the population of high-class investors. Data for these variables has been sourced from the International Labour Organization (ILO) and the Ameco database, as outlined in Section 7.1.1. The results of model (7.3.3.1) are presented in Table 6.

Firstly, it should be noted that, for all countries and years in the data, the ratio of the population of middle investors to high-class investors, denoted as Λ_K, has consistently been larger than the ratio of the total income of high-class investors to middle-class investors, represented as m_K, $(\Lambda_K - m_K > 0)$.

Table 6 results

	Depented variable: ΔInequalityK			
	(7.3.3.1)			
Variable	**fixed**	**random**	**gmmest**	**pooled**
ΔΛK	-.73852989***	-.71134871***	-.70643144***	-.3730266**
ΔqK	.87892723***	.88276458***	.88252905***	.83368362***
L1. ΔInequalityK				-.02230484
_cons	.00378484	.00397681	.05250114	.00654638
N	456	456	456	420
r2	.83523291		.84681544	
r2_a	.83450546		.83041612	

Hence, according to the theoretical approach presented in Chapter 5.3, there is a low level of monopoly, which indicates a negative relationship between the rate of the population of middle investors and high-class investors, denoted as Λ_K, and profit inequality growth rates, in accordance with relation (5.3.32). As observed, the sign of this impact is negative, as expected. Therefore, following relation (5.3.33), for every growth in Λ_K, the profit premium q_K should increase by a factor of 0.84 in the same direction $\left(\frac{\Delta q_{K_{it}}}{\Delta \Lambda_{K_{it}}} = 0{,}84026284\right)$[50]. Consequently, if the economy tends toward higher monopoly due to a decreasing ($\dot{\Lambda}_K$), the profit income premium should decrease by 0.84 times in relation to changes in $\dot{\Lambda}_K$.

Furthermore, evidence is presented regarding the factors that affect monopoly and profit premium changes. Consequently, the following econometric panel models (7.3.12) and (7.3.13) have been used to find evidence about the determinants of profit

[50] $0{,}87892723 \frac{dq}{q}_{it} = 0{,}73852989 \frac{d\Lambda_K}{\Lambda_K}_{it}$

inequality. Moreover, the estimates from these models are compared with the results from model (7.3.14), where the dependent variable is profit inequality. The econometric model that is used includes variables for financial integration, such as financial, trade, and FDI openness, in accordance with the literature and the theoretical approach of Chapter 5. Additional independent factors, such as the lag of the monopoly index, Λ_K investing in R&D, technological changes, financial development, European convergence, participation in the eurozone, and the financial crisis of 2008, have been included. The results of models (7.3.3.2), (7.3.3.3), and (7.3.3.4) are presented in Table 7.

$$\begin{aligned} \Delta \Lambda_{K_{it}} &= a_{1_{it}} + a_2 L.relatK_{it} + a_3 invest\ in\ R\&D_{it} + a_4 capital\ innovation\ ratio_{it} \\ &+ a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 fdi\ oppenness_{it} \\ &+ a_8 convergence_{it} + a_9 financial\ development_{it} + a_{10} convergence_{it} \\ &+ a_{11} euro\ dummy_{it} + a_{12} 2008\ crisis\ dummy_{it} + b_i \\ &+ u_{it} \end{aligned} \tag{7.3.3.2}$$

$$\begin{aligned} \Delta q_{K_{it}} &= a_{1_{it}} + a_2 L.relatK_{it} + a_3 invest\ in\ R\&D_{it} + a_4 capital\ innovation\ ratio_{it} \\ &+ a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 fdi\ oppenness_{it} \\ &+ a_8 convergence_{it} + a_9 financial\ development_{it} + a_{10} convergence_{it} \\ &+ a_{11} euro\ dummy_{it} + a_{12} 2008\ crisis\ dummy_{it} + b_i \\ &+ u_{it} \end{aligned} \tag{7.3.3.3}$$

$$\begin{aligned} \Delta InequalityK_{it} &= a_{1_{it}} + a_2 L.relatK_{it} + a_3 invest\ in\ R\&D_{it} + a_4 capital\ innovation\ ratio_{it} \\ &+ a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 fdi\ oppenness_{it} \\ &+ a_8 convergence_{it} + a_9 financial\ development_{it} + a_8 convergence_{it} \\ &+ a_{11} euro\ dummy_{it} + a_{12} 2008\ crisis\ dummy_{it} + b_i \\ &+ u_{it} \end{aligned} \tag{7.3.3.4}$$

The lag of the monopoly index, Λ_K, appears to be statistically significant in all three models. The impact on model (7.3.3.2) indicates a negative relationship of past monopoly levels with changes in monopoly levels. The relationship with profit premium is positive, as observed in model (7.3.3.3).

Table 7 results

	Depented variable: Relative employment growth ΔΛK				Depented variable: ΔqK				Depented variable: ΔInequalityK			
	(7.3.3.2)				(7.3.3.3)				(7.3.3.4)			
Variable	**fixed**	**random**	**gmmest**	**pooled**	**fixed**	**random**	**pooled**	**gmmest**	**fixed**	**random**	**gmmest**	**pooled**
L. lnΛK	-.07744025**	-.02343783*	-.0778633**	-.12505281***	.27180944***	-.01410062	.27291982***	.39660105***	.20789804**	-.01655754	.21437148**	.47121589***
L. qK	-.00212011	-.00204602	-.00160552	-.00683672	-.46372846***	-.13947613***	-.46642327***	-.68051296***	-.43264361***	-.14968003***	-.44152736***	-.63647083***
R n D	-.02712038	.00379656	-.03655434	-.01956105	.05048469	-.00741516	.02561751	.1533956*	.06867003*	-.00945191	.04887712	.20162863**
technological change	.02738084	-.02547183	.065661	-.00226242	-.02711341	.05730945	-.01822066	-.09588395	-.07959011	.07430364	-.11335443	-.26506986
financial oppenness	-.07111941	-.05337142	-.11732151	-.08063583	-.52141214	-.28831515	-.65138973	-.18479559	-.38209876	-.24378766	-.46746252	.09154293
trade openness	-.0115984**	-.01137443***	-.01519551**	-.02244698***	-.05300305**	-.00170714	-.06370456*	-.11917058***	-.06176167**	-.01561811*	-.06761266**	-.08075175*
FDI oppenness	.07244781**	.01557889***	.06683736*	.06468906**	.25099755*	.04901115	.2057055	.1268164	.10105629	.02877574	.05787507	-.03857602
convergence	-.00603158*	-.00933116**	-.00760093**	-.00643314	.01904621	-.02319287*	.01944956	.02130447*	.01246157	-.01780197*	.01433713	.02530415**
financial development	.17606528	.20627865	41210585	.11911937	.1657873	.56677226	83570306	.08806383	-.01248138	.34290462	30812328	-.01011816
eurozone participation	.01291011	.01226949	.02334822	.02065608*	.03048398	.03295969	.05920743	.06943455	.02501781	.02555163	.03563662	.05212096
2008 financial crisis	-.00843095	-.01301512	-.01592923	-.01709056	-.09130896*	-.04501594*	-.02677614	-.16513952**	-.07850337*	-.03811186**	-.00861874	-.13592422**
L. Depended variable				.16401795				-.00071725				.00092672
_cons	.31659775*	.03017856	-.09380892	.44133223***	-.42711207	.20730572	-14628462	-.89833459	-.23471137	.31376458**	-.59555587	-13404884
N	396	396	396	374	396	396	396	369	394	394	394	367
r2	.13419901		.28927346		.26916647		.30120839		.25232487		.28765422	
r2_a	.10939742		.1909597		.24823113		.20454557		.23079496		.18854524	

This implies that lower levels of past monopoly result in higher profit premiums in the future. Finally, monopoly levels are related to higher future profit inequality, as observed in model (7.3.14) of Table 7. Additionally, as presented in Table 7, the lag of the profit premium index has a negative impact in all three models but is statistically significant only for models (7.3.3.3) and (7.3.3.4). Hence, high past wage premium levels are related to negative growth in future profit premium and profit inequality.

Gross domestic expenditure on R&D, although appearing to be negatively related to the monopoly index and positively related to profit premium, is not statistically significant. Nevertheless, the impact on profit inequality appears to be significantly positive, indicating a positive relation between expenditures on R&D and profit inequality.

Technological change also seems to have a positive impact on the monopoly index and a negative impact on profit premium and profit inequality. However, the variables of these factors are statistically insignificant for all three models. In addition, financial openness seems to have a negative but not statistically significant impact in all three models.

Furthermore, the impact of trade openness is statistically significant in all three models, indicating that higher trade openness is associated with increases in monopoly and decreases in profit premium. As expected according to equation (5.3.30), the final impact of trade openness on profit inequality appears to be negative and statistically significant, mainly through the impact of the monopoly level and profit premium. Furthermore, as it seems from the estimates of model (7.3.3.2), FDI openness leads to decreases in monopoly and increases in profit premium. However, the impact on profit inequality is positive and not statistically significant. Additionally, the variable of European convergence appears to increase monopoly; however, the impact on profit premium and profit inequality is not significant.

Moreover, the factors of financial development and participation in the eurozone have positive signs, but they are not statistically significant. Finally, the 2008 crisis dummy has a significant negative impact on profit premium and profit inequality.

Therefore, as it emerges, investing in R&D and trade openness are the factors that policy makers should consider in order to control profit inequality.

7.2.4 Growth and Inequality

The aim of this chapter is to provide evidence regarding the relationship between income inequality and economic growth.

7.2.4.1 Total inequality

To start, this chapter compares various types of inequality, as calculated and presented in Chapter 7.1.4, to different Gini indexes from diverse datasets. Both factor labor and profit inequality are used as independent variables in the following econometric panel data models: (7.3.4.1), (7.3.4.2), (7.3.4.3), (7.3.4.4), (7.3.4.5), (7.3.4.6), and (7.3.4.7). The dependent variables are the GINI indexes calculated in Chapter 7.1.4, as well as the GINI indexes from databases such as EUROSTAT, OECD, UN, and Texas University. The results are presented in Table 8 and Table 9.

$$Inequality_{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it} \quad (7.3.4.1)$$

$$Gini\ Eurostat_{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it} \quad (7.3.4.2)$$

$$Gini\ Eurostat\ Before\ Taxes_{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it} \quad (7.3.4.3)$$

$$Gini\ OECD_{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it} \quad (7.3.4.4)$$

$$Gini\ OECD\ pre\ tax\ _{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it} \quad (7.3.4.5)$$

$$Gini\ UN_{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it} \quad (7.3.4.6)$$

$$Gini\ Texas\ University_{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it} \quad (7.3.4.7)$$

Table 8

	Depented variable: total inequality				Depented variable: Gini Eurostat				Depented variable: Gini Eurostat Before Transfers				Depented variable: Gini OECD			
	(7.3.4.1)				(7.3.4.2)				(7.3.4.3)				(7.3.4.4)			
Variable	fixed	random	pooled	gmmest	fixed	random	pooled	gmmest	fixed	random	pooled	gmmest	fixed	random	pooled	gmmest
InequalityF	.69095134***	.69733751***	.65744165***	.55934004***	.03661512	.05110462	.01780474	.05445214	.30352995*	.27864187*	.40532983**	.04521537	.05472802	.07680521	.02479548	-.01441153
InequalityL	.57523917***	.57321844***	.62798751***	.49011404***	.01374528	.02442802	.05117015	-.02215972	.29407832***	.24625945***	.14383333*	.16239447***	.0082722	.02292225	.03459109	-.02288631
InequalityK	.04599946*	.04854399**	.06697842**	.04102038*	.01060766	.01849067	.03608438	-.02132802	.11769891	.1012287	.0570523	.0194527	.03950029	.04658281	.05767921	.02816089
unemplRT	.71140598***	.70916117***	.75211993***	.62565589***	.05673742	.06552245	.03822015	.0497817	.57086036***	.55135885***	.45948196**	.37139519***	.12523323*	.13275429*	.11952671	.07233185*
L1. Gini Eurostat Before Taxes				.10763409**				.51719929***				.55926783***				.53907503***
_cons	.06141908***	.05908287***	.05083117**	.07069465***	.27953801***	.27325438***	.26330397***	.1343606***	.29736171***	.31026086***	.32631614***	.14096318***	.28303769***	.2748262***	.26160715***	.13909927***
N	419	419	419	380	371	371	371	303	280	280	280	244	290	290	290	230
r2	.93587384		.9910418		.01617526		.89036952		.52694555		.89091811		.10241673		.89606778	
r2_a	.93525427		.98993406		.00542307		.8748047		.52006476		.87371848		.08981907		.8774024	

Table 9

	Depented variable: total inequality				Depented variable: Gini Eurostat				Depented variable: Gini Eurostat Before Transfers				Depented variable: Gini OECD			
	(7.3.4.1)				(7.3.4.2)				(7.3.4.3)				(7.3.4.4)			
Variable	**fixed**	**random**	**pooled**	**gmmest**	**fixed**	**random**	**pooled**	**gmmest**	**fixed**	**random**	**pooled**	**gmmest**	**fixed**	**random**	**pooled**	**gmmest**
InequalityF	.69095134***	.69733751***	.65744165***	.55934004***	.03661512	.05110462	.01780474	.05445214	.30352995*	.27864187*	.40532983**	.04521537	.05472802	.07680521	.02479548	-.01441153
InequalityL	.57523917***	.57321844***	.62798751***	.49011404***	.01374528	.02442802	.05117015	-.02215972	.29407832***	.24625945***	.14383333*	.16239447***	.0082722	.02292225	.03459109	-.02288631
InequalityK	.04599946*	.04854399**	.06697842**	.04102038*	.01060766	.01849067	.03608438	-.02132802	.11769891	.1012287	.0570523	.0194527	.03950029	.04658281	.05767921	.02816089
unemplRT	.71140598***	.70916117***	.75211993***	.62565589***	.05673742	.06552245	.03822015	.0497817	.57086036***	.55135885***	.45948196**	.37139519***	.12523323*	.13275429*	.11952671	.07233185*
L1. Gini Eurostat Before Taxes				.10763409**				.51719929***				.55926783***				.53907503***
_cons	.06141908***	.05908287***	.05083117**	.07069465***	.27953801***	.27325438***	.26330397***	.1343606***	.29736171***	.31026086***	.32631614***	.14096318***	.28303769***	.2748262***	.26160715***	.13909927***
N	419	419	419	380	371	371	371	303	280	280	280	244	290	290	290	230
r2	.93587384		.9910418		.01617526		.89036952		.52694555		.89091811		.10241673		.89606778	
r2_a	.93525427		.98993406		.00542307		.8748047		.52006476		.87371848		.08981907		.8774024	

As observed in Tables 8 and 9, factor inequality is statistically significant only in model (7.3.4.3). This indicates that calculated factor inequality is associated solely with the Gini index before transfers from Eurostat. The variable representing calculated labor inequality shows statistical significance in the Eurostat Gini before transfers, OECD Gini before taxes, UN Gini, and Texas University Gini. On the other hand, profit inequality is statistically significant only in relation to the Gini index of the UN, while unemployment is a statistically significant component across all Gini indexes.

7.2.4.2 Kuznets

To examine the validity of the famous Kuznets hypothesis, a nonlinear approach, commonly employed in the literature, is utilized. In this investigation of the nonlinear Kuznets hypothesis, we employ the following panel data models: (7.3.4.2.1), (7.3.4.2.2), (7.3.4.2.3), and (7.3.4.2.4). These models incorporate GDP per capita and the square of GDP per capita as independent variables to explain the levels of all previously calculated inequality types. The choice of models aligns with the literature on the Kuznets curve, where the inclusion of the square of GDP per capita assesses whether the curve's relationship is concave or convex. The model estimates are presented in Table 10.

$$InequalityF_{it} = a_{1_{it}} + a_2 GDP\ per\ capita_{it} + a_3 GDP\ per\ capita^2{}_{it} + b_i + u_{it} \qquad (7.3.4.2.1)$$

$$InequalityL_{it} = a_{1_{it}} + a_2 GDP\ per\ capita_{it} + a_3 GDP\ per\ capita^2{}_{it} + b_i + u_{it} \qquad (7.3.4.2.2)$$

$$InequalityK_{it} = a_{1_{it}} + a_2 GDP\ per\ capita_{it} + a_3 GDP\ per\ capita^2{}_{it} + b_i + u_{it} \qquad (7.3.4.2.3)$$

$$Inequality_{it} = a_{1_{it}} + a_2 GDP\ per\ capita_{it} + a_3 GDP\ per\ capita^2{}_{it} + b_i + u_{it} \qquad (7.3.4.2.4)$$

The results presented in Table 10 indicate that the Kuznets hypothesis holds true only in the context of labor inequality. These findings align with the theoretical model presented in Chapter 5.2 and are consistent with the evidence derived from the model (7.3.2.1) in Chapter 7.3.2, which also confirms the validity of the Kuznets hypothesis concerning labor inequality. Consequently, policymakers should prioritize examining the relationship between labor inequality and economic growth to facilitate the transition of the economy into the later stages of the Kuznets hypothesis. In these stages, economic growth and the reduction of labor inequality occur simultaneously.

Table 10

	Depented variable: Growth - ΔInequalityF				Depented variable: Growth - ΔInequalityL				Depented variable: Growth - ΔInequalityK				Depented variable: Growth - Δinequality			
	(7.3.4.1)				(7.3.4.2)				(7.3.4.3)				(7.3.4.4)			
Variable	fixed	random	pooled	gmmest	fixed	random	pooled	gmmest	fixed	random	pooled	gmmest	fixed	random	pooled	gmmest
lnGDPpcapita	-.0426496	-.03818488	-.04541298	-.09067933	.36090691*	.18686191	.43248355*	.63126785*	-.18167479	-.16344246	-.17203275	-.28845477	-.14738658	-.14287643	-.18411807	.02563525
lnGDPpcapi~2	-.00053163	.00520573	-.00301349	.00512983	-.05502542*	-.02583172	-.07181858*	-.09508129*	.02239322	.02088649	.02712746	.04251531	.0145889	.01841131	.02402554	-.0147979
lag of depended				-.10212585				-.27898389*				-.19114824**				-.13179964**
_cons	.15355628	.06065211	.28467216	.25051491*	-.53732197	-.30203698	-.46337243	-.96853078*	.3712915	.32587859	.42029257	.48770334	.33560642	.26713475	.47649122	.10566629
N	457	457	457	421	405	405	405	363	456	456	456	420	435	435	435	393
r2	.04798908		.20266249		.01869218		.16452591		.01518312		.08416655		.05904854		.17421586	
r2_a	.0437952		.11750994		.01381005		.06241241		.01083514		-.01387888		.05469228		.08105047	

7.2.4.3 Inequality on economic growth

Finally, evidence regarding the relationship between inequality and economic growth is presented, following the theoretical approach outlined in Chapter 5.7. To assess the impact of inequality levels on economic growth, the following models, (7.3.17) and (7.3.18), have been estimated based on equation (5.7.1) and the theoretical framework provided in Chapter 5.7.

$$\begin{aligned} \Delta GDPpercapita_{it} &= a_{1_{it}} + a_2 L.profit\,rate_{it} + a_3 L.interest\,rate_{it} \\ &+ a_4 L.private\,dept_{it} + a_5 inequality_{it} + a_6 euro\,entrance_{it} \\ &+ a_7 2008\,financial\,crisis_{it} + b_i + u_{it} \end{aligned} \tag{7.3.17}$$

$$\begin{aligned} \Delta GDPpercapita_{it} &= a_{1_{it}} + a_2 L.profit\,rate_{it} + a_3 L.interest\,rate_{it} \\ &+ a_4 L.private\,dept_{it} + a_5 InequalityF_{it} + a_6 InequalityL_{it} \\ &+ a_7 InequalityK_{it} + a_8 unemployment\,rate_{it} \\ &+ a_9 euro\,entrance_{it} + a_{10} 2008\,financial\,crisis_{it} + b_i \\ &+ u_{it} \end{aligned} \tag{7.3.18}$$

In the absence of data, the lag of the growth of the profit rate, denoted as 'r', has been utilized in place of profit shares ('h') and capacity utilization ('u'). Additionally, lagged growth rates of interest rates and private debt have been included as explanatory variables of growth.

Moreover, total inequality is employed as an explanatory variable in equation (7.3.17), while the unemployment rate, factor inequality, labor inequality, and profit inequality are utilized instead in equation (7.3.18). Furthermore, the model incorporates dummy variables for participation in the eurozone, 'eurodamm', and the dummy for the 2008 financial crisis, 'crisisdumm'. Both dummy variables were introduced in Chapter 7.1 and applied in the data models of previous chapters.

The eurozone dummy variable, which pertains to the years of participation in the Economic and Monetary Union (EMU), takes on a value of one during the years when the country is an EMU member, and zero otherwise.

The crisis dummy pertains to the years from the onset of the crisis until the most recent year of the available data, which extends up to 2020. Consequently, the dummy variable takes on a value of 0 for the period spanning from 1995 to 2007, and a value of 1 for the period covering 2008 to 2020. The results of models (7.3.17) and (7.3.18) are presented in Table 11.

The lag profit rate has a positive sign, as expected according to Chapter 5.7, and is statistically significant in both models (7.3.17) and (7.3.18). This result aligns with the theoretical framework outlined in Chapter 5.7, which posits that higher profit rates are associated with increased incentives to invest, leading to greater capital accumulation and economic growth.

Furthermore, the interest rate lag is negative, as expected, and is statistically significant only in model (7.3.18), while in model (7.3.17), it is statistically significant only for the GMM model. This result aligns with the theoretical framework of Chapter 5.7, which posits that the profit rate of rentiers is negatively correlated with economic growth.

Table 11 results

	Depented variable: Growth - ΔGDP per capita				Depented variable: Growth - ΔGDP per capita			
	(7.3.17)				(7.3.18)			
Variable	**fixed**	**random**	**pooled**	**gmmest**	**fixed**	**random**	**pooled**	**gmmest**
L. growthr	.19339977***	.18564184***	.14142258***	.16445722***	.16286678**	.20401624***	.13179143***	.1419968**
L. growthir	-.05465182	-.03711583	-.05210005	-.06156484*	-.03127404*	-.04236648	-.02938462	-.02544647*
L. lnDebtH1	-.00814004	-.00794952***	-.02109288***	-.00544937	-.01280178*	-.00713741***	-.02403464***	-.01584503*
inequality	.01015369	-.01559051	-.04237723	.02821708				
InequalityF					.21436476*	.12668683	.1229499	.386773**
InequalityL					.2590017***	-.02403379	.13335065*	.30384773***
InequalityK					.20440042*	.09703232	.12500724	.2957542***
unemplRT					-.27289671*	-.17149197	-.38746962**	-.29376438*
eurodumm	.00818106	-.00016015	-.00649107	.00051843	-.00290362	-.00347459	-.01653638	-.01706238
crisisdumm	-.02674982**	-.02301452***	-.01481813	-.03197394***	-.02175528**	-.01720973***	-.01877804	-.02294062**
L. Growth - ΔGDP per capita				.06845812				-.05834477
_cons	.06949668***	.08225844***	.12790487***	.0585991**	-.00339627	.04287618	.09931748*	-.03707087
N	430	430	430	410	402	402	402	382
r2	.27082422		.59107028		.34639932		.62292902	
r2_a	.2604813		.541956		.33139318		.57043903	

Moreover, private debt has the anticipated sign and is statistically significant in model (7.3.18), while in model (7.3.17), it is statistically significant only for the Random Effects and the Pooled OLS model. This result also aligns with the theoretical framework of Chapter 5.7, which suggests that private debt hampers both investment and consumption, thereby impeding economic development.

The sign of total inequality appears to be positive for the Fixed Effects and GMM model and negative for the Random Effects and Pooled OLS model. Although the Fixed Effects model is more appropriate, the impact of total inequality seems not to be statistically significant, as observed in model (7.3.17) of Table 11. This outcome indicates that inequality has a weak or no relationship with growth.

However, when inequality is broken down into unemployment, factor, labor, and profit inequality, as presented in model (7.3.18), all the explanatory variables representing inequality appear to be statistically significant. As shown in Table 11, factor labor and profit inequality have a positive impact on growth, while unemployment appears to be negatively related. The contrasting impacts of unemployment and the other forms of inequality seem to explain why inequality was statistically insignificant in model (7.3.17). Additionally, in both models, the dummy for EMU participation is not statistically significant, while the dummy for the 2008 crisis is statistically significant in both models, implying a negative influence on economic growth, as expected.

Thus, it emerges that economic growth in the eurozone for the period 1995-2020 has been positively related to all types of inequality. According to the theoretical framework in Chapter 5.7, these results suggest that economic growth is associated with lower nominal wages in relation to profit income, indicating a possible profit-led economy. However, the positive relationship between factor inequality and growth may be attributed to changes in the relative employment of labor rather than changes in income shares.

Furthermore, based on the results presented in Table 11, economic growth has been correlated with high levels of labor inequality. This finding aligns with the theoretical framework outlined in Chapter 5.7.2, which suggests that this pattern is consistent in a profit-led economy where growth is driven more by investment than consumption. However, it's important to note that a significant portion of the observations pertain to the first phase of the Kuznets curve. Therefore, this conclusion implies that the economy experiences faster growth when it benefits from a more productive labor force, particularly with a higher proportion of skilled labor compared to basic labor. Additionally, the negative impact of inequality stemming from unemployment on growth suggests that a less economically active population is associated with weaker economic performance.

Hence, if our goal is to achieve economic growth accompanied by decreasing inequality, our primary focus should be on addressing levels of unemployment and labor inequality.

Therefore, policies aimed at reducing unemployment will not only lead to lower total inequality but also encourage more individuals to participate in the production process, whether as laborers or investors. Consequently, this will have a positive impact on economic growth, driven by increased investment and consumption.

Furthermore, a strategy to reduce unemployment, coupled with efforts to simultaneously decrease relative labor employment (Λ_L) due to the increased employment of highly skilled labor, should be pursued to expedite progress toward the later stages of the Kuznets curve, as discussed in Chapter 5.2. This implies that as labor inequality approaches a level where greater employment of higher-skilled and higher-paid workers leads to decreased labor inequality and higher growth, a quicker transition to these stages can be achieved. Consequently, increased labor force participation by more productive and higher-paid skilled workers will result in economic growth accompanied by reduced levels of inequality.

8 The political economy of inequality in Europe.

The impact of openness and financial integration is expected to be more pronounced in the case of monetary integration, such as the Eurozone. Monetary integration represents a deeper form of integration that can introduce new market forces and sources of shocks, potentially widening disparities across educational and skill levels.

In the aftermath of World War II, European countries began actively pursuing economic and social integration. The initial step was the Treaty of Rome in 1957, which led to the establishment of the European Economic Community (EEC) the next year.

Subsequently, as more European nations expressed interest in economic and social cooperation, the European Union (EU) was founded in 1993 with the Maastricht Treaty, with a primary focus on building a European community. Since the establishment of the European Union, several initiatives have been undertaken to strengthen the integration of European nations, including the European Monetary Union (EMU) and the Lisbon Treaty (2009). It is evident that European countries have prioritized

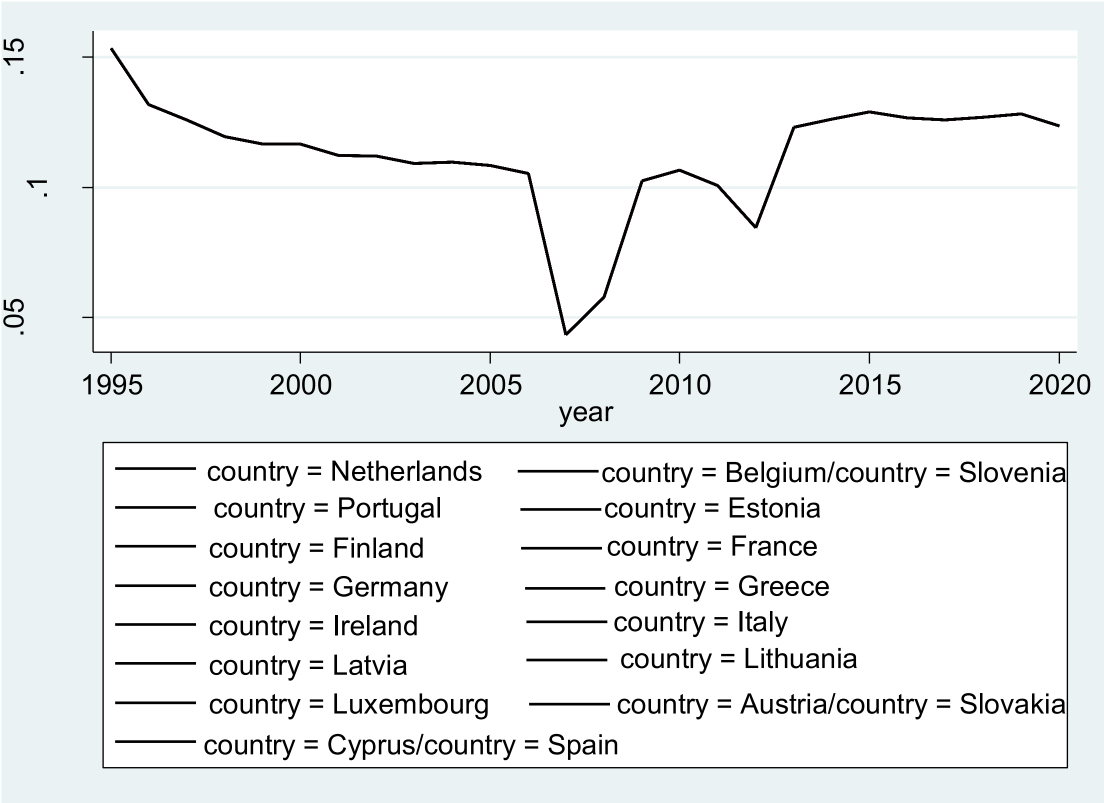
European integration, with regional integration, accelerated economic growth, and enhanced social cohesion being among their primary objectives. Consequently, the EU and EMU structures and the ongoing integration process have given rise to new market forces and have been associated with changes in both economic growth and income distribution among member countries. However, this has also introduced the risk of encountering new economic shocks. Thus, it can be assumed that economic integration impacts economic growth and inequality significantly due to its fundamental characteristics.

In general, European integration, and more specifically, the Eurozone, has been a political process with a strong focus on economic objectives. While this process offers numerous advantages, such as increased trade, reduced uncertainty for businesses and individuals, and opportunities for technological catch-up, it also comes with notable disadvantages, including the need for budgetary austerity measures among member countries (García-Peñalosa, 2010).

Regional integration has been argued to have both positive and negative effects. On the one hand, it can create new markets, improve capital allocation, and promote faster economic growth. On the other hand, it may reduce inequality between countries while increasing inequality within countries (Azis, 2015). Specifically, concerning European integration, the evidence suggests that it is associated with lower inequality between countries but has also been linked to increased personal inequality within European countries (Bertola, 2007; Beckfield, 2009; Bouvet, 2010b). Additionally, it has been argued that poorer countries within the European Union have experienced an increase in regional inequality following the establishment of the EMU (Bouvet, 2010b). Furthermore, studies have indicated that there is greater symmetry among northern members of the Eurozone compared to southern members (Fingleton & Martin, 2015). According to Monfort et al. (2018), both between-country and within-country inequality increased in the European Union, accompanied by historical levels of unemployment (Monfort, et al., 2018). They argue that European treaties, such as the Maastricht Treaty and the fiscal discipline of the Stability and Growth Pact, have focused on nominal convergence while neglecting real convergence indicators (Monfort, et al., 2018). In general, it appears that nominal unit labor costs have diverged within the Eurozone, as productivity and production processes did not converge as assumed.

According to our estimations (see Chapter 7), inequality between Eurozone countries decreased until the 2008 financial crisis, suggesting regional convergence. However, there was a divergence in the period following the crisis, with inequality between countries reaching higher levels than before the crisis, as shown in Figure 12.

Figure 12 inequality between Eurozone countries



In addition, regional convergence, as measured by the inequality between countries, seems to have a negative and statistically significant impact on average wage growth, implying a positive effect on factor inequality[51]. Furthermore, convergence has been found to be statistically significant and negatively related to the relative employment of profit earners, implying a higher monopoly and a positive impact on profit inequality[52]. Finally, convergence, although it appears to be positively related to factor, labor, and profit inequality, has been found to be statistically insignificant, hence the impact is weak[53].

[51] See results in Table 3
[52] See results in Table 7
[53] See results in Tables 3, 5 and 7

European convergence is expected to affect intra-country inequality in several ways. Additionally, given that inequality within countries is essential for social cohesion, European convergence is crucial for the future of European nations.

Firstly, the impact of openness and financial integration is expected to be stronger in the case of monetary integration, like the Eurozone. European integration has focused on enhancing transparency, competition, and factor mobility (Monfort, et al., 2018). Additionally, income distribution is expected to be affected by capital mobility, which is assumed to be fostered by monetary integration. As a consequence, this results in rising effects of openness and international competitiveness on factor prices, and hence, on factor distribution and inequality. Consequently, the effect of openness and international competitiveness on inequality is assumed to be stronger among Eurozone countries. Thus, income distribution, and hence inequality, will be affected due to pressure on production costs. Hence, depending on the policy of each economy, factor inequality could increase or decrease due to international competitiveness, as it has been presented in sections 5.5.1. and 7.3.2. More specifically, it has been argued that since the Euro was introduced, real exchange rates have diverged (Stockhammer, 2012a).

Moreover, inequality may also be affected by monetary integration due to the removal of macroeconomic policy tools from member countries. There is evidence that the ability to apply redistribution policies can be restricted by integration (Facchini & Mayda, 2006). Redistribution policies have always been used to reduce ex-ante inequality and prevent the perpetuation of inequality by helping the poorer move up to higher income classes. As it appears, the Eurozone, despite the better aggregate economic performance, is associated with higher inequality and lower social spending within countries that have joined the Eurozone (Bertola, 2007).

The process and the structure of European convergence have set several barriers to some economic policies regarding international competitiveness, imposing further pressures on factor prices. For instance, since the monetary union has removed the independence of macroeconomic policy tools among members, member states have lost the ability to devalue currency to manage international competitiveness issues. As a result, international competitiveness is determined exclusively by production costs, as per relation (5.5.3), since $e = 0$. Thus, as a consequence, on the one hand, trade openness has had a negative impact on wage shares due to international competitiveness, as presented in section 7.3.1. Openness has been found statistically significant and negatively related to wage shares. Furthermore, the final impact on factor inequality is positive and statistically significant, as expected[54]. Hence, openness has led to higher factor inequality within European countries due to lower wage shares, which is a result of higher international competitiveness.

In addition, it is suggested that inequality will increase due to workers' exposure to international competition and the weakening of labor unions (Beckfield, 2006). As seen in the evidence presented in Table 3, the impact of bargaining power has not been found statistically significant. Furthermore, there is evidence that the ability to implement redistribution policies can be restricted by integration (Facchini & Mayda, 2006). As it seems, EMU, despite its better economic performance, is associated with higher increases in inequality, mainly due to public spending constraints (Bertola, 2007). Redistribution policies have always been used to reduce ex-ante inequality and prevent the perpetuation of inequality by helping the poorer move up to higher income classes.

Furthermore, incentives to relocate resources into export-oriented economies have been generated, leading to higher labor productivity growth. As assumed, higher openness and FDIs can lead to technology diffusion and higher labor productivity. Indeed, as observed in Table 5, technological change, trade, and FDI openness have been found statistically significant and positively related to labor productivity. However, their impact on factor inequality is not statistically significant. Additionally, although trade openness has a significant positive effect on labor productivity, relative labor employment is affected positively[55]. This effect was not expected, given that higher labor productivity is usually associated with more skilled labor. Hence, although labor productivity increases through openness, the demand for skilled labor decreases, and, as it seems, more trade openness is related to more basic labor. The final impact on labor inequality is positive but not statistically significant.

Moreover, trade openness seems to promote higher monopoly and lower profit premium, which finally leads to a significant negative effect on profit inequality. On

[54] See results in Table 3
[55] See results in Table 5

the contrary, FDI openness promotes a lower monopoly and a higher profit premium; however, the impact on profit inequality is not significant[56].

As argued, convergence was fueled by technology transfer, enabling improvements in product quality and organizational structures and procedures (Becker, et al., 2010). Therefore, since cross-border restrictions were removed, allowing for more international trade and direct investment, as well as technology transfer, monetary integration may also contribute to widening the gap across educational and skill levels. Differences in labor productivity and technological skills among the members of the Eurozone can be a significant problem for their inequality levels (Storm & Naastepad, 2015). Additionally, there is evidence by Bouvet, 2010b, that regional inequality has increased as a result of the decreased dispersion of regional productivity (Bouvet, 2010b). Moreover, as mentioned earlier, widening wage differentials across levels of education are responsible for a portion of the observed growth in income inequality, which might be explained by mechanisms where unskilled labor is replaced (and skilled labor is supplemented) by machines and labor from developing economies (Bertola, 2007).

Technological changes have a positive and statistically significant impact on labor productivity, indicating a positive relation with factor inequality; however, the impact is not statistically significant[57]. Additionally, technological changes have been found statistically significant and positively related to the wage premium, indicating a positive impact on labor inequality[58]. Hence, given that technological changes increase wages of skilled labor relative to wages of basic labor, the effect of technological changes on labor inequality is positive, as expected, and statistically significant. Thus, the impact of technological change is higher labor productivity, a wage premium, and labor inequality for the countries of the Eurozone. Additionally, expenditures on education seem to be a useful macroeconomic instrument in controlling labor inequality, given that it is negatively related to the wage premium and labor inequality.

Moreover, while on one hand, in order to respond to sectoral or regional shocks, monetary integration necessitates increased wage and employment flexibility, on the

[56] See results in Table 7
[57] See results in Table 3
[58] See results in Table 5

other hand, it also necessitates well-developed financial markets, which will make it easier for people to borrow, so they can be less affected by income variations. Financial liberalization was mainly an outcome of European integration. However, the impact of financial development on inequality has not been found statistically significant. On the contrary, financial openness has been found to be positively related to factor and labor inequality[59].

Therefore, inequality is primarily influenced by pressures on factor prices, changes in productivity due to technological diffusion, and the new financial environment. Furthermore, structural imbalances in the Eurozone may exert additional pressure on wages, affecting inequality, while integration may benefit some members more than others (Azis, 2015).

The core economies have shown some productivity improvements due to advancements in productive and trade specialization. In contrast, peripheral economies have seen job creation driven by public expenditure and real estate bubbles (Molero-Simarro, 2016,). In the peripheral countries, earnings, and especially wages, have deteriorated substantially. According to evidence found by Stockhammer & List, 2015, there were three different effects on the working class in European countries during the first decade of the Euro (Stockhammer, et al., 2015). Firstly, there was an erosion of cohesion in the working class of northern countries, while in southern countries, wage dispersion increased. In eastern countries, real wages increased simultaneously with an increase in wage differences. It should also be noted that there is a varying level of financialization among the countries in these three groups. In general, Europe has been characterized by debt and export-driven models (Hein, 2013b; Stockhammer, 2016), a subordinated integration of eastern countries (Bohle & Greskovits, 2012; Nölke & Vliegenthart, 2009), and divergence between northern and southern countries (Boyer, 2013; Stockhammer, et al., 2015).

Thomas Goda (2016) argued that European integration and capital flow deregulation have been cited as key factors enabling debt-driven growth in Europe's periphery. International financial liberalization allowed debt-driven growth regimes to maintain

[59] See results in Tables 3, 5 and 7

long-term current account deficits, supported by capital inflows from export-driven nations with persistent current account surpluses (Thomas Goda, 2016).

According to Blanchard & Giavazzi (2002), financial integration in Europe has been associated with the evolution of current account imbalances, where the richer countries used to run current account surpluses, while the poorer countries ran current account deficits (Blanchard & Giavazzi, 2002).

Several countries in the southern and eastern periphery of Europe have experienced significant capital inflows from countries with trade surpluses, mainly from Germany. It has been argued that on one hand, the European Union led to the maintenance of external trade deficits in peripheral countries, while on the other hand, some central countries, especially Germany, have focused on increasing their exports in high-value-added industries (Molero-Simarro, 2016,). Since 1999, Germany has depreciated by more than 20% in real terms against Portugal, Spain, Ireland, and Greece, leading these countries into substantial current account deficits, accompanied by current account surpluses in Germany (Stockhammer, 2012a). Consequently, southern countries have experienced low inflation, but they lost competitiveness to Germany and its satellites, while 'the entire era of European integration is marked by German surpluses and subsequent revaluations' (Stockhammer, 2013).

As a result, debt-driven expenditure has been supported, with large external liabilities accumulated in deficit countries (Thomas Goda, 2016). This debt has been mostly in the private sector, except in Greece, where the government sector was primarily responsible for the debt. Moreover, the policy of maintaining wages at low levels in order to achieve surpluses has added pressure to wage levels of trading partners (Disoska & Toshevska-Trpcevska, 2016). Additionally, further pressures have been imposed on European member states with trade deficits due to the strategy of international devaluation that has been enforced on them, based on the assumption that this would improve competitiveness, profitability, and growth (Obst, 2016). Therefore, on one hand, some countries have current account surpluses, pushing their partners into the Eurozone with current account deficits and debt-driven expenditure. On the other hand, this affects wages and, consequently, inequality in both surplus and deficit countries.

Current account imbalances have a statistically significant impact on wages, productivity, and factor inequality. More specifically, larger current account deficits are negatively correlated with average wages, wage shares, and labor productivity. Consequently, the impact on factor inequality has been found to be positive[60]. Private debt exhibits a similar impact on wages and factor inequality, while also displaying a negative relationship with relative labor employment[61]. Therefore, both higher current account deficits and private debt contribute to greater factor inequality, primarily due to their adverse effects on wages, productivity, and employment.

These imbalances lead to debt crises, and the constriction of monetary policy exacerbates the crisis drivers. Thus, the Eurozone crisis may have resulted from the financial crisis, where payment imbalances and growing private debts were exacerbated by high inequality (Thomas Goda, 2016). Furthermore, it appears that post-crisis growth has been weak and unevenly distributed. As argued by Nacho Álvarez (2018), during the 2008 economic crisis, the European Union opted for austerity policies, which included restrictions on public investment and declines in wage shares. These measures aimed to achieve internal devaluation as a strategy to enhance competitiveness and foster export-led growth. The consequence was a period of poor annual growth in the Eurozone from 2008 to 2016, accompanied by rising unemployment and decreased investment (Nacho Álvarez, June 2018). According to our findings, the 2008 crisis factor has been significantly associated with profit inequality, implying a decrease in profit inequality since the financial crisis[62].

Additionally, further labor market deregulation and wage moderation policies constituted the 2020 strategy of the European Commission. This strategy aimed to maintain real wage growth below labor productivity growth to regain international competitiveness, reduce unemployment, and stimulate economic growth (European Comission, 2011; European Comission, 2012; Obst, 2016). Disoska & Toshevska-Trpcevska (2016) supported the notion that the EU's strategy of keeping real wages below productivity levels results in slower economic growth. Moreover, this wage moderation policy has had a positive impact on inequality and unemployment. They also suggest that higher real wages promote economic growth through increased

[60] See results in Table 3
[61] See results in Tables 3 and 5
[62] See results in Table 7

effective demand, rather than hindering growth due to production slowdowns resulting from labor costs (Disoska & Toshevska-Trpcevska, 2016). Additionally, maintaining real wage growth below labor productivity has led to an increase in inequality, as explained in Section 5.1. Thus, inequality in the Eurozone has been primarily determined by the structure and strategies imposed by these policies.

9 Conclusion

The role of economic inequality has been a central focus in economic literature due to its association with negative effects on economic and social outcomes over recent decades. Specifically, the relationship between income inequality and economic growth has been a subject of debate, with various theories proposing different channels through which income inequality influences economic growth.

Initially, it is assumed that income inequality arises from the distribution of income among members of the economy. Income distribution is believed to be determined by several factors, including an individual's position in the production process, their productivity, and the amount of capital they supply. To comprehensively examine the formation of income inequality, it is essential to consider income distribution from two perspectives: functional distribution and personal distribution. Functional income distribution pertains to the allocation of income among the primary factors of production, typically labor and capital. Conversely, personal distribution refers to the allocation of income among households and individuals, who may be either workers or capital owners. Thus, income inequality can manifest among individuals with the same or different income sources.

In Chapter 5, the theoretical model is used to illuminate the emergence of income inequality by breaking it down into three distinct components: factor inequality, wage inequality, and profit inequality. This model for income distribution and inequality leverages the Gini formula.

Factor inequality represents the disparity between wage-earning workers and profit-receiving investors. It is shaped by functional distribution. According to the model, factor inequality hinges on the difference between the wage share, determined by labor productivity and the average wage, and the proportion of labor within the total employees. Consequently, given the crucial roles of labor productivity and labor employment in economic growth, any enhancement in either of these two factors requires the fulfillment of two prerequisites to reduce inequality. First, real average wage growth must surpass labor productivity to ensure positive wage share growth. Second, wage shares must increase at a faster rate than the relative employment of labor. Therefore, to mitigate factor inequality, one must examine the factors influencing labor employment, wage shares, productivity, and real wages. Consequently, elevating the real average wage emerges as the primary policy instrument for reducing factor inequality, as labor productivity and labor employment are pivotal for economic growth, and policies that hinder them cannot be deemed sound economic strategies. Consequently, assuming that there exists inequality among members of the same class, inequality stemming from factor distribution is considered the lowest level of income inequality.

Wage inequality pertains to disparities among workers whose income is derived from wages and is primarily attributed to differences in labor skills. As illustrated by the theoretical model in Chapter 5.2, wage inequality exhibits a positive relationship with the wage premium, which represents the rate of personal wage incomes for skilled and basic labor. Additionally, wage inequality is influenced by the composition of skilled and basic labor within the workforce, quantified by the relative labor employment rate. This rate signifies the ratio of the basic labor population to the skilled labor population. As deduced from the theoretical model, an increase in the population of skilled labor will intensify wage inequality when their relative labor employment rate surpasses the ratio of their total incomes (the combined income of skilled labor to that of basic labor). Conversely, in cases where their relative incomes exceed their relative employment, wage inequality will decrease as the population of skilled labor expands relative to basic labor. Therefore, if it is assumed that the relative labor employment rate diminishes over time as the economy evolves, concomitant with the growth of the skilled labor population, an inverted 'U'-shaped relationship between growth and labor inequality, reminiscent of Kuznets' hypothesis, would inevitably emerge. Thus, the theoretical model substantiates the Kuznets hypothesis in situations where the population of skilled labor increases at a faster pace than that of basic labor over time. Consequently, given that increased skilled labor employment is associated with higher labor productivity, a positive factor for economic growth, managing the wage premium becomes an economic instrument that policymakers should consider to mitigate wage inequality.

Profit inequality materializes among investors whose primary income source is profits. According to the theoretical model expounded in Chapter 5.3, profit inequality is propelled by the growth of the profit premium and the influence of monopoly dynamics through shifts in relative investor employment. Profit inequality is positively correlated with the profit premium. Moreover, the impact of relative investor employment hinges on market monopoly levels. Increased competitiveness is associated with a negative relationship with inequality and technological advancement, while higher levels of monopoly exhibit a negative connection with both inequality levels and the extent of innovation.

Furthermore, while many theoretical frameworks posit a trade-off between inequality and economic efficiency, the nature and direction of this trade-off have remained ambiguous. Simon Kuznets originally proposed a nonlinear relationship between inequality and growth that is positive in the early stages of growth but becomes negative as the economy matures over time. Kuznets' theory was rooted in a period during which rural economies transitioned into industrial economies, and the workforce shifted from agricultural employment to higher-paying industrial jobs. Consequently, income inequality initially increased as workers with higher incomes became the majority, subsequently stabilized, and ultimately decreased as a growing proportion of the population moved from rural to industrial work. Thus, as this significant transformation occurred—shifting the composition of the workforce—income inequality exhibited an inverted U-shaped relationship with economic growth over time. Kuznets' assertions suggest that transitions between old and new production processes impact income distribution due to varying wage levels among workers, as elucidated in the theoretical model in Chapter 5.2.

Since Kuznets' pioneering work, numerous theoretical approaches have attempted to elucidate the intricate relationship between inequality and economic growth. Some propose that inequality may stimulate growth, while others contend that it exerts a detrimental influence. Additionally, existing literature posits that the nexus between economic growth and income inequality is shaped by multifaceted channels, including fiscal policy, taxation, sociopolitical stability, and market imperfections. Consequently, income inequality can exhibit a positive relationship with growth, primarily because the requisite investment is typically furnished by the wealthier segment of the population. Conversely, the costs associated with income redistribution, aimed at addressing sociopolitical challenges stemming from heightened inequality, can impede economic performance, thereby engendering a negative association between income inequality and economic growth.

Moreover, it is postulated that income serves a dual function, with each individual employing it for consumption, investment, or savings. On one hand, income constitutes an integral component of the cost structure in the production function, thus forging a fundamental link with economic growth. On the other hand, income governs demand. Consequently, given that distinct income classes manifest varying propensities for saving, investing, and consuming, shifts in income distribution ultimately translate into fluctuations in economic growth. Therefore, as economic growth hinges on determinations concerning the allocation of factor shares, inequality in functional distribution becomes intricately entwined with growth dynamics arising from the production process.

Henceforth, it becomes apparent that, under certain circumstances, personal income inequality can bolster growth, particularly within a profit-led regime. Conversely, within a wage-led framework, growth may be inversely related to factor inequality. Nonetheless, such a relationship is not absolute. Alterations in income distribution may not invariably lead to shifts in factor inequality, as factor inequality is also influenced by changes in population proportions. Therefore, since an upswing in wage share can stem from an increase in labor employment rather than a surge in nominal wages, the repercussions of inequality resulting from factor distribution on demand and growth may be characterized by ambiguity.

Furthermore, labor and profit inequality exert a negative impact on capacity utilization, capital accumulation, and consequently, economic growth. This occurs due to variations in the propensity to save across different income classes, as elucidated in the theoretical model in Chapter 5.7.2. The model suggests that, given differences in saving and consumption habits among classes, growth is positively associated with the total income shares of the less affluent segments of society. In essence, inequality can influence the economy's saving patterns, thereby affecting economic growth. However, the direction of this impact is contingent on the prevailing growth regime, with changes in income distribution needing to outpace alterations in employment growth.

Moreover, income inequality and economic growth share a complex relationship shaped by fundamental facets of globalization and financial integration. These pivotal factors include technological advancements, open markets, and financialization.

Technological advancements constitute a cornerstone influencing both income inequality and economic growth. Firstly, these innovations are intertwined with shifts in productivity, which, in turn, influence production costs and income levels for both wage and profit earners. Consequently, investments in more productive methods through technological innovation yield higher profits. Additionally, skilled labor capable of harnessing these new technologies can command higher wages, given their ability to contribute more efficiently to production.

It is posited that technological advancements are closely linked to income inequality, affecting factors such as labor and profit inequality. Assuming that technological innovation isn't exogenously determined but rather nonlinearly linked to distribution, inequality plays a role in shaping incentives for innovation. High levels of factor inequality can stifle incentives for innovation, even when financial resources are available for investing in innovative technologies. Conversely, low levels of factor inequality can foster significant incentives for innovation, but the capacity to support innovation may be limited.

Profit inequality exerts a parallel influence on innovation, as it hinges on the incentives and available capital for investing in new technology. Heightened profit inequality may impede technological change, thereby affecting productivity and overall growth, as affluent firms lack the motivation to innovate. In contrast, lower levels of profit inequality incentivize technological innovation since firms seek to maintain competitiveness. Additionally, substantial profit inequality might be linked to robust monopolies, discouraging new firms and innovations from entering the market. On the other hand, profit inequality is influenced by the diffusion of innovation, determined by the monopolistic strength of the leading class. Therefore, managing innovation diffusion may be an effective strategy for reducing profit inequality and spurring future demand for innovation.

Furthermore, as discussed in both Chapters 5.2 and 5.4.3, technological innovation, coupled with an increase in skilled labor, may lead to an inverted "U" relationship between labor inequality and growth over time, thereby providing a theoretical confirmation of the Kuznets hypothesis. In scenarios where technological innovations trigger profound transformations, following a Schumpeterian creative destruction path, an increasing number of firms replace old technologies with innovations, driving up the demand for skilled labor. Given that skilled labor is typically better compensated than basic labor, this can result in a relationship between income inequality and economic growth characterized by an inverted "U" curve, aligning with the Kuznets hypothesis. Consequently, assuming that technological change can influence the population growth of workers, wage inequality may follow a Kuznets trajectory, with initial growth in skilled labor populations positively associated with inequality, while in the long run, when skilled workers become the majority, inequality decreases. Therefore, policymakers should prioritize enhancing the workforce's capacity to acquire skills, which, when combined with technological changes, can bolster the economy and rapidly shift it to the right side of the Kuznets curve, where reducing labor inequality is conducive to economic growth.

Income distribution and, by extension, inequality appear to be linked to trade openness, primarily due to the pressures exerted on the prices of goods and wages stemming from exposure to international competition and labor market deregulations. Additionally, trade openness promotes capital allocation and technological diffusion, amplifying the effects of technological changes on income distribution and economic growth. Consequently, on one hand, trade openness can be advantageous for economies through improved capital allocation and increased technological diffusion, particularly in less affluent countries, resulting in higher growth rates and reduced poverty. Furthermore, the benefits of trade openness and the transformations ushered in by globalization in recent decades have been associated with decreased poverty and inequality, stemming from an increase in average income. However, these benefits of globalization may not be evenly distributed, potentially resulting in higher levels of inequality both within and between countries. As trade openness tends to push down prices, international competitiveness can be linked to either the growth or reduction of factor inequality and profit share. Therefore, overall inequality will be primarily determined by the interplay between profits and wages, as the final outcome hinges on the causes of domestic distributional shifts. Furthermore, trade openness can influence labor inequality by altering the relative demand for basic labor versus skilled labor. The impacts on labor and profit inequality may also be observed due to the technological diffusion that can occur as a result of trade openness. Moreover, since international competitiveness exerts downward pressure on prices, it appears that the bargaining power of all classes, including investor classes, is curtailed. Consequently, policymakers should pay closer attention to the overall influence of relative labor demand on inequality.

Financial development has emerged as a prominent feature of economic growth in most advanced economies over recent decades. This evolution in financial development has precipitated fundamental changes in economies, particularly in the relationship between income distribution and economic growth. The capacity of credit to facilitate investment and consumption has fundamentally altered functional distribution, resulting in significant shifts in consumption and investment patterns, ultimately reshaping aggregate demand. Consequently, as credit enables individuals across developed economies to bridge income gaps through borrowing, savings and the distributive effect become less critical for growth, and the economy becomes increasingly reliant on financial development.

According to the theoretical model outlined in Chapter 5.6.1, the influence of financialization on factor inequality primarily stems from increased credit availability and labor debt. On one hand, mounting labor debt impacts factor distribution by boosting profits, as lending becomes an alternative source of profit income. On the other hand, workers may opt to supplement their income with credit, thereby increasing their disposable income and subsequently boosting aggregate demand. Consequently, if factor inequality diminishes in the early stages, workers will borrow less and gradually pay down their debt from previous periods. This, in turn, propels consumption, both in the short and long run. In the short term, consumption is likely to surge due to the injection of credit income, while in the long term, sustained high consumption levels are maintained thanks to the wage increases that have been realized.

However, there is a risk associated with expanding credit availability, which may not yield the intended outcome in terms of reducing inequality. While financial integration has made credit more accessible to a wider population, enabling both the affluent and less affluent to borrow, this may inadvertently encourage increased borrowing for both investment and consumption. Such a trend could eventually lead to elevated levels of debt. Borrowing as a means to 'correct' inequality may offer short-term benefits, but it carries the potential to give rise to unsustainable growth in the long run, eventually culminating in a debt crisis.

Moreover, due to varying income levels among rentiers and investors, a shift in sectoral compositions has been observed. This shift has implications for personal profit inequality, differentiating between those who opt to invest in real sectors and those who favor financial sectors. According to the theoretical model discussed in Chapter 5.6.2, sectoral shifts and profit inequality between sectors are determined by differences in profit rates resulting from investments and lending. Additionally, the debt shares of the investor class are positively correlated with profit inequality. In the early stages, increased lending could benefit growth and profit inequality. Investors might choose to borrow to 'rectify' inequality or opt for sectors offering higher profit rates. Furthermore, if they accrue higher income in the long term, they can repay the debts accumulated over previous periods, leading to a decline in profit inequality. Ultimately, this results in reduced profit inequality and fosters increased investment for long-term growth. Conversely, if investors' future income decreases, there is a risk of heightened debt and unsustainable growth, which could ultimately exacerbate inequality in the long run.

Furthermore, the shift in sectoral composition has led to a change in managerial behavior, moving from a 'retain and reinvest' approach to a 'downsize and distribute' strategy. Firms increasingly prioritize shareholder value maximization over long-term investment motives. As a result, since real sector investments are a key driver of growth, profit inequality is closely linked to financialization and the extent of this sectoral shift.

Moreover, broader access to credit due to financial development has paved the way for new growth trajectories among economies. Inequality can give rise to either an export-led or debt-led growth model, as economies grapple with strategies to address changes in domestic demand. Consequently, current account imbalances can be tied to levels of inequality, driven by the development of debt and export-led growth models.

Therefore, attempting to address inequality by expanding access to credit for the less affluent could prove detrimental if the financial sector lacks effective regulation. While financialization tools have yielded short-term growth benefits, these gains may come at the cost of future income and economic growth. Therefore, policymakers should exercise caution when attempting to address inequality by expanding access to credit, ensuring effective regulation of the financial sector to prevent the risk of a debt crisis and facilitate long-term income improvements for those with lower incomes.

To explore empirical evidence on the determinants of income inequality and its relationship with growth, income inequality was analyzed based on the theoretical model. Panel data analysis was conducted using data from Eurozone member countries. The empirical findings reveal that factor inequality increased during the period of 1995-2020, driven by labor's increased share of employment compared to the growth of the wage share. Among the determinants of factor inequality, financial and trade openness were positively correlated with it. While financial and trade openness were associated with higher labor productivity and average wages, the rate of growth in labor productivity outpaced wage growth significantly, resulting in a negative trend in wage shares despite the expansion of labor employment. This contributed to rising factor inequality. Additionally, private debt and current account balances were found to have negative effects on both wages and labor productivity, while also increasing factor inequality. Therefore, policymakers should avoid high levels of both private debt and current account balances to achieve sustained economic growth. Furthermore, Eurozone participation appeared to be a prudent decision, particularly concerning wage shares and factor inequality.

The empirical evidence in Chapter 7.3.2 indicates that wage inequality is positively influenced by wage premiums, while the Kuznets hypothesis is empirically confirmed, as suggested in Chapter 5.2. The relative labor employment is negatively related to wage inequality when the rate of basic to skilled labor population is larger than the rate of total skilled labor income to total basic labor income ($m_L < \Lambda_L$). Conversely, it is positively related to wage inequality when the population and total income of skilled labor have increased, such that the rate of basic to skilled labor population is smaller than the rate of total skilled labor income to total basic labor income ($m_L > \Lambda_L$). The Kuznets hypothesis on wage inequality is further supported in Chapter 7.3.4.2 using an empirical model of non-linearity, widely utilized in the literature. Moreover, while technological changes and financial openness, which are positively related to wage inequality, cannot be avoided, policymakers should prioritize education expenditure to control wage inequality. Additionally, to achieve a rapid reduction in relative labor employment as a policy goal and shift to the second phase of the Kuznets curve, policymakers should focus on factors such as wage premiums, investment in new technologies, and trade openness. Trade openness, though challenging to regulate, can be complemented by investments in education and new technologies, combined with a lower wage premium, as an effective economic policy for sustained economic growth. Evidence suggests that wage premiums can be controlled through factors like technological changes, FDI openness, and education expenditures.

Regarding profit inequality, it appears to be negatively influenced by investments in R&D and trade openness, with a significant impact stemming from the 2008 economic crisis. Additionally, the data reveals low levels of monopoly among the countries studied.

European convergence is expected to impact inequality in several ways. However, regional integration, as measured by inequality between countries, does not appear to have a statistically significant impact on factor, labor, or profit inequality. Convergence does, however, exhibit a negative and statistically significant effect on average wage growth. Additionally, it has been found to be statistically significant and negatively related to the employment of relative profit earners, implying a higher level of monopoly power.

Furthermore, there is evidence that trade openness negatively affects wage shares, consequently resulting in a positive impact on factor inequality as expected. Thus, it appears that openness has led to higher factor inequality within European countries, primarily due to lower wage shares resulting from increased international competitiveness. Additionally, trade openness seems to promote lower profit inequality.

Technological changes, although they have a positive impact on labor productivity, do not appear to significantly affect factor inequality. However, technological changes have been found to be positively related to wage premiums, indicating a positive impact on labor inequality. Consequently, technological changes in Eurozone countries lead to increased labor productivity, larger wage premiums, and greater labor inequality.

Finally, all types of inequality have been found to be positively related to economic growth. Therefore, as factor inequality is positively related to growth, there is evidence to suggest that Eurozone countries experience growth driven by profits. Furthermore, it seems that the majority of countries in the Eurozone are in the first phase of the Kuznets curve, as the relationship between wage inequality and growth is positive. Additionally, the fact that profit inequality is positively associated with growth aligns with the assumption that the wealthier population invests a higher portion of their income, leading to a higher growth rate, especially in a profit-led regime.

References

Acemoglu, D., 2011. *Thoughts on Inequality and the Financial Crisis,* Denver: American Economic Association Meeting.

Acemoglu, D. & Robinson, A. J., 2000. Why did the West extend the franchise?, Democracy, Inequality, and Growth in Historical Perspective. *The Quarterly Journal of Economics,* 115(4), pp. 1167-1199.

Acharyya, R., 2011. A note on quantitative trade restrictions, income effects and wage inequality. *Econ. models,* 6(28), p. 2628–2633.

Aghion, P. & Bolton, P., 1997. A theory of trickle-down growth and development. *Review of Economic Studies,* 64(2), pp. 151-172.

Aghion, P., Caroli, E. & García-Peñalosa, C., 1999. Inequality and Economic Growth: The Perspective of the New Growth Theories.". *Journal of Economic Literature,* Τόμος 37, pp. 1615-1660.

Aghion, P. & Howitt, P., 1992. A Model of Growth Through Creative Destruction. *Econometrica,* 2(60), pp. 323-351.

Ahluwalia, M. & Chenery, H., 1983,. The Economic Framework. Στο: *Redistribution with Growth.* London: Oxford University Press, pp. 135-147.

Ahmed, N. και συν., 2022. *Inequality Kills,* s.l.: Oxfam.

Alesina, A. & Perotti, R., 1996. Income distribution, political instability, and investment.. *European Economic Review,* Τόμος 40, pp. 1203-1228.

Alesina, A. & Rodrik, D., 1994. Distributive politics and economic growth. *Quarterly Journal of Economics,* pp. 465-490.

Anderson, E., 2005. Openness and Inequality in Developing Countries: A Review of Theory and Recent Evidence. *Overseas Development Institute,* 33(7), p. 1045–1063.

Andraz, J. M. & Rodrigues, P. M., 2010. What causes economic growth in Portugal: exports or inward FDI?. *Journal of Economic Studies,* 3(37), p. 267–287.

Andraz, J. M. & Rodrigues, P. M., 2010. What Causes Economic Growth in Portugal: Exports or Inward FDI?. *Journal of Economic Studies ,* 3(37), p. 267–87.

Andrews, D., Jencks, C. & Leigh, A., 2010. Do Rising Top Incomes Lift All Boats?. *Discussion Paper No. 4920 IZA.*

Antonelli, C. & Gehringer, A., 2013. Innovation and income inequality. *Department of Economics.*

Arrow, K., 1962. Economic Welfare and the Allocation of Resources for Invention. Στο: *The Rate and Direction of Inventive Activity: Economic.* s.l.:Princeton University Press, pp. 609-626.

Asteriou, D., Dimelis, S. & Moudatsou, A., 2014. Globalization and income inequality: A panel data econometric approach for the EU27 countries. *Economic Modelling, 36*, pp. 592-599.

Atkinson, A. B., 1997. Bringing Income Distribution in From the Cold. *The Economic Journal,* Τόμος 107, pp. 297-321.

Atkinson, A. B., 2009. Factor shares: the principal problem of political economy?. *Oxford Review of Economic Policy,* 1(25), pp. 3-16.

Atkinson, A. B., 2015. *Inequality: What can be done?.* London: Harvard University Press.

Autor, D. H., Katz, L. F. & Krueger, A. B., 1998. Computing Inequality: Have Computers Changed the Labor Market?. *Quarterly Journal of Economics,* Issue 113, pp. 1169- 1213.

Azis, I. J., 2015. *Integration, Contagion, and Income Distribution,* s.l.: Regional Science Matters.

Baltagi, B. H., 2005. *Econometric Analysis of Panel Data.* 3rd επιμ. West Sussex, UK: John Wiley & Sons Ltd.

Banerjee, A. V. & Newman, A. F., 1993. Occupational choice and the process of development. *Journal of Political Economy,* 101(2), pp. 274-298.

Banerjee, V. A. & Duflo, E., 2003. Inequality and Growth: What Can the Data Say?. *Journal of Economic Growth,* Τόμος 8, pp. 267-299.

Barbosa-Filho, N. H. & Taylor, L., 2006. Distributive and demand cycles in the US economy: a structuralist Goodwin model. *Metroeconomica,* 3 (57), p. 389–411.

Barro, J., 2000. Inequality and Growth in a Panel of Countries. *Journal of Economic Growth,* Τόμος 5, pp. 5-32.

Barro, R. J., 1990. Government Spending in a Simple Model of Endogeneous Growth. *Journal of Political Economy,* Τόμος 98, pp. 103-125.

Barro, R. J., 2008. Inequality and Growth Revisited. *ADB Working Paper Series on Regional Economic Integration,* Τόμος 11.

Bazillier, R. & Hericourt, J., 2017. The Circular Relationship between Inequality, Leverage, and Financial Crises. *Journal of Economic Surveys ,* 2(31), p. 463–96.

Becker, T. και συν., 2010. Whither growth in central and eastern Europe? Policy lessons for an integrated Europe. *Bruegel economic think tank,* pp. 24-46.

Beckfield, J., 2009. Remapping Inequality in Europe - The Net Effect of Regional Integration on Total Income Inequality in the European Union-. *International Journal of Comparative Sociology,* Τόμος 50(5–6), p. 486–509.

Beck, T., Demirgüç-Kunt, A. & Levine, R., 2007. Finance, Inequality and the Poor. *Journal of Economic Growth,* 12(1), pp. 27-49.

Behringer, J. & Treeck, T. v., 2015. Income Distribution and the Current Account: A Sectoral Perspective'. *Working Papers 379, ECINEQ, Society for the Study of Economic Inequality.*

Behringer, J. & Treeck, T. v., 2018. Income distribution and the current account. *Journal of International Economics,* Issue 114, p. 238–254.

Belabed, C. A. & Treeck, T. T. a. T. v., 2017. Income distribution and current account imbalances. *Cambridge Journal of Economics,* Issue 42, p. 47–94.

Benabou, R., 1996. Inequality and Growth. Στο: B. S. B. a. J. J. Rotemberg, επιμ. *NBER Macroeconomics Annual.* s.l.:MIT Press, pp. 11-92.

Benabou, R., 2000. Unequal Societies: Income Distribution and the Social Contract. *American Economic Review,* 90(1), pp. 96-129.

Berg, A., Ostry, J. D., Tsangarides, C. G. & Yakhshilikov, Y., 2018. Redistribution, inequality, and growth: new evidence. *Journal of Economic Growth.*

Berman, E., Bound, J. & Zvi, G., 1994. Changes in the demand for skilled labor within U.S. manoufacturing: evidence from the annual survey of manufactures. *The Quarterly Journal of Economics,* pp. 367-397.

Bertola, G., 2007. Economic Integration, Growth, Distribution: Does the euro make a difference?. 15 September .

Bigsten, A., 1983. *Income Distribution and Development: Theory, Evidence, and Policy.* London: Heinemann.

Blanchard, O. & Giavazzi, F., 2002. Current Account Deficits in the Euro Area: The End of the Feldstein-Horioka Puzzle?. *Brookings Papers on Economic Activity,* 2002(2), pp. 147-186.

Blundell, R. & Preston, I., 1998. Consumption inequality and income uncertainty. *The Quarterly Journal of Economics ,* Issue 113, p. 603–640.

Bohle, D. & Greskovits, B., 2012. *Capitalist Diversity in Europe's Periphery.* s.l.:Itahca: Cornell University Press.

Bourguignon, F., 1981. Pareto Superiority of Unegalitarian Equilibria in Stiglitz' Model of Wealth Distribution with Convex Saving Function. *Econometrica,,* 46(6), pp. 1469-1475.

Bourguignon, F. & Morrisson, C., 1998. Inequality and development: the role of dualism. *Journal of Development Economics,* 2 (57), p. 233–257.

Bouvet, F., 2010b. Dynamics of regional income inequality in Europe and impact of EU regional policy and EMU.

Boyer, R., 2013. The euro crisis; undetected by conventional economics, favoured by nationally focused polity,. *Cambridge Journal of Economics,* Τόμος 37, pp. 533-569.

Brenner, N., Peck, J. & Theodore, N., 2010. Variegated neoliberalization: geographies, modalities, pathways. *Global networks,* 2(10), pp. 182-222.

Buera, F. J., Kaboski, J. P. & Rogerson, R., 2015. Skill Biased Structural Change. *NBER Working Paper No. 21165* .

Caballero, R. J., Farhi, E. & Gourinchas, P.-O., 2008. An Equilibrium Model of "Global Imbalances" and Low Interest Rates. *American Economic Review ,* 1(98), p. 358–393.

Cardaci, A. & Saraceno, F., 2016 . Inequality, Financialisation and Credit Booms: a Model of Two Crises. *LUISS Guido Carli / School of European Political Economy.*

Carvalho, L. & Rezai, A., 2015. Personal income inequality and aggregate demand. *Cambridge Journal of Economics*, 20 March, pp. 1-15.

Chambers, D., 2005. Trading places: Does past growth impact inequality?. *Journal of Development Economics, Volume 82*, 5 July, pp. 257-266..

Chancel, L., Piketty, T., Saez, E. & Zucman, G., 2022. *World Inequality Report 2022,* s.l.: World Inequality Lab.

Chinn, M. D. & Ito, H., 2005. "What Matters for Financial Development? Capital Controls, Institutions, and Interactions,". *NBER Working Paper*, May.

Chinn, M. D. & Ito, H., 2008. A New Measure of Financial Openness. *Journal of Comparative Policy Analysis*.

Clarke, G. R. G., Xu, L. C. & Zou, H.-f., 2006. Finance and Income Inequality: What Do the Data Tell Us?. *Southern Economic Journal,* 72(3), pp. 578-596.

Cline, W. R., 1975. Distribution and Development. A Survey Of Literature. *Journal of Development,* Τόμος 1, pp. 359-400.

Coe, D. T. & Helpman, E., 1995. International R&D spillovers. *European Economic Review,* 5 (39), p. 859–887.

Corak, M., 2013. Income Inequality, Equality of Opportunity, and Intergenerational Mobility. *The Journal of Economic Perspectives,* Τόμος 27, pp. 79-102.

Cowell, F. A., 1995. *Measuring Inequality.* London: Oxford University Press.

Cowell, F. A., 2007. *Inequality, Income Distribution and,* London: London School of Economics.

Cozzens, S. E., 2008. *Innovation and inequality,* s.l.: Georgia Institute of Technology Working Papers.

Cuaresma, J. C. & Wörz, J., 2005. On Export Composition and Growth.. *Review of,* 1(141), p. 33–49.

Cynamon, B. Z. & Fazzari, S. M., 2008. Household debt in the consumer age: Source of growth - risk of collapse. *Capitalism and Society ,* 2(3), p. 1–30.

Dabla-Norris, E. και συν., 2015. *Causes and Consequences of Income Inequality: A Global Perspective,* s.l.: Strategy, Policy, and Review Department (IMF).

Dahan, M. & Tsiddon, D., 1998. Demographic Transition, Income Distribution, and Economic Growth. *Journal of Economic Growth,* 3(1), pp. 29-52.

Dardot, P. & Laval, C., 2014. *The new way of the world: On neoliberal society.* s.l.:s.n.

Davis, L. E., 2018. Financialisation and the Nonfinancial Corporation: An Investigation of Firm Level Investment Behavior in the United States. *Metroeconomica,* 69(1), p. 270–307.

Deaton, A., 1995. Data and econometric tools for development analysis. Στο: *Handbook of Development Economics.* Amsterdam:: J.B. a. T. Srinivasan.

Deininger, K. & Squire, L., 1998. New ways of looking at old issues: inequality and growth. *Journal of Development Economics,* Τόμος 57, pp. 259-287.

Desai, S. D., Brief, A. P. & George, J. M., 2009. Meaner Managers: A Consequence of Income Inequality.

Detzer, D., 2018. Inequality, emulation and debt: The occurrence of different growth regimes in the age of financialization in a stock-flow consistent model. *Journal of Post Keynesian Economics*.

Dew-Becker, I. & Gordon, R. J., 2008. *The Role of Labor Market Changes in The Slowdown of European Productivity Growth,* Massachusetts: National Bureau of Economic Research.

Disoska, E. M. & Toshevska-Trpcevska, K., 2016. Debt or Wage-led Growth : the European Integration. *Journal of Economic Integration*.

Dodig, N., Hein, E. & Detzer, D., 2016. Financialisation and the financial and economic crises: theoretical framework and empirical analysis for 15 countries.

Dollar, D. & Kraay, A., 2002. Growth is good for the poor.. *Journal of Economic Growth,* 7(195-225).

Dolton, P. & Pelkonen, P., 2008. The Wage Effects of Computer Use: Evidence from WERS 2004. *British Journal of Industrial Relations,* 46(4), p. 587–630.

Duménil, G. & Lévy, D., 2001. Costs and benefits of neoliberalism. A class analysis. *Review of International Political Economy,* 4 (8), p. 578–607.

Duménil, G. & Lévy, D., 2004. *Capital Resurgent. Roots of the Neoliberal Revolution.* s.l.:Cambridge, MA: Harvard University.

Dünhaupt, P., 2013. Determinants of functional income distribution: Theory and empirical evidence. *Global Labour University*.

Dünhaupt, P., 2016. Determinants of labour's income share in the era of financialisation. *Cambridge Journal of Economics,* 41(1), pp. 283-306.

Dutt, A., 1992. Rentiers in post-Keynesian models, . Στο: *Recent Developments in Post-Keynesian Economics.* s.l.:s.n., p. 95–122.

Dutt, A. K., 2006. Maturity, Stagnation and Consumer Debt: a Steindlian Approach.. *Metroeconomica,* 57(3), p. 339–364.

Dutt, A. K., 2017. Income inequality, the wage share, and economic growth. *Review of Keynesian Economics*, Summer , p. 170–195.

Dutt, K. A., 1994. On the long-run stability of capitalist economies: implications of a model of growth and distribution. Στο: E. Elgar, επιμ. *New Directions in Analytical Political Economy.* Aldershot: K. A. Dutt .

Ederer, S. & Stockhammer, E., 2007. Wages and aggregate demand in France: an empirical investigation. Στο: E. a. T. A. Hein, επιμ. *Money, Distribution and Economic.* s.l.:s.n., p. 119–38.

Edwards, S., 1996. Why are Latin America' s savings rates so low? An international comparative analysis. *Journal of Development Economics,* Τόμος 51 , pp. 5-44.

Epstein, G., 2001. *Financialization, Rentier Interests, and Central Bank Policy,* s.l.: University of Massachusetts, Amherst.

European Comission, 2011. *Annual Growth Survey.* [Ηλεκτρονικό] Available at: http://ec.europa.eu/europe2020/making-it-happen/annualgrowth-surveys/2012/index_en.htm

European Comission, 2012. *Annual Growth Survey.* [Ηλεκτρονικό] Available at: http://ec.europa.eu/europe2020/making-it-happen/annualgrowth-surveys/2012/index_en.htm

European Commission, 2007. *The labour income share in the European Union. In Employment in Europe. ,* Brussels: European Commission.

Facchini, G. & Mayda, A. M., 2006. Individual Attitudes towards Immigrants:. *Welfare-State Determinants Across Countries,* Issue 1768.

Feenstra, R. C. & Hanson, G. H., 1997. Foreign direct investment and relative wages: evidence fromMexico's maquiladoras. *Journal of International Economics ,* 3–4(42), p. 371–93.

Ferrer-i-Carbonell, A., 2005. Income and well-being: an empirical analysis of the comparison income effect. *Journal of Public Economics ,* Issue 89 , p. 997 – 1019.

Fingleton, B. & Martin, H. G. a. R., 2015. Shocking aspects of monetary union: the vulnerability of regions in Euroland. *Journal of Economic Geography,* p. 1–28.

Firebaugh, G., 2003. *The New Geography of Global Income Inequality.* s.l.:Cambridge, MA: Harvard University Press.

Forbes, J., 2000. A Reassessment of the Relationship Between Inequality and Growth. *American Economic Review ,* Τόμος 90, pp. 869-887.

Franke, R., Flaschel, P. & Proaño, C. R., 2006. Wage–price dynamics and income distribution in a semi-structural Keynes–Goodwin model. *Structural Change and Economic Dynamics,* 4(17), p. 0–465.

Frank, R. H., 2007. *Falling Behind: How Rising Inequality Harms the Middle Class.* s.l.:Berkley: University of California Press.

Frank, R. H., Levine, A. S. & Dijk, O., 2014. Expenditure Cascades. *Review of Behavioral,* Τόμος 1, pp. 55-73.

Freeman, R. B., 1993. Labor Markets and Institutions in Economic Development. *The American Economic Review,* 83(2), pp. 403-408.

Galbraith, K. J., 2012. *Inequality and Instability: A study of the world economy just before the great crisis.* s.l.:Oxford University Press.

Galor, O. & Moav, O., 2000. From Physical to Human Capital Accumulation: Inequality and the Process of Development. *Review of Economic Studies,* Τόμος 71, pp. 1001-1026.

Galor, O. & Zang, H., 1997. Fertility, income distribution, and economic growth: Theory and cross-country evidence. *Japan and the World Economy,* Τόμος 9, pp. 197-229.

Galor, O. & Zeira, J., 1993. Income distribution and macroeconomics. *Review of Economic Studies,* 60(1), pp. 35-52.

Garca-Pealosa, C. & Daudey, E., 2007. The personal and the factor distributions of income in a cross-section of countries. *The Journal of Development Studies,* 5(43), pp. 812-829.

García-Peñalosa, C., 2010. Income distribution, economic growth and European integration. *Journal of Economic Inequality ,* Τόμος 8, pp. 277-292.

Garicano, L. & Rossi-Hansberg, E., 2006. Organization and Inequality in a Knowledge Economy. *Quarterly Journal of Economics,* Issue 121, pp. 1383-1435.

Geishecker, I. & Görg, H., 2008. Winners and Losers: A Micro-Level Analysis of International Outsourcing and Wages. *The Canadian Journal of Economics ,* 41(1), pp. 243-270.

Gilles, S.-P. & Thierry, V., 1993. Education, democracy and growth. *Journal of Development Economics,* 42(2), pp. 399-407.

Gillis, M., Perkins, D., Roemer, M. & Snodgrass, D., 1987. *Economics of Development.* 2nd επιμ. s.l.:WW Norton and Company.

Giovannoni, O., 2010. *Functional Distribution of Income, Inequality and the Incidence of Poverty: Stylized Facts and the Role of Macroeconomic Policy,* s.l.: The University of Texas Inequality Project.

Glyn, A., 2007. *Capitalism unleashed: finance, globalization, and welfare.* s.l.:Oxford University Press.

Glyn, A., 2011. Functional Distribution and Inequality. *The Oxford Handbook of Economic Inequality*.

Goldberg, P. K. & Pavcnik, N., 2007. Distributional Effects of Globalization in Developing Countries. *Journal of Economic Literature,* 1(45), pp. 39-82.

Goldin, C. & Katz, L. F., 2008. *The Race between Education and Technology.* s.l.:Cambridge, MA: The Belknap Press of Harvard University Press..

Greenwood, J. & Jovanovic, B., 1990. Financial Development, Growth, and the Distribution of Income. *The Journal of Political Economy,* Τόμος 98, pp. 1076-1107.

Grijalva, D. F., 2011. *Inequality and Economic Growth: Bridging the Short-run and the Long-run,* s.l.: UC Irvine: Center for the Study of Democracy.

Grossman, G. M. & Helpman, E., 1991. Quality Ladders in the Theory of Growth. *The Review of Economic Studies, ,* 1(58), pp. 43-61.

Grossman, G. M. & Helpman, E., 1991. Trade, knowledge spillovers, and growth. *European Economic Review ,* 2-3(35), p. 517–526.

Gu, X., Dong, B. & Huang, B., 2014. Inequality, Saving and Global Imbalances: A New Theory with Evidence from OECD and Asian Countries. *The World Economy* .

Halter, D., Oechslin, M. & Zweimüller, J., 2014. Inequality and growth: the neglected time dimension. *J Econ Growth ,* Issue 19, p. 81–104.

Harris, D. J., 1993. Economic Growth and Equity: Complements or Opposites. *Review of Black Political Economy,* 21(3), pp. 65-72.

Harrison, A., 2002. Has globalization eroded labor’s share? Some cross-country evidence. *Mimeo, UC Berkeley.*

Harvey, D., 2005. *A Brief History of Neoliberalism.* s.l.:Oxford: Oxford University Press.

Heathcote, J. P. F. V. G., 2010. Unequal We Stand: An Empirical Analysis of Economic Inequality in the United States. *Review of Economic Dynamics,* Τόμος 13, p. 15–51.

Hein, E., 2011. *Distribution, 'Financialisation' and the Financial and Economic Crisis –Implications for Post-crisis Economic Policies,* Berlin: Berlin School of Economics and Law and Institute for International Political Economy (IPE).

Hein, E., 2012. "Financialization," distribution, capital accumulation, and productivity growth in a post-Kaleckian model. *Journal of Post Keynesian Economics*.

Hein, E., 2012b. Finance-dominated Capitalism, Re-distribution, Household Debt And Financial Fragility In A Kaleckian Distribution And Growth Model.. *PSL Quarterly Review, ,* 260(65), p. 11–51.

Hein, E., 2013b. The crisis of finance-dominated capitalism in the euro area, deficiencies in the economic policy architecture, and deflationary stagnation policies. *Journal of Post Keynesian Economics,* 2(36), p. 325–354.

Hein, E., 2013. *Finance-dominated capitalism and redistribution of income: A Kaleckian perspective,* NY: Working Paper, No. 746, Levy Economics Institute of Bard.

Hein, E., 2014. *Distribution and Growth after Keynes. A Post-Keynesian Guide.* s.l.:Edward Elgar Publishing Limited.

Hein, E. & Detzer, D., 2015. Finance-Dominated Capitalism and Income Distribution: A Kaleckian Perspective on the Case of Germany. *Italian Economic Journal,* 2(1), p. 171–191.

Hein, E. & Dodig, N., 2014. Financialisation, distribution, growth and crises: Long-run tendencies. *Working Paper, ,* Issue 35.

Hein, E. & Dünhaupt, P., 2019. Financialization, distribution, and macroeconomic regimes before and after the crisis: a postKeynesian view on Denmark, Estonia, and La. *Journal of Baltic Studies*.

Hein, E. & Mundt, M., 2012. *Financialisation and the Requirements and Potentials for Wage-led Recovery – A Review Focusing on the G20,* s.l.: In Conditions of Work and Employment Series 37.

Hein, E. & Prante, F. J., 2018. *Functional distribution and wage inequality in recent Kaleckian growth models,* Berlin, Germany: Berlin School of Economics and Law and Institute for International Political Economy (IPE).

Hein, E. & van Treeck, T., 2008. Financialisation'' in post-Keynesian Models of Distribution and Growth – a Systematic Review. *IMK Working Paper,* Τόμος no. 10.

Hein, E. & Vogel, L., 2008. Distribution and growth reconsidered: empirical results for six OECD countries. *Cambridge Journal of Economics,* 3(32), p. 479–511.

Hein, P. D. &. E., 2019. Financialization, distribution, and macroeconomic regimes before and after the crisis: a postKeynesian view on Denmark, Estonia, and La. *Journal of Baltic Studies*.

Herr, H., 2018. *Karl Marx's thoughts on functional income distribution – a critical analysis,* Berlin: Institute for International Political Economy (IPE),.

Higgins, M. & Williamson, J., 1999. Explaining inequality the world round: cohort size, Kuznets curve and openness. *NBER working papers,* Τόμος 7224..

Huang, H.-C. (., Lin, Y.-C. & Yeh, C.-C., 2012. An appropriate test of the Kuznets hypothesis. *Applied Economics Letters,* Τόμος 19, pp. 47-51.

Iacoviello, M., 2008. Household Debt and Income Inequality, 1963–2003. *Journal of Money, Credit and Banking,* 40(5), pp. 930-965.

ILO, 2008. *World of work report 2008 : income inequalities in the age of financial globalization,* Geneva:: International Labour Office, International Institute for Labour Studies. ILO.

International Labour Organization (ILO), 2008. *World of Work Report 2008. Income inequalities in the age of financial globalization,* Geneva: ILO.

International Monetary Fund , 2007a. *The globalization of labor,* Washington, DC: In World Economic Outlook .

International Monetary Fund, 2006. *World Economic Outlook: Financial Systems and Economic Cycles,* Washington, D.C.: International Monetary Fund,.

International Monetary Fund, 2007b. *Globalization and Inequality,* s.l.: World Economic Outlook.

Iradian, G., 2005. *Inequality, Poverty, and Growth: Cross-Country Evidence,* s.l.: IMF Working Paper.

Ivanova, M. N., 2019. Inequality, financialization, and the US current account deficit. *Industrial and Corporate Change Vol. 28*, 19 March, p. 707–724.

Jäggi, A., Schetter, U. & Schneider, M. T., 2021. Inequality, Openness, and Growth through Creative Destruction. *CID Research Fellow and Graduate Student Working Paper No. 130.*

Jayadev, A., 2007. Capital account openness and the labour share of income. *Cambridge Journal of Economics,* Τόμος 31, p. 423–443.

Kaldor, N., 1956. Alternative Theories of Distribution. *The Review of Economic Studies,* Τόμος 23, pp. 83-100.

Kaldor, N., 1961. Capital Accumulation And Economic Growth. *F.A. Lutz and D.C. Hague, eds., The Theory of Capital, St. Martins Press,,* pp. 177-222.

Kali, R., Méndez, F. & Reyes, J., 2007. Trade structure and economic growth. *The Journal of International Trade & Economic Development,* 2(16), p. 245–269.

Kanbur, R. & Stiglitz, J., 2015. Wealth and income distribution: New theories needed for a new era. *VOX CEPR's Policy Portal*, 18 August.

Karwowski, E., Shabani, M. & Stockhammer, E., 2017. Financialization: Dimensions and Determinants. A Cross-Country Study. *Kingston University Economics Discussion Papers ,* Τόμος 1.

Keller, W., 2004. International Technology Diffusion. *Journal of Economic Literature,* 3(42), p. 752–782.

Kiefer, D. & Rada, C., 2004. Profit maximising goes global: the race to the bottom. *Cambridge Journal of Economics.*

Kim, J.-H., 2016. A Study on the Effect of Financial Inclusion on the Relationship Between Income Inequality and Economic Growth. *Emerging Markets Finance and Trade,* 2(52), p. 498–512.

Kim, Y. K., 2013. Household Debt, Financialisation, and Macroeconomic Performance in the United States. 1951–2009.. *Journal of Post Keynesian Economics ,* Τόμος 35, p. 675–694.

Kindleberger, C. P., 2000. *Manias, Panics, and Crashes: A History of Financial Crise.* 4 επιμ. New York: s.n.

Kohler, K., Guschanski, A. & Stockhammer, E., 2018. The impact of financialisation on the wage share. A theoretical clarification and empirical test. *Kingston University Economics Discussion Papers ,* Issue 1.

Kolev, G. & Niehues, J., 2016. *The Inequality-Growth Relationship - An Empirical Reassessment,* s.l.: Verein für Socialpolitik / German Economic Association.

Korzeniewicz, R. P. & Patrick, M. T., 2005. Theorizing the relationship between inequality and economic growth. *Theory and Society,* Τόμος 34, pp. 277-316.

Krueger, D. & Perri, F., 2006. Does Income Inequality Lead to Consumption Inequality? Evidence and Theory. *Review of Economic Studies,* 1 (73), pp. 163-193.

Kumhof, M., Lebarz, C., Rancière, R. & Throckmorton, A. W. R. a. N. A., 2012. *Income Inequality and Current Account Imbalances,* s.l.: International Monetary Fund.

Kumhof, M. & Ranciere, R., 2010. Inequality, Leverage and Crises. *IMF Working Paper,* Issue 268.

Kumhof, M. R. R. a. P. W., 2015. (2015) ‘Inequality, Leverage, and Crises. *American Economic Review ,* 3 (105), p. 1217–45.

Kuttner, R., 2007. *The Squandering of America: How the Failure of Our Politics Undermines Our Prosperity.* Knopf, Alfred A. επιμ. New York: s.n.

Lavoie, M. & Stockhammer, E., 2013. *Wage-Led Growth: An Equitable Strategy for Economic Recovery.* s.l.:Palgrave Macmillan.

Lazear, E. P. & Rosen, S., 1981. Rank-Order Tournaments as Optimum Labor Contracts. *Journal of Political Economy,* 89(5), pp. 841-864.

Lazonick, W. & O'Sullivan, M., 2000. Maximizing shareholder value: a new ideology for corporate governance. *Economy and Society,* 1(29), pp. 13-35.

Leigh, A. & Posso, A., 2009. Top incomes and national savings. *Review of Income & Wealth,* 55(1), p. 57 – 74.

Li, H., Squire, L. & Zou, H., 1998. Explaining international and intertemporal variations in income inequality.. *Economic Journal,* 108(446), p. 26–43..

Lima, G. T., 2000. Market concentration and technological innovation in a dynamic model of growth and distribution. December.

Lima, G. T., 2004. Endogenous Technological Innovation, Capital Accumulation and Distributional Dynamics. *Metroeconomica*.

Lopez, H., 2006. Growth and inequality: Are the 1990s different?. *Economics Letters,* Τόμος 93, pp. 18-25.

Lucas, R. E. J., 1988. On the Mechanics of Economic Development. *Journal of Monetary Economics,,* Τόμος 22, pp. 3-42.

Lundberg, M. & Squire, L., 2003. The simultaneous evolution of growth and inequality. *Economic Journal,,* 113 (487), p. 326–344.

Madsen, J. B., Islam, M. R. & Doucouliagos, H., 2017. *Inequality, Financial Development and Economic Growth in the OECD, 1870-2011,* s.l.: European Economic Review.

Manea, S. & Wildauer, Ö. O. a. R., 2019. *The Impact of Fiscal Policy, Income and Wealth Inequality, Financialization and the Housing Market on Growth,* s.l.: University of Greenwich.

Martin Čihák, R. S. A. B. S. C. A. F. P. X., 2020. *Finance and Inequality,* s.l.: IMF.

Matyas, L., Konya, L. & MaCquarie, L., 1998. The Kuznets U-curve hypothesis: some panel data evidence. *Applied Economics Letters,* Τόμος 11, pp. 693-697.

Meltzer, A. H. & Richard, S. F., 1981. A rational theory of the size of government. *Journal of Political Economy,* 89(5), pp. 914-927.

Mian, A. & Sufi, A., 2008. 'The consequences of mortgage credit expansion: Evidence from the u.s. mortgage default crisis. *nber working paper series,* Issue Working Paper 13936.

Milanovic, B., 2005. Can we discern the effect of globalisation on income distribution? Evidence from household budget surveys. *World Bank Economic Review,* 19(1), p. 21–44.

Minsky, H. P., 1973. The Strategy of Economic Policy and Income Distribution. *Annals of the American Academy of Political and Social Science,* Issue 409.

Minsky, H. P., 1990. Schumpeter: Finance and Evolution.. Στο: A. Heertje & M. Perlman, επιμ. *Evolving Technology and Market Structure: Studies in Schumpeterian Economics.* s.l.:St. Martin's Press, pp. 51-73.

Minsky, H. P., 1996. Uncertainty and the Institutional Structure of Capitalist Economies: Remarks upon Receiving the Veblen-Commons Award. *Journal of Economic Issues,* 30(2), pp. 357-368.

Molero-Simarro, R., 2016,. Growth and inequality revisited: the role of primary distribution of income. A new approach for understanding today's economic and social crises. *Cambridge Journal of Economics*, pp. 1-24.

Monfort, M., Ordóñez, J. & Sala, H., 2018. Inequality and unemployment patterns in Europe: Does integration lead to (real) convergence?. *Open Economies Review, Springer,* Τόμος 29 , pp. 703-724.

Mookerjee, R. &. K. P., 2010. Availability of financial services and income inequality: The evidence from many countries. *Emerging Markets Review,* 4(11), p. 404–408.

Morelli, P. L. a. S., 2012. *Inequality, debt and growth,* s.l.: Resolution Foundation.

Naastepad, C. & Storm, S., 2015. NAIRU economics and the Eurozone crisis. *International Review of Applied Economics,* 6(29), pp. 843-877.

Naastepad, C. W. M. & Storm, S., 2007. OECD Demand Regimes (1960-2000). *Journal of Post Keynesian Economics,* 2(29), pp. 211-246.

Nacho Álvarez, J. C. M. K. J. U., June 2018. *The Functional Income Distribution and Labour Market Institutions: the Missing Links in the Agenda for Inclusive Growth After Austerity,* s.l.: KU Leuven.

Nelson R., W. S., 1982. *An Evolutionary Theory of Economic Change.* s.l.:Harvard University.

Nishi, H., 2012. Structural VAR analysis of debt, capital accumulation, and income distribution in the Japanese economy: a Post Keynesian perspective. *Journal of Post Keynesian Economics,* 34(4), pp. 658-712.

Nölke, A. & Vliegenthart, A., 2009. Enlarging the Varieties of Capitalism: The Emergence of Dependent Market Economies in East Central Europe. *World Politics ,* 61 (4), pp. 670-702.

Obstfeld, M. & Rogoff, K., 2009. *Global Imbalances and the Financial Crisis: Products of Common Causes,* s.l.: UC Berkeley and Harvard University.

Obst, O. O. a. T., 2016. Wage-led growth in the EU15 member-states: the effects of income distribution on growth, investment, trade balance and inflation. *Cambridge Journal of Economics* , pp. 1-35.

OECD, 2012. *Employment Outlook,* Paris: OECD.

Okun, A. M., 1975. *Equality and Efficiency: The Big Tradeoff.* Washington, DC: Brookings Institution Press.

Onaran, Ö., 2009. Wage share, globalization, and crisis: The case of manufacturing ndustry in Korea, Mexico, and Turkey. *International Review of Applied Economics,* 2(23), pp. 113-34.

Onaran, O., 2011. Globalisation, macroeconomic performance and distribution. Στο: E. H. a. E. Stockhammer, επιμ. *A modern guide to Keynesian macroeconomics and economic policies* . s.l.:Cheltenham Edward Elgar. pp. , pp. 240-266.

Onaran, O., 2019. Equality-led Development and the Demand- and Supply-side Effects. *Development and Change* , p. 445–457.

Onaran, Ö. & Galanis, G., 2012. Is aggregate demand wage-led? National and global effects. Στο: *Conditions of Work and Employment Series No. 40.* Geneva: International Labour Office.

Onaran, O. & Grafl, E. S. a. L., 2011. Financialisation, income distribution and aggregate demand in the USA. *Cambridge Journal of Economics*, 7 January, p. 637–661.

Orhangazi, O., 2008. Financialisation and capital accumulation in the non-financial corporate sector: A theoretical and empirical investigation on the US economy: 1973–2003. *Cambridge Journal of Economics,* Τόμος 32, p. 863–886.

Ostry, J. D., Berg, A. & Tsangarides, C. G., 2014. *Redistribution, Inequality, and Growth,* Washington, DC: International Monetary Fund.

Palley, T. I., 2007. *Financialization: What It Is and Why It Matters,* Washington, D.C.: The Levy Economics Institute and Economics for Democratic and Open Societies.

Palley, T. I., 2015. The middle-income class in macroeconomics and growth theory: a three-class neo-Kaleckian-Goodwin model. *Cambridge Journal of Economics,* 1 (39), pp. 221-243.

Palley, T. I., 2016. *Inequality and Growth in Neo-Kaleckian and Cambridge Growth Theory,* Massachusetts: Political Evonomy Research Institute.

Panizza, U., 1995. Income Inequality and Economic Growth: Evidence from American Data. *Journal of Economic Growth,* Τόμος 7, pp. 25-41.

Partridge, M. D., 1997. Is Inequality Harmful for Growth? Comment. *The American Economic Review,* 5(87), pp. 1019-1032.

Parui, P., 2018. Financialization and Endogenous Technological Change: a Post-Kaleckian Perspective. *Centre for Economic Studies and Planning, Jawaharlal Nehru*, October .

Perotti, R., 1993. Political Equilibrium, Income Distribution, and Growth. *The Review of Economic Studies,* 60(4), pp. 755-776.

Perotti, R., 1996a. Growth, Income Distribution, and Democracy: What the Data Say. *Journal of Economic Growth,* Τόμος 1, pp. 149-187.

Persson, T. & Tabellini, G., 1994. Is Inequality Harmful for Growth?. *The American Economic Review,* 84(3), pp. 600-621.

Pettis, M., 2013. *The Great Rebalancing: Trade, Conflict, and the Perilous Road Ahead for the World Economy.* s.l.:Princeton University Press.

Piketty, T., 1994. Inégalités et redistribution. Développements théoriques récents. *Revue d'Economie Politique,* 104(6), pp. 769-800.

Piketty, T., 1997. The dynamics of the wealth distribution and the interest rate with credit rationing. *Review of Economic Studies,* 64(2), pp. 173-189.

Piketty, T., 2000. Theories of persistent inequality and intergenerational mobility. Στο: A. B. Atkinson & B. F., επιμ. *Handbook of Income Distribution.* s.l.:Elsevier Science B. V., pp. 429-476.

Piketty, T., 2014. *Capital in the 21st century.* Cambridge, Massachusetts London: The Belknap Press of Harvard University Press.

Pivetti, M. & Barba, A., 2009. Rising household debt: Its causes and macroeconomic implications—a long-period analysis. *Cambridge Journal of Economics,* Issue 33, p. 113–137.

Pozsar, Z., Adrian, T., Ashcraft, A. & Boesky, H., 2010. *Shadow Banking,* New York: Staff Report No. 458.

Rajan, R. G., 2010. *Fault Lines: How Hidden Fractures Still Threaten the World Economy.* Princeton: Princeton University Press.

Rajan, R. G., 2011. *Fault Lines: How Hidden Fractures Still Threaten the World Economy.* Princeton: Princeton University Press.

Ravallion, M., 2001. Growth, inequality and poverty: looking beyond averages.. *World Development,* 29(11).

Reich, R., 2010. *Aftershock: The Next Economy and America's Future.* s.l.:Knopf.

Rodríguez, F. C., 2000. *Inequality, Economic Growth and Economic Performance: A Background Note for the World Development Report 2000,* s.l.: Department of Economics; University of Maryland.

Rodrik, D., 1997. *Has Globalization Gone Too Far?.* Washington: Institute of International Economics.

Rodrik, D., 1998. *Capital mobility and labor,* s.l.: Harvard University.

Rodrik, D., 1998. *Who needs capital-account convertibility?,* s.l.: Harvard University.

Romer, P. M., 1986. Increasing Returns and Long-Run Growth. *The Journal of Political Economy,* 94(5), pp. 1002-1037.

Roy-Mukherjee, S. & Udeogu, E., 2020. Neo-liberal Globalization and Income Inequality: Panel Data Evidence from OECD and Western Balkan Countries. *Journal of Balkan and Near Eastern Studies.*

Sahay, R. και συν., 2015. Rethinking Financial Deepening: Stability and Growth in Emerging Markets.. *IMF Staff Discussion Note.*

Sahota, G. S., 1978. Theories of Personal Income Distribution: A Survey. *Journal of Economic Literature,* Τόμος 16, pp. 1-55.

Saint-Paul, G., 2001. On the Distribution of Income and Worker Assignment under Intrafirm Spillovers, with an Application to Ideas and Networks. *Journal of Political Economy ,* Τόμος 109, pp. 1-37.

Saith, A., 1983. Development and distribution: A critique of the cross-country U-hypothesis. *Journal of Development Economics,* 13(3), pp. 367-382.

Schmidheiny, K., 2019. Panel Data: Fixed and Random Effects. Στο: Basel: Unversiẗat Basel: s.n.

Schmidt-Hebbel, K. & Servén, L., 2000. Does income inequality raise aggregate saving?. *Journal of Development Economics,* 61(2), pp. 417-446.

Schumpeter, J. A., 1942. *Capitalism, socialism and democracy.* s.l.:s.n.

Shaxson, N., 2010. *Treasure Islands: Tax Havens and the Men who Stole the World.* London: s.n.

Shell, K., 1973. Inventive Activity, Industrial Organisation and Economic Growth. Στο: J. A. Mirrlees & N. H. Stern, επιμ. *In Models of Economic Growth.* New York: Wiley, pp. 78-100.

Soukiazis, E. & Antunes, M., 2011. Is foreign trade important for regional growth? Empirical evidence from Portugal. *Economic Modelling,* 3(28), p. –1373.

Spilimbergo, A., 2000. Growth and Trade: The North Can Lose. *Journal of Economic Growth,* 2(5), p. 131–146.

Steger, M. S. T. M., 2010. Financial Integration, Investment, And Economic Growth: Evidence From Two Eras of Financial Globalization. *The Review of Economics and Statistics*, November, p. 756–768.

Stiglitz, J., 2015. Inequality and Economic Growth. Στο: M. Mazzucato & M. Jacobs, επιμ. *Rethinking Capitalism.* New Jersey: Wiley-Blackwell.

Stiglitz, J. E., 2012. *The price of inequality.* s.l.:W. W. Norton & Company.

Stockhammer, E., 2004. Financialisation and the slowdown of accumulation. *Cambridge Journal of Economics ,* November, Τόμος 28, p. 719–741.

Stockhammer, E., 2009. Determinants of functional income distribution in OECD countries. September.

Stockhammer, E., 2010. Income Distribution, the Finance-dominated Accumulation Regime, and the Present Crisis.. Στο: *The World Economy in Crisis - the Return of Keynesianism? .* Marburg: Metropolis: S. Dullien, E. Hein, A. Truger, and T. van Treeck, p. 63–86.

Stockhammer, E., 2011. Peripheral Europe’s debt and German wages. *International Journal for Public Policy,* 7(1-3), pp. 83-96.

Stockhammer, E., 2012a. Financialization, income distribution and the crisis. *Investigación Económica,* 279(71).

Stockhammer, E., 2012b. *Rising Inequality as a Root Cause of the Present Crisis,* s.l.: Political Economy Research Institute.

Stockhammer, E., 2012c. *Why have wage shares fallen? A panel analysis of the determinants of functional income distribution,* GENEVA: International Labour Organization.

Stockhammer, E., 2013. Rising inequality as a cause of the present crisis. *Cambridge Journal of Economics*, pp. 1-24.

Stockhammer, E., 2014. Debt-driven Growth? Wealth, Distribution and Demand in OECD Countries.
Rising inequality as a structural cause of the present financial and economic crisis.

Stockhammer, E., 2015. Wage-led versus Profit-led Demand: What Have we Learned? A Kalecki-Minsky View. *Post Keynesian Economics Study Group*, December .

Stockhammer, E., 2016. Neoliberal growth models, monetary union and the Euro crisis. A post-Keynesian perspective. *New Political Economy*.

Stockhammer, E., 2017. Determinants of the wage share. A panel analysis of advanced and developing economies. *British Journal of Industrial Relations,* Issue 55, pp. 3-33.

Stockhammer, E. & Kohler, K., 2019. *Financialization and demand regimes in advanced economies,* s.l.: Post-Keynesian Economics Society.

Stockhammer, E., List, L. & Durand, C., 2015. *European Growth Models and Working Class Restructuring before the Crisis,* s.l.: Post Keynesian Economics Study Group.

Stockhammer, E. & Onaran, Ö., 2004. Accumulation, distribution and employment: a structural VAR approach to a Kaleckian macro model. *Structural Change and Economic Dynamics,* 4(15), p. 421–447.

Storm, S. & Naastepad, C., 2015. Europe's Hunger Games: Income Distribution, Cost Competitiveness and Crisis. *Cambridge Journal of Economics,* 3(39), p. 959–986.

Thomas Goda, Ö. O. a. E. S., 2016. Income Inequality and Wealth Concentration in the Recent Crisis. *Development and Change 48*, p. 3–27..

Todaro, M., 1994. *Economic Development.* 5 επιμ. s.l.:Longman Group.

Tori, D. & Onaran, Ö., 2018. Financialization, financial development and investment. Evidence from European non-financial corporations. *Socio-Economic Review.*

Tridico, P. & Pariboni, R., 2017. Inequality, financialization, and economic decline. *Journal of Post Keynesian Economics*.

Van Treeck, T. & Sturn., S., 2012. *Income Inequality as A Cause of the Great Recession? A Survey of Current Debates.,* s.l.: In Conditions of Work and Employment Series 39. Geneva: International Labor Organization.

Van Zanden, J. L. και συν., 2014. *Income inequality since 1820,* s.l.: OECD.

Vega, J. C. a. P. d. l., 2018. Investment, Inequality and Openness: A Cross-Country Analysis.

Verdier, G. S.-P. a. T., 1993. Education, democracy and growth. *Journal of Development Economics 42*, January.

Voitchovsky, S., 2005. Does the Profile of Income Inequality Matter for Economic Growth?: Distinguishing Between the Effects of Inequality in Different Parts of the Income Distribution. *Journal of Economic Growth,* Τόμος 10, pp. 273-296.

Wade, R. H., 2004. Is globalization reducing poverty and inequality?. *World Development,* Issue 32, p. 567–589.

Weide, R. v. d. & Milanovic, B., 2014. Inequality Is Bad for Growth of the Poor (But Not for That of the Rich). *Policy Research Working Paper 6963 World Bank Group.*

Wilkinson, R. G. & Pickett, K. E., 2007. The problems of relative deprivation: Why some societies do better than others. *Social Science & Medicine,* Τόμος 65, pp. 1965-1978.

Williamson, J. G. & Lindert, P. H., 1980. *American inequality : a macroeconomic history.* New York : Academic Press.

Wolff, E. N. & Zacharias, A., 2007. *Class Structure and Economic Inequality,* s.l.: Levy Economics Institute.

Wray, L. R., 2007. *Minsky's Approach to Employment Policy and Poverty: Employer of Last Resort and the War on Poverty,* New York: The Levy Economics Institute of Bard College.

Zalewski, D. A. & Whalen, C. J., 2010. Financialization and Income Inequality: A Post Keynesian Institutionalist Analysis. *Journal of Economic Issues,* Τόμος 44, pp. 757-777.

Zeman, J., 2019. Income Distribution and Economic Growth: Empirical Results for Slovakia. *Ekonomický časopis, 67*, pp. č. 5, s. 459 – 480.

Appendix

Description of variables

The data have been primarily derived from various sources, including the annual macroeconomic database of the European Commission (AMECO database), Eurostat, the International Labour Organization (ILO), the World Inequality Database (WID), the International Monetary Fund (IMF), the United Nations Conference on Trade and Development (UNCTAD), The World Bank, and the OECD. All variables and data used are presented in the following subsections.

Population data

For the demographic explanatory variables that have been used, data has been primarily sourced from the European Commission's database (AMECO database)[63] and the International Labour Organization (ILO) [64]. Population variables are presented in Table 12.

Table 12

Population	description	source	label
Total Population	Unempl+L+Ξ	calculated	N
Unemployment	(NUTN)	Ameco	Unempl
Unemployment rate	Unempl/N	calculated	unemplRT
Employment	L+Ξ	calculated	T
Employment Rate	T/N	calculated	e
Workers	Wage and salary earners (Persons),Total economy, domestic (NWTD)	Ameco	L
Labor Employment Rate	L/N	calculated	eL
Skilled Workers	adv_empl*L	calculated	Ls
Basic Educated Workers	Basic_empl*L	calculated	Lb
Tertiary Educated Workers	share of employed with tertiary education	ILO	adv_empl
Up to secondary educated Eorkers	1-adv_empl	ILO	Basic_empl
Capital owners	Self-employed (Persons), Total economy (NSTD)	Ameco	Ξ
High class Capital Owners	0,1*N	calculated	Ξh
Middle class Capital Owners	Ξ-Ξh	calculated	Ξm
proportion of workers	L/T	calculated	l
Proportion of Skilled employment	Ls/L	calculated	γs
Proportion of Basic employment	Lb/L	calculated	γb
Proportion of high class capital owners	Ξh/Ξ	calculated	ηh
Proportion of middle class capital owners	Ξm/Ξ	calculated	ηm
income share of 0,1 richer population	pre tax income share of 0,1 richer population	World Inequality Database (WID) (https://wid.world/data/)	onePCshare
income share of the middle class	1-share of 50% poorer-share of 10% richer	World Inequality Database (WID) (https://wid.world/data/)	middleClassShare
relative labor employnmet	Lb/Ls	calculated	relatL
relative capital owners' employment	Ξm/Ξh	calculated	relatK

[63] Unemployment, Total (NUTN), Wage and salary earners (Persons), Total economy, domestic (NWTD), Self-employed (Persons), Total economy (NSTD)
[64] Employment by Education, Annual.

Income and distribution data

Income and distribution data has primarily been sourced from the European Commission's database (AMECO database) and the World Inequality Database (WID). Data for income variables are presented in Table 13.

Table 13

Income	description	source	label
Gross domestic product at current prices	Gross domestic product at current prices (UVGD) (ECU/EUR)	Ameco	gdp
Total Income	Wages + Profits	calculated	Y
Wages	HH & NPISH, Gross wages and salaries (D11) (UWSH)	Ameco	W
Wage share	Wages/Profits	calculated	λ
Total Skilled Wages	ws*Ls	calculated	Ws
Total Basic Wages	W-Ws	calculated	Wb
Average Income From Wages	W/L	calculated	w
Average Income for skilled Labor	middleClassShare/(0,4*N)	calculated	ws
Average Income for basic Labor	Wb/Lb	calculated	wb
Share of skilled Wages	Ws/W	calculated	ωs
Share of Basic Wages	1-ωs	calculated	ωb
wage premium	ws/wb	calculated	qL
Profits	HH & NPISH, Nonlabour income (B2g+B3g+D4 net) (UYOH)	Ameco	Π
Total High class Profits	onePCshare*Y	calculated	Πh
Total middle class Profits	Π-Πh	calculated	Πm
Average Income From Profits	Π/Ξ	calculated	π
Average Icome for high class profits	Πh/Ξh	calculated	πh
Average Icome for middle class profits	Πm/Ξm	calculated	πm
Share of high class profits	Πh/Π	calculated	kh
profti premium	πh/πm	calculated	qK
Share of middle class profits	Πm/Π	calculated	km
profit rate	Operating surplus, Net (UOND)/Net capital stock (OKND)	Ameco	r

Integration data

Additionally, integration is represented by four explanatory variables. Firstly, the sum of exports and imports is used as a variable to represent trade openness. Second, the Chinn-Ito index, which measures financial openness, is employed as the second variable. The Chinn-Ito index, introduced by Chinn and Ito in 2005, is based on the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) (Chinn & Ito, 2005; Chinn & Ito, 2008).[65] This index quantifies the level

[65] *http://web.pdx.edu/~ito/Chinn-Ito_website.htm*

of financial openness in economies and has been utilized in various studies (ILO, 2008; Vega, 2018; Roy-Mukherjee & Udeogu, 2020).

Thirdly, the sum of inflows and outflows of FDI is used as a measure of FDI openness. Finally, the GINI index, which measures inequality among the citizens of the total European population, is employed as a proxy for convergence. The integration variables are presented in Table 14.

Table 14

integration variables			
trade openness	(X+M)/gdp	calculated	op
Financial openess	The Chinn-Ito index (*KAOPEN*)	index	financial_open
fdi openness	FDIinflowPC+FDIoutflowPC	calculated	fdiopen
convergence	Gini estimated bettween euro coutries	calculated	eugini

Inequality data

Factor inequality is calculated using equation (5.1.10), labor inequality is computed using relation (5.2.13), and profit inequality is determined using equation (5.3.21). These calculations utilize the variables of population, income, and distribution data, as presented in Table 15.

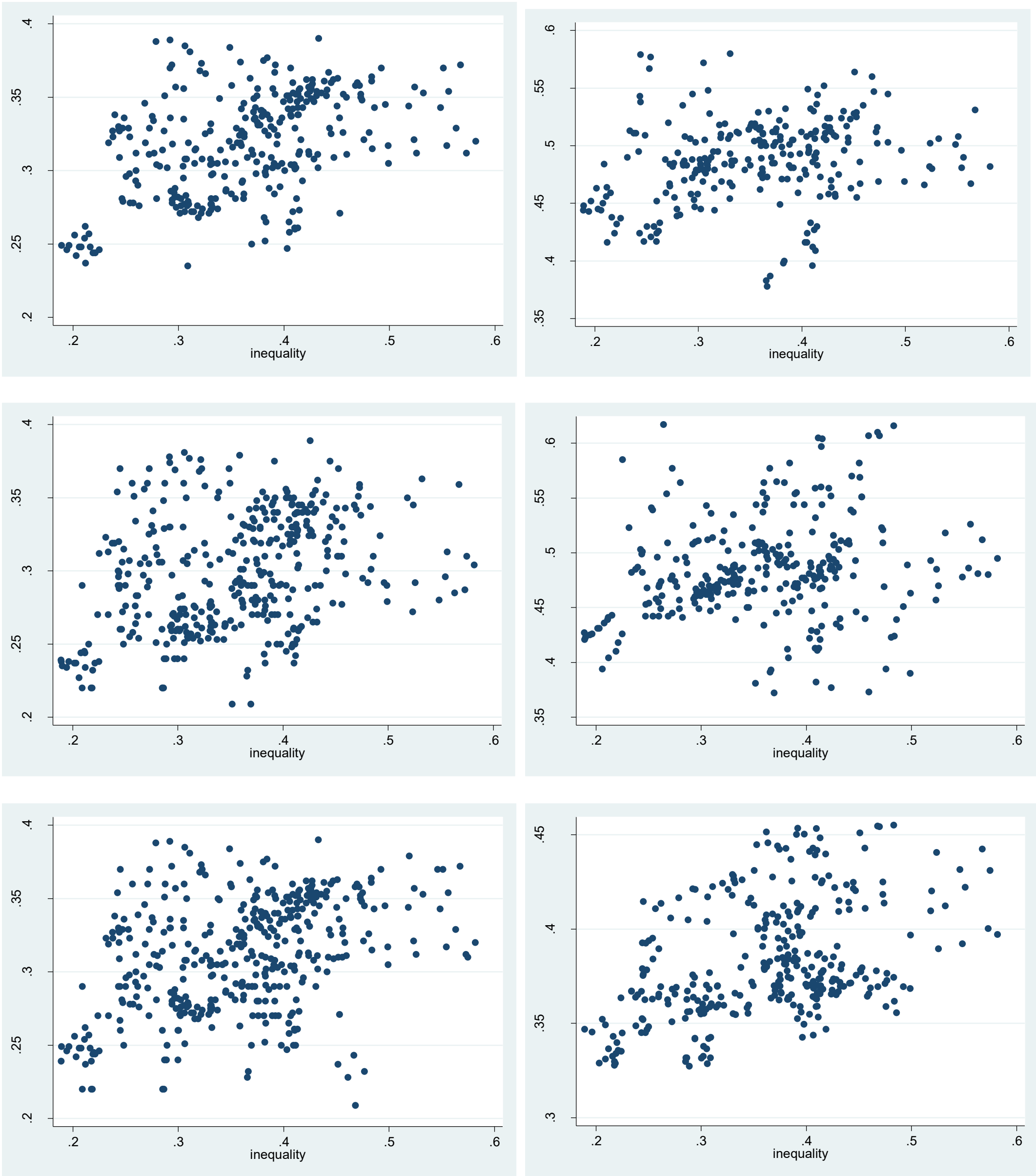
Table 15

Inequality Data	**description**	**source**	**label**
Inequality	Unemploymentrate+e*(InequalityF+L*λ*InequalityL +Ξ*h*InequalityΞ) or Unemploymentrate+e*(InequalityF+L*λ*InequalityL +*Ξ*h*InequalityΞ+2*[(Ws+Πm)/Y]*[(Ls+Ξm)/T]*[Ws /(Ws+Πm)-Ls/(Ls+Ξm)]	calculated	Inequality
InequalityF	l-λ	calculated	InequalityF
InequalityL	ωs- γs	calculated	InequalityL
InequalityK	kh-ηh	calculated	InequalityK

Related to other Gini indexes

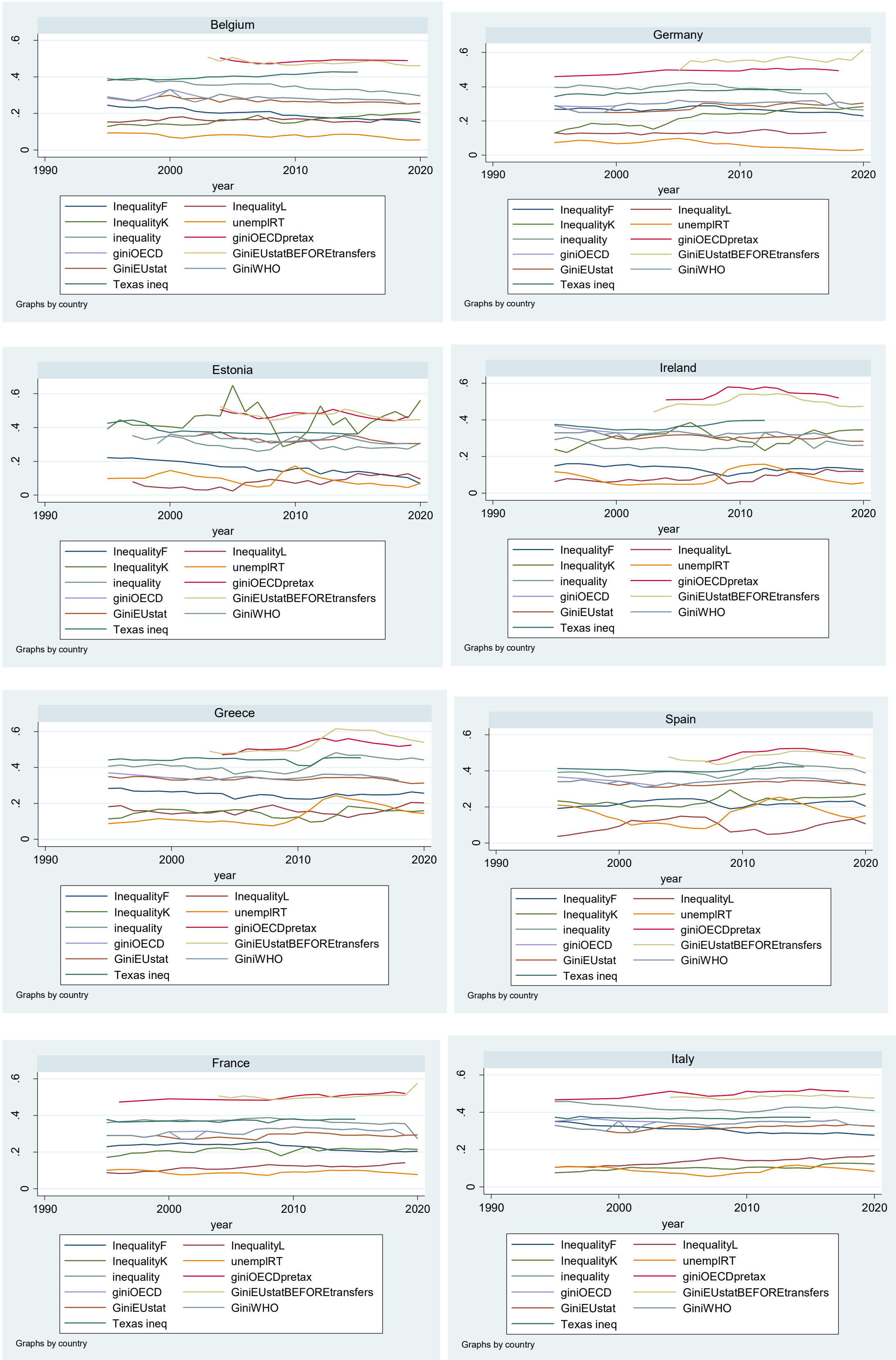
In the following figures, we can observe the correlation between the inequality index calculated using equation (7.4.4.1.3) or (7.4.4.1.9) and the Gini indexes from Eurostat, OECD, Texas University, and the UN.

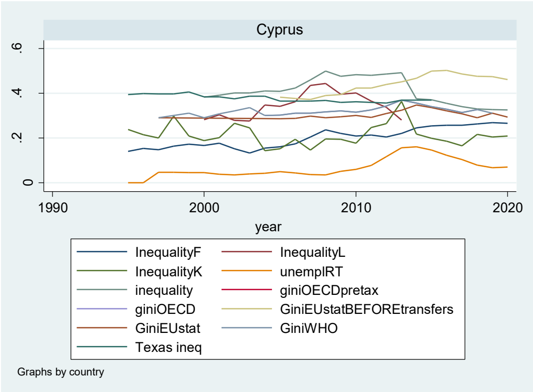
Figure 13

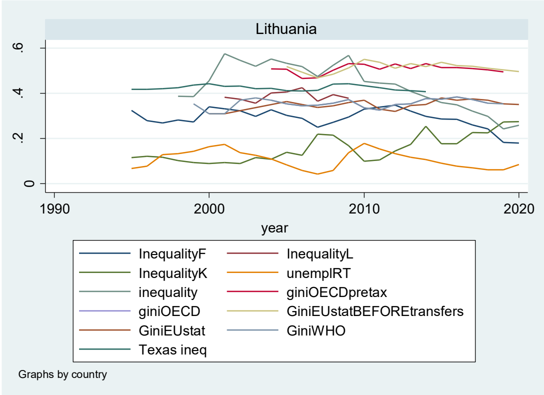


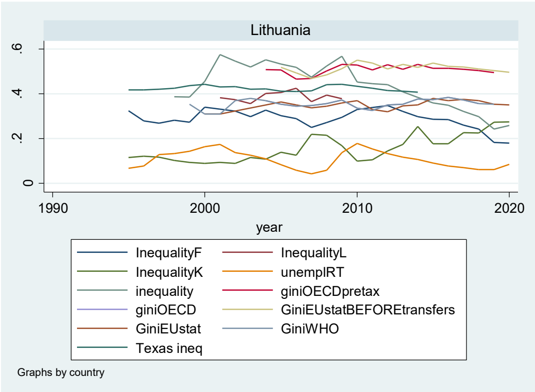
In the following figures, we can observe the temporal trend of inequality using the total inequality index, all the calculated types of inequality indexes, as well as the Gini indexes from Eurostat, OECD, Texas University, and the UN.

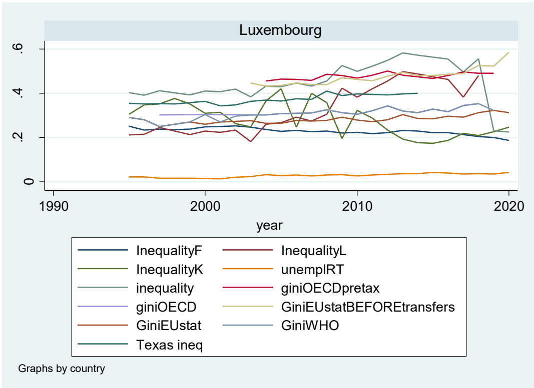
Figure 14

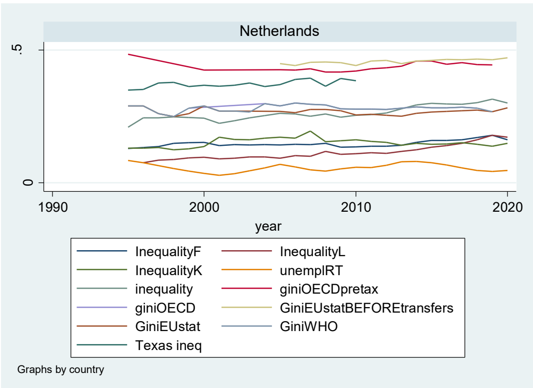

Belgium
0
.2
.4
.6
1990
2000
2010
2020
year
InequalityF
InequalityK
inequality
giniOECD
GiniEUstat
Texas ineq
InequalityL
unemplRT
giniOECDpretax
GiniEUstatBEFOREtransfers
GiniWHO
Graphs by country
Germany
0
.2
.4
.6
1990
2000
2010
2020
year
InequalityF
InequalityK
inequality
giniOECD
GiniEUstat
Texas ineq
InequalityL
unemplRT
giniOECDpretax
GiniEUstatBEFOREtransfers
GiniWHO
Graphs by country
Estonia
0
.2
.4
.6
1990
2000
2010
2020
year
InequalityF
InequalityK
inequality
giniOECD
GiniEUstat
Texas ineq
InequalityL
unemplRT
giniOECDpretax
GiniEUstatBEFOREtransfers
GiniWHO
Graphs by country
Ireland
0
.2
.4
.6
1990
2000
2010
2020
year
InequalityF
InequalityK
inequality
giniOECD
GiniEUstat
Texas ineq
InequalityL
unemplRT
giniOECDpretax
GiniEUstatBEFOREtransfers
GiniWHO
Graphs by country
Greece
0
.2
.4
.6
1990
2000
2010
2020
year
InequalityF
InequalityK
inequality
giniOECD
GiniEUstat
Texas ineq
InequalityL
unemplRT
giniOECDpretax
GiniEUstatBEFOREtransfers
GiniWHO
Graphs by country
Spain
0
.2
.4
.6
1990
2000
2010
2020
year
InequalityF
InequalityK
inequality
giniOECD
GiniEUstat
Texas ineq
InequalityL
unemplRT
giniOECDpretax
GiniEUstatBEFOREtransfers
GiniWHO
Graphs by country
France
0
.2
.4
.6
1990
2000
2010
2020
year
InequalityF
InequalityK
inequality
giniOECD
GiniEUstat
Texas ineq
InequalityL
unemplRT
giniOECDpretax
GiniEUstatBEFOREtransfers
GiniWHO
Graphs by country
Italy
0
.2
.4
.6
1990
2000
2010
2020
year
InequalityF
InequalityK
inequality
giniOECD
GiniEUstat
Texas ineq
InequalityL
unemplRT
giniOECDpretax
GiniEUstatBEFOREtransfers
GiniWHO
Graphs by country

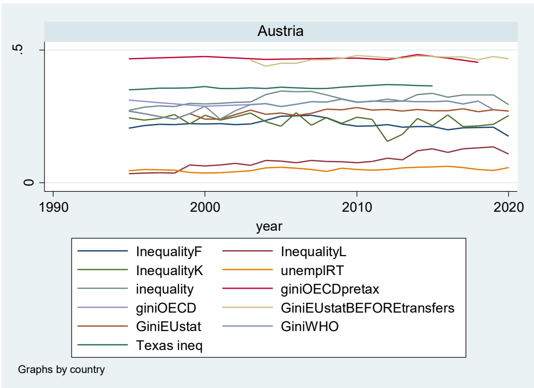

Cyprus
0
.2
.4
.6
1990
2000
2010
2020
year
InequalityF
InequalityL
InequalityK
unemplRT
inequality
giniOECDpretax
giniOECD
GiniEUstatBEFOREtransfers
GiniEUstat
GiniWHO
Texas ineq
Graphs by country

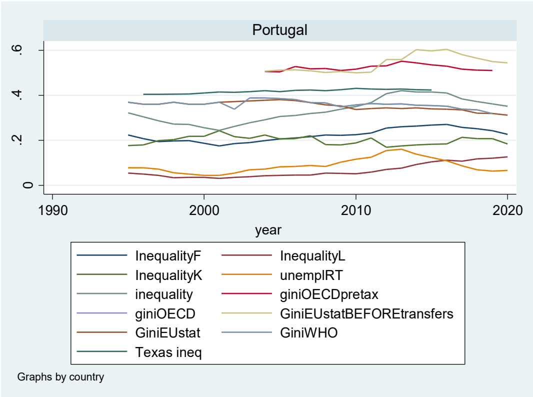

Lithuania
0
.2
.4
.6
1990
2000
2010
2020
year
InequalityF
InequalityL
InequalityK
unemplRT
inequality
giniOECDpretax
giniOECD
GiniEUstatBEFOREtransfers
GiniEUstat
GiniWHO
Texas ineq
Graphs by country

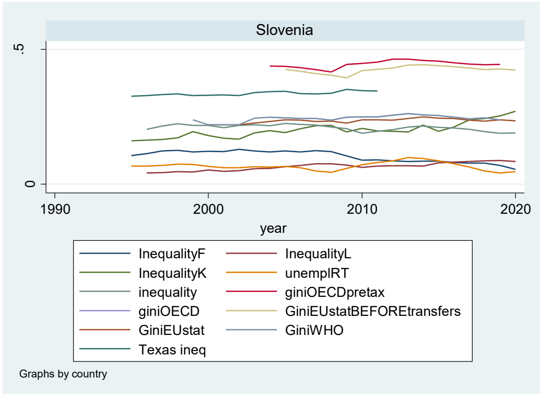

Lithuania
0
.2
.4
.6
1990
2000
2010
2020
year
InequalityF
InequalityL
InequalityK
unemplRT
inequality
giniOECDpretax
giniOECD
GiniEUstatBEFOREtransfers
GiniEUstat
GiniWHO
Texas ineq
Graphs by country

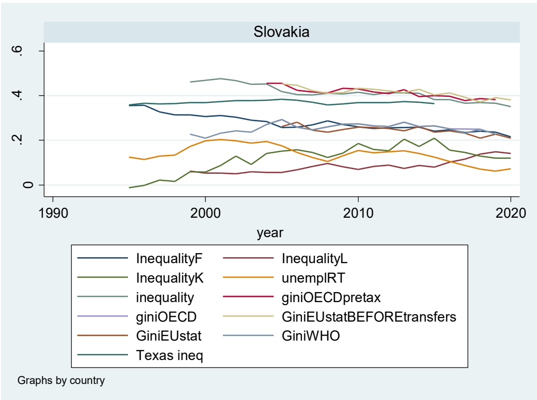

Luxembourg
0
.2
.4
.6
1990
2000
2010
2020
year
InequalityF
InequalityL
InequalityK
unemplRT
inequality
giniOECDpretax
giniOECD
GiniEUstatBEFOREtransfers
GiniEUstat
GiniWHO
Texas ineq
Graphs by country

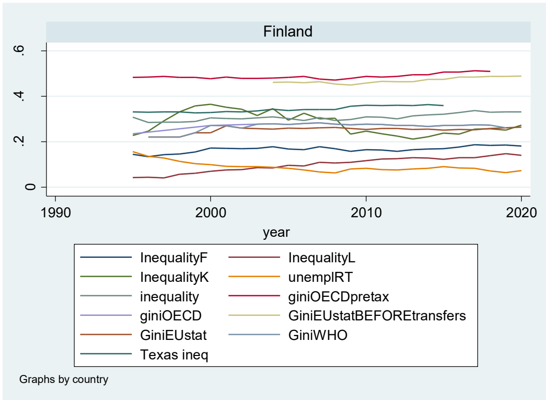

Netherlands
0
.5
1990
2000
2010
2020
year
InequalityF
InequalityL
InequalityK
unemplRT
inequality
giniOECDpretax
giniOECD
GiniEUstatBEFOREtransfers
GiniEUstat
GiniWHO
Texas ineq
Graphs by country


Austria
0
.5
1990
2000
2010
2020
year
InequalityF
InequalityL
InequalityK
unemplRT
inequality
giniOECDpretax
giniOECD
GiniEUstatBEFOREtransfers
GiniEUstat
GiniWHO
Texas ineq
Graphs by country









Other variables

Finally, Table 16 presents other variables used in the models as explanatory variables, following the literature and the theoretical models presented in chapters 4 and 5.

Table 16

other variables	description	source	label
Bargaining Power	Trade union density rate (%)	ILO	Bargaining
Household dept	Household debt, consolidated including Nonprofit institutions serving households % of GDP [TIPSPD22__custom_1527661]	Eurostat	DebtH
Gross domestic expenditure on R and D	GERD by sector of performance [rd_e_gerdtot]	eurostat	gerd
Current account balance	Balance of payments, Current account balance, annual [BOPCABA], GDP shares	UNCTAD	caPC
Exports	Exports, at current prices (UXGS)	Ameco	X
Imports	Imports, at current prices (UMGS)	Ameco	M
FDI openness	FDIinflowPC + FDIoutflowPC	calculated	fdiopen
FDI inflows	Foreign direct investment, net inflows (% of GDP)	World Bank Indicators (WB WDI)	FDIinflowPC
FDI outflows	Foreign direct investment, net outflows (% of GDP)	WB-WDI time series	FDIoutflowPC
ICT investment share	ICT shares in capital services	EU KLEMS database	ICT_cap
Non-ICT investment share	Non-ICT shares in capital services	EU KLEMS database	NonICT_cap
capital innovation rate	ICT investment share/nonICT investment share	calculated	k_inov
Financial Development	Financial Development Index	IMF	FD
General government expenditure on education	General government expenditure on education. (COFOG) (Percentage of gross domestic product (GDP))	Ameco	eduexpe

Results (Stata view)

Factor Inequality

Depended: ΔInequalityF

$$\Delta Inequality_{F_{it}} = a_{1_{it}} + a_2 \Delta l_{it} + a_3 \Delta \lambda_{it} + b_i + u_{it} \qquad (7.3.1.1)$$

```
Instruments for differenced equation
        GMM-type: L(2/.).growthInequalityF
        Standard: D.growthWS D.growthl
Instruments for level equation
        Standard: _cons

. estimates store gmmest

. estimates table fixed random pooled gmmest , star stats(N r2 r2_a)
```

Variable	fixed	random	pooled	gmmest
growthWS	-2.8389191***	-2.8232209***	-2.8006095***	-2.8536332***
growthl	4.0685912***	4.1776805***	3.9363927***	4.0532853***
cou				
5			.00360678***	
6			-.01446586***	
7			-.00038763	
8			.0133927***	
9			.00249005	
10			.00264451*	
11			.00797052***	
12			.00424605	
13			-.00150099	
14			.00704047*	
15			.00099354	
17			.004561*	
18			.00119329	
20			.00260809	
21			-.01561133***	
22			.00832644**	
23			.00657064*	
year				
1996			.01248055	
1997			.02846794	
1998			.01585159	
1999			.00707886	
2000			.00709779	
2001			.0068041	
2002			.01106986	
2003			.00914946	
2004			.00714525	
2005			.01811942	
2006			.00774328	
2007			.0047319	
2008			.00330221	
2009			-.00131323	
2010			.01225373	
2011			.01089534	
2012			.00213782	
2013			.01092363	
2014			.01426879	
2015			.00854305	
2016			.00377995	
2017			.00871926	
2018			.00566734	
2019			-.00131459	
2020			-.02540004	
growthIneq~F				
L1.				-.01501685
_cons	-.00119031	-.00143693	-.01042085	-.00122503
N	457	457	457	421
r2	.81811889		.83989876	
r2_a	.81731765		.82280057	

Depended: ΔInequalityF

$$\Delta Inequality_{F_{it}} = a_{1_{it}} + a_2 \Delta l_{it} + a_3 \Delta w_{it} + a_4 \Delta A_{it} + b_i + u_{it} \qquad (7.3.1.2)$$

```
Instruments for differenced equation
        GMM-type: L(2/.).growthInequalityF
        Standard: D.growthw D.growthproductivity D.growthl
Instruments for level equation
        Standard: _cons

. estimates store gmmest

. estimates table fixed random pooled gmmest , star stats(N r2 r2_a)
```

Variable	fixed	random	pooled	gmmest
growthw	-.82472426***	-.84522649***	-1.0605207***	-.79042558***
growthprod~y	.9083483***	.86782125***	1.0588542**	.68687105***
growthl	3.4081567***	3.4307379***	3.0187782***	3.0731965***
cou				
5			.0109766***	
6			-.00946052	
7			-.00629368	
8			-.001291	
9			.00936958**	
10			.01348604***	
11			.00738959***	
12			.02967166***	
13			.01733888	
14			.00639653	
15			.00224804	
17			.01700238***	
18			.00846691**	
20			.01079241***	
21			-.00705424*	
22			.01156084	
23			.02531683***	
year				
1996			-.0646191	
1997			-.04311589	
1998			-.06996452	
1999			-.08887984	
2000			-.04178891	
2001			-.06311448	
2002			-.08296828	
2003			-.07236516	
2004			-.05385024	
2005			-.08097152	
2006			-.06210016	
2007			-.08550268	
2008			-.04443293	
2009			-.08105251	
2010			-.08080483	
2011			-.06287423	
2012			-.06362394	
2013			-.05829803	
2014			-.064938	
2015			-.07745423	
2016			-.06622122	
2017			-.07043611	
2018			-.0709738	
2019			-.06294401	
2020			-.18418525*	
growthIneq~F				
L1.				-.11242281
_cons	-.01668679*	-.01433682**	.04974844	-.01073604**
N	457	457	457	421
r2	.21354653		.37345393	
r2_a	.20833823		.304854	

Depended variable: Δw

$$\text{Wage growth}_{it} = a_{1it} + a_2 relative\ Labor\ Employment_{it} + a_3 bargaining\ power_{it} + a_4 technological\ change_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 FDI\ oppenness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} + a_{10} house\ debth_{it} + a_{11} eurozone\ \text{participation}_{it} + a_{12} 2008\ financial\ crisis_{it} + b_i + u_{it} \qquad (7.3.1.3)$$

Variable	fixed	random	pooled	gmmest
lnrelatL	-.03023922	-.00755471	.02350617	-.0267871
BargainingL2	.17119345	-.02242761	.35339412*	.28584672*
k_inov	.35821583	.20245558	.07596906	.5662835**
fdiopen	.00539111	.00026888	.01016342*	.00818195*
financial_~n	.0035409	.00456255	.00229362	.00953696
op	.04163294	.02311893*	.02252016	.06484378
eugini	-.24067024*	-.19292917*	29.313037	-.12861217
FD	-.04316618	-.02330073	-.12327373*	.00632188
DebtH	-.00128491***	-.00049422*	-.00123927***	-.00103546***
caPC	-.00566978**	-.00268925	-.00550016**	-.00539308***
eurodumm	.01588307	-.00980332	.01925214	.0173923
crisisdumm	-.01079341	-.02173773***	-.25643279	-.00995789
cou				
5			.16985036	
6			.14043982	
7			.10939207*	
8			.02997351	
9			.17488466	
10			.17446348	
11			.05030483	
12			.01692711	
13			.10152518	
14			.11896518	
17			.22499691**	
18			.07392617	
20			.10673115	
21			.04206952	
22			.05349071	
23			-.02555941	
year				
2001			.11857411	
2002			.12751952	
2003			.21948104	
2004			.22214683	
2005			.25768964	
2006			.36326577	
2007			2.1922361	
2008			2.0170059	
2009			.67949832	
2010			.56834343	
2011			.74203747	
2012			1.2224288	
2013			.09553322	
2014			.00854027	
2015			-.07508437	
2016			-.00265494	
2017			.02577125	
2018			(omitted)	
2019			(omitted)	
growthw				
L1.				.19089813***
_cons	.04424056	.07814301**	-3.5368625	-.10823273
N	289	289	289	263
r2	.48042614		.69103078	
r2_a	.45783597		.63381426	

Depended variable: Δproductivity

Productivity growth

$$= a_{1_{it}} + a_2 relative\ Labor\ Employment_{it} + a_3 bargaining\ power_{it}$$
$$+ a_4 technological\ change_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it}$$
$$+ a_7 FDI\ oppenness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it}$$
$$+ a_{10} house\ debth_{it} + a_{11} eurozone\ \text{participation}_{it} + a_{12} 2008\ financial\ crisis_{it}$$
$$+ b_i + u_{it} \qquad (7.3.1.4)$$

Variable	fixed	random	pooled	gmmest
lnrelatL	-.02361914	-.00349656	.00395311	-.00701955
BargainingL2	.15356596	-.03242772	.17663525	.17919599
k_inov	.43355733*	.19414299	.32764301*	.71567581***
fdiopen	.01614332**	.0089794	.01608806*	.017541**
financial_~n	.0032794	.00220165	.00235108	.0061932
op	.08902012***	.04267147***	.04266221	.11562317***
eugini	-.10507176	-.02957511	1.0083202	-.143707
FD	-.03239156	.05011372*	-.10809667	-.08505653
DebtH	-.00095243***	-.0006949***	-.00110805***	-.00085592***
caPC	-.00375645**	-.00243128*	-.003521**	-.00447861***
eurodumm	-.0270769	-.02991538	-.02415619	-.03241064*
crisisdumm	-.02267187***	-.02371835***	-.00118282	-.02365584***
cou				
5			.13561301*	
6			.06412314	
7			.09569037**	
8			.03580829	
9			.14807983	
10			.12201175	
11			.06713031	
12			.00878221	
13			.05168022	
14			.02459168	
17			.15431097**	
18			.05751827	
20			.11420301	
21			.02915286	
22			.02219194	
23			.03098505	
year				
2001			-.00392547	
2002			-.00547245	
2003			-.00097767	
2004			.0208854	
2005			.00991614	
2006			.03235527	
2007			.109441	
2008			.05338493	
2009			-.02048105	
2010			.03471963	
2011			.03202004	
2012			.03394974	
2013			-.00320077	
2014			-.00507446	
2015			.00254973	
2016			-.00936493	
2017			.00356968	
2018			(omitted)	
2019			(omitted)	
growthprod~y				
L1.				-.19106462**
_cons	-.01107547	.02707972	-.14946436	-.04800482
N	289	289	289	263
r2	.50116893		.70962214	
r2_a	.47948062		.65584846	

Depended variable: ΔWS

$$\text{Wage Share growth} = a_{1_{it}} + a_2 relative\ Labor\ Employment_{it} + a_3 bargaining\ power_{it} + a_4 technological\ change_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 FDI\ oppenness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} + a_{10} house\ debth_{it} + a_{11} eurozone\ \text{participation}_{it} + a_{12} 2008\ financial\ crisis_{it} + b_i + u_{it} \quad (7.3.1.5)$$

Variable	fixed	random	pooled	gmmest
lnrelatL	-.003246	-.00376445	.00783135	-.00490412
BargainingL2	-.05294938	-.00222716	.00968002	-.01140478
k_inov	-.0405528	.04456705	-.08026374	.0509096
fdiopen	-.00164495	.00043321	-.00015223	-.00008842
financial_~n	-.00399355	-.00032033	-.00323592	-.00308503
op	-.02623058*	.00002167	-.01382393	-.02299153
eugini	-.0028851	-.0004387	8.7885545	-.00881485
FD	.02727606	-.00140225	.01835177	.03436719
DebtH	-.00043877**	-.00018916*	-.00042833**	-.00043684***
caPC	-.0015097***	-.00111502***	-.0016944***	-.00152307***
eurodumm	.020013***	.01061416	.02026163***	.01881339***
crisisdumm	.00554259	.00090229	-.07232414	.0064429
cou				
5			-.00715345	
6			.00217728	
7			.00590818	
8			-.02470644	
9			-.02064257	
10			-.01911749	
11			-.02945516	
12			.0096606	
13			-.00470934	
14			.01483428	
17			.02346714	
18			-.01153605	
20			-.02873327	
21			-.01934984	
22			-.0194235	
23			-.02180137	
year				
2001			.03661952	
2002			.05330357	
2003			.06849994	
2004			.05782701	
2005			.08107695	
2006			.10178002	
2007			.65331724	
2008			.5974852	
2009			.22101289	
2010			.17077263	
2011			.2187225	
2012			.36684941	
2013			.02985612	
2014			.00432721	
2015			-.01998316	
2016			.00067307	
2017			.00683618	
2018			(omitted)	
2019			(omitted)	
growthWS				
L1.				.05303931
_cons	.04899402	.00631577	-1.0099576	.02267238
N	289	289	289	263
r2	.13679002		.29295833	
r2_a	.09925915		.16202468	

legend: * p<0.05; ** p<0.01; *** p<0.001

Depended variable: Δl

$$\text{Relative Labor Employment growth} = a_{1_{it}} + a_2 relative\ Labor\ Employment_{it} + a_3 bargaining\ power_{it} + a_4 technological\ change_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 FDI\ oppenness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} + a_{10} house\ debth_{it} + a_{11} eurozone\ \text{participation}_{it} + a_{12} 2008\ financial\ crisis_{it} + b_i + u_{it} \quad (7.3.1.6)$$

Variable	fixed	random	pooled	gmmest
lnrelatL	-.00357631	-.0023082	-.00521092	-.00343376
BargainingL2	-.00961555	.00240279	-.01770902	-.0051638
k_inov	.03110225	.0009613	.04613261	.04989734
fdiopen	-.00122***	-.00077154	-.0014067**	-.00184097***
financial_~n	.00407665**	.00292508**	.00476026***	.00449911***
op	.00192132	.00213584	-.00015664	.00401187
eugini	-.0164316	-.00978822	-1.2216237	-.0132769
FD	.02086286	.00839105*	.02608126	.03253886**
DebtH	-.00013835**	-.00006484	-.00010231	-.00012326*
caPC	-.00025993	-.00034635*	-.0001329	-.00030954*
eurodumm	-.00007726	.00052697	-.00139826	.00018848
crisisdumm	-.00044407	-.00030976	.00816079	-.00033516
cou				
5			-.00247441	
6			-.00148709	
7			.00210008	
8			.01506028	
9			-.00701993	
10			-.01106644	
11			.00112589	
12			.02378641***	
13			.00486256	
14			.00543504	
17			-.00202108	
18			-.00038127	
20			.00518526	
21			.00778519	
22			.01224281	
23			.00480328	
year				
2001			-.00553375	
2002			-.00602125	
2003			-.01448295*	
2004			-.01595879*	
2005			-.01088286	
2006			-.01794019	
2007			-.09236734	
2008			-.08113637	
2009			-.0328111	
2010			-.02386673	
2011			-.03161284	
2012			-.05332368	
2013			-.00821851	
2014			-.00150442	
2015			.00218948	
2016			.00001471	
2017			-.00034812	
2018			(omitted)	
2019			(omitted)	
growthl				
L1.				.16617655
_cons	-.00813369	-.00578486	.13325726	-.02266459
N	289	289	289	263
r2	.18345402		.43923343	
r2_a	.14795203		.33538776	

Depended variable: ΔInequalityF

$$\text{Factor Inequality growth} = a_{1_{it}} + a_2 relative\ Labor\ Employment_{it} + a_3 bargaining\ power_{it} + a_4 technological\ change_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 FDI\ oppenness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} + a_{10} house\ debth_{it} + a_{11} eurozone\ \text{participation}_{it} + a_{12} 2008\ financial\ crisis_{it} + b_i + u_{it} \quad (7.3.1.7)$$

Variable	fixed	random	pooled	gmmest
lnrelatL	.00651168	.01229255	-.03784321	.00540998
BargainingL2	.11807578	.0287777	-.13226786	.04604131
k_inov	.36487045	-.10450149	.58049563	.13378973
fdiopen	.00048142	-.00120107	-.00581026	-.00377932
financial_~n	.03694834*	.00490904	.03701163*	.0459657*
op	.10379117*	-.00205707	.05137795	.10606024*
eugini	.07145417	.11579489	-30.750224	.05155081
FD	-.00831128	.03075689	.0228753	.02786207
DebtH	.00074035**	.00043798	.00076769**	.00052998*
caPC	.00355359***	.00123954	.00459007***	.00427958***
eurodumm	-.07380244***	-.02970271*	-.07832446***	-.08547401***
crisisdumm	-.01669647	.00120325	.23784411	-.00828446
cou				
5			.01597393	
6			-.0502483	
7			-.00678931	
8			.13558789	
9			.04433546	
10			.01008592	
11			.10808344	
12			.0836885*	
13			.00838996	
14			-.03768061	
17			-.08021177	
18			.02324351	
20			.10479684	
21			.07627981	
22			.09420503	
23			.10974019**	
year				
2001			-.13591887	
2002			-.18636608	
2003			-.26220016	
2004			-.23652636	
2005			-.2872171	
2006			-.37453059	
2007			-2.3008272	
2008			-2.0853528	
2009			-.7826834	
2010			-.58171154	
2011			-.76452789	
2012			-1.2924747	
2013			-.11279359	
2014			-.00868921	
2015			.07563581	
2016			.00019083	
2017			-.01525722	
2018			(omitted)	
2019			(omitted)	
growthIneq~F				
L1.				-.08498277
_cons	-.23035701	-.05415309	3.5039997	-.21443922
N	289	289	289	263
r2	.11982981		.28981107	
r2_a	.08156155		.1582946	

legend: * p<0.05; ** p<0.01; *** p<0.001

Labor Inequality

Depended variable: Δ InequalityL

$$\Delta Inequality_{L_{it}} = a_{1_{it}} + a_2 \Delta q_{L_{it}} + a_3 \Delta \Lambda_L Ldummy1_{it} + a_4 \Delta \Lambda_L Ldummy2_{it} + b_i + u_{it} (7.3.2.1)$$

Variable	fixed	random	pooled	gmmest
growthq	1.0360858**	.98224568**	.9597293**	1.0918711***
Ldummy1	1.8282078**	1.690398**	1.649792*	2.1048377***
Ldummy2	-.39766549**	-.38928674**	-.45568441**	-.31572818*
cou				
5			-.01270985**	
6			.00542516	
7			.01198507**	
8			-.01774668***	
9			.01159536*	
10			-.01302463**	
11			-.00490752	
12			.04629627*	
13			-.00785339	
14			.04992084*	
15			-.06519337*	
17			-.00102803	
18			.00175189	
20			.00016358	
21			-.00573302	
22			.00377566	
23			.01929899***	
year				
1996			-.03434597	
1997			-.04929081	
1998			-.04020906	
1999			-.03889695	
2000			-.04246295	
2001			-.03708296	
2002			-.08169609**	
2003			-.05332477	
2004			-.04845458	
2005			-.10628502*	
2006			-.00022037	
2007			-.02228477	
2008			-.03828426	
2009			-.15712967**	
2010			-.0701981*	
2011			-.01976451	
2012			-.07143401	
2013			-.07344272	
2014			-.03664762	
2015			-.02545241	
2016			-.04013558	
2017			-.00635936	
2018			-.05641894*	
2019			-.04605584*	
2020			-.05670274	
growthIneq~L				
L1.				-.15324879
_cons	.00873933	.00907235	.05837631*	.01666114*
N	402	402	402	360
r2	.47097374		.52866841	
r2_a	.4669861		.46908998	

Depended variable: Δrelative labor employment

$$\Delta\Lambda_{L_{it}} = a_{1_{it}} + a_2 wage\ premium_{it} + a_3 invest\ in\ R\&D_{it} + a_4 capital\ innovation\ ratio_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 fdi\ oppenness_{it} + a_8 convergence_{it} + a_9 education\ expenditure_{it} + a_{10} euro\ dummy_{it} + a_{11} 2008\ crisis\ dummy_{it} + b_i + u_{it} \quad (7.3.2.3)$$

Variable	fixed	random	pooled	gmmest
lnq				
L1.	.11879201*	.00052348	.09107268*	.08774065
lngerd	-.06054271*	.00062947	-.07782532*	-.01301101
k_inov	.13608341	-.0032481	.08580011	.14458321
financial_~n	.00528096	.00891722	.00140836	.01756714
op	.1660144*	.01878482	.12927042	.12803815*
fdiopen	.00343046	.00247162	.00204216	.00621664
eugini	.03505421	.17166672	-6.9379105	.10252836
eduexpe2	-.85148245	-.30649743	-.11561723	-.94480574
eurodumm	-.00570193	-.0091896	.02930729	-.02663529
crisisdumm	-.00043721	-.01174009	-.02294805	-.01927783**
cou				
5			.28958094*	
6			-.20262802*	
7			-.12935845**	
8			-.02591802	
9			.15537724	
10			.25535778*	
11			.16788956	
12			-.40478556**	
13			-.30226714**	
14			-.33322615**	
17			.06616574	
18			.03749921	
20			-.00013489	
21			-.15487665*	
22			-.23309452*	
23			.09302704	
year				
1997			-.03534079	
1998			-.03827175	
1999			-.19794259	
2000			-.12565874	
2001			-.14244071	
2002			-.14947639	
2003			-.17686605	
2004			-.20992095	
2005			-.16880991	
2006			-.17717098	
2007			-.61133981	
2008			-.49784051	
2009			-.20017851	
2010			-.16169371	
2011			-.2068323	
2012			-.33014788	
2013			-.04203877	
2014			-.0410376	
2015			.01285015	
2016			-.00903202	
2017			-.01838387	
2018			(omitted)	
2019			(omitted)	
growthrelatL				
L1.				.05420576
_cons	.21925297	-.07397884**	1.3003362	-.1004417
N	361	361	361	329
r2	.08607221		.21262244	
r2_a	.05995999		.09439003	

Depended variable: Δq

$$\Delta q_{L_{it}} = a_{1_{it}} + a_2 wage\ premium_{it} + a_3 invest\ in\ R\&D_{it} + a_4 capital\ innovation\ ratio_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 fdi\ oppenness_{it} + a_8 convergence_{it} + a_9 education\ expenditure_{it} + a_{10} euro\ dummy_{it} + a_{11} 2008\ crisis\ dummy_{it} + b_i + u_{it} \quad (7.3.2.4)$$

Variable	fixed	random	pooled	gmmest
lnq				
L1.	-.25790434***	-.00644427	-.24477***	-.35533234***
lngerd	.01637226	-.00219117	.02022057	.0179685
k_inov	.36050954**	.05637253	.29225571**	.22808222
financial_~n	.04113869	.01273743*	.03940963	.05518051
op	.08224537	.02203092**	.0339595	.09601026
fdiopen	-.03707311***	-.03696971***	-.03561976**	-.04626999***
eugini	-.07651479	-.11275597	.08632446	-.10201112
eduexpe2	-3.2141589*	-.53726103	-1.3845667	-4.9539946**
eurodumm	-.01089526	-.0023353	-.01290383	-.00861149
crisisdumm	-.01593293	-.00614991	.01080942	-.01713946
cou				
5			-.06870557	
6			-.00904001	
7			-.06063413	
8			.05851935	
9			-.05809672	
10			-.0604731	
11			.01178922	
12			.40625498**	
13			.20045924*	
14			.30740896**	
17			-.05203793*	
18			-.06017995	
20			-.01114083	
21			-.00165097	
22			.04577095	
23			-.01642307	
year				
1997			-.01072485	
1998			-.00537073	
1999			.00513168	
2000			.01906747	
2001			.02195772	
2002			-.0107182	
2003			-.01174752	
2004			.02247144	
2005			-.02590427	
2006			.02341878	
2007			.01437924	
2008			.01702034	
2009			-.07319567	
2010			-.03022307	
2011			-.01696402	
2012			-.02232477	
2013			-.050112	
2014			-.01832404	
2015			-.00343966	
2016			-.00604151	
2017			.00285095	
2018			(omitted)	
2019			(omitted)	
growthq				
L1.				-.0806407
_cons	.02719765	.02528313	-.08438431	.13173934
N	359	359	359	323
r2	.2854321		.3737859	
r2_a	.26489854		.27914904	

Depended variable: Δ InequalityL

$$\Delta InequalityL_{it} = a_{1_{it}} + a_2 invest\ in\ R\&D_{it} + a_3 capital\ innovation\ ratio_{it} + a_4 financial\ oppenness_{it} + a_5 trade\ openness_{it} + a_6 fdi\ oppenness_{it} + a_7 convergence_{it} + a_8 education\ expenditure_{it} + a_9 euro\ dummy_{it} + a_{10} 2008\ crisis\ dummy_{it} + b_i + u_{it} (7.3.2.5)$$

Variable	fixed	random	pooled	gmmest
lnq				
L1.	-.60149639**	-.06487312**	-.56851052**	-.68197869***
lngerd	.07432758	-.00678444	.08748752	.05007922
k_inov	.72321621*	.23276016	.61978446*	1.4979191*
financial_~n	.061507*	.01991852	.05760094*	.07236799
op	.07566467	.01257978	-.00396444	.04287738
fdiopen	.00857765	-.01422769	.01106899	-.00920781
eugini	.10417587	-.04868713	-2.0415092	-.00564224
eduexpe2	-5.8816438*	-1.5926023	-3.1489029	-10.617865*
eurodumm	-.01496177	.00434698	-.01620793	.00557039
crisisdumm	-.0495597	-.01174714	-.05639723	-.03483818
cou				
5			-.28166269	
6			.15803539	
7			-.05920091	
8			.15609442*	
9			-.18256251	
10			-.25461791	
11			-.035534	
12			.95490826*	
13			.62011131	
14			.86488198*	
17			-.15834474	
18			-.11833719	
20			.01202161	
21			.10176367	
22			.23440286	
23			-.05620171	
year				
1997			-.05009892	
1998			-.08191777	
1999			-.00732696	
2000			-.04838627	
2001			-.04398828	
2002			-.11015572	
2003			-.08905389	
2004			-.03936885	
2005			-.1716114	
2006			-.03896529	
2007			-.22002507	
2008			-.12265307	
2009			-.18320662	
2010			-.10626732	
2011			-.06168438	
2012			-.14937633	
2013			-.0774149	
2014			-.01005642	
2015			.00057959	
2016			-.01560452	
2017			.00838771	
2018			(omitted)	
2019			(omitted)	
growthIneq~L				
L1.				-.20986787
_cons	-.14089063	.13978113***	-.05116189	.28795686
N	359	359	359	323
r2	.16238401		.25134212	
r2_a	.13831459		.13820089	

Profit inequality

Depended variable: ΔInequalityK

$$\Delta Inequality_{K\,it} = a_{1\,it} + a_2 \Delta q_{K\,it} + a_3 \Delta \Lambda_{K\,it} + b_i + u_{it} \qquad (7.3.3.1)$$

Variable	fixed	random	gmmest	pooled
growthrelatK	-.73852989***	-.71134871***	-.3730266**	-.70643144***
growthpremK	.87892723***	.88276458***	.83368362***	.88252905***
growthIneq~K				
L1.			-.02230484	
cou				
5				.00289636
6				-.00434082*
7				-.0022201
8				.00133016
9				-.00134662
10				-.00124061
11				.00271323***
12				-.00333661
13				.00931128
14				.00187625
15				-.00430404
17				.00010664
18				-.00099447
20				-.00161421
21				.0008774
22				.05992015***
23				-.00136701
year				
1996				-.04672451
1997				-.04730843
1998				-.07103581
1999				.00264469
2000				-.0593462
2001				-.04003915
2002				-.05370519
2003				-.05581455
2004				-.04311596
2005				-.07954752
2006				-.02793528
2007				-.05682456
2008				-.05362421
2009				-.05719971
2010				-.06309331
2011				-.05429921
2012				-.0655216
2013				-.03943216
2014				-.05002103
2015				-.05295021
2016				-.05939483
2017				-.05529639
2018				-.06025716
2019				-.05465261
2020				-.06364047
_cons	.00378484	.00397681	.00654638	.05250114
N	456	456	420	456
r2	.83523291			.84681544
r2_a	.83450546			.83041612

Depended variable: Δ relatK

$$\Delta\Lambda_{K\,it} = a_{1\,it} + a_2 L.relatK_{it} + a_3 invest\ in\ R\&D_{it} + a_4 capital\ innovation\ ratio_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 fdi\ oppenness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} + a_8 convergence_{it} + a_{11} euro\ dummy_{it} + a_{12} 2008\ crisis\ dummy_{it} + b_i + u_{it} \qquad (7.3.3.2)$$

Variable	fixed	random	pooled	gmmest
lnrelatK				
L1.	-.07744025**	-.02343783*	-.0778633**	-.12505281***
lnpremK				
L1.	-.00212011	-.00204602	-.00160552	-.00683672
lngerd	-.02712038	.00379656	-.03655434	-.01956105
FD	.02738084	-.02547183	.065661	-.00226242
k_inov	-.07111941	-.05337142	-.11732151	-.08063583
financial_~n	-.0115984**	-.01137443***	-.01519551**	-.02244698***
op	.07244781**	.01557889***	.06683736*	.06468906**
fdiopen	-.00603158*	-.00933116**	-.00760093**	-.00643314
eugini	.17606528	.20627865	4.1210585	.11911937
eurodumm	.01291011	.01226949	.02334822	.02065608*
crisisdumm	-.00843095	-.01301512	-.01592923	-.01709056
cou				
5			.08444465	
6			-.13950183	
7			-.07317302*	
8			.0283911	
9			.03325343	
10			.07056639	
11			.1192905*	
12			-.19170174	
13			-.13622432	
14			-.11147798	
17			.02032728	
18			.01871757	
20			-.02023335	
21			-.06122885	
22			-.11352599	
23			.00112274	
year				
1997			.00698268	
1998			.02449779	
1999			.01623616	
2000			.01111457	
2001			.03803729	
2002			.04395873	
2003			.07638059	
2004			.07443266	
2005			.05244535	
2006			.09121871	
2007			.33418535	
2008			.26372467	
2009			.10428108	
2010			.06438201	
2011			.11408678	
2012			.18073998	
2013			.03130372	
2014			.01516234	
2015			.0056913	
2016			.00517327	
2017			.00568195	
2018			(omitted)	
2019			(omitted)	
growthrelatK				
L1.				.16401795
_cons	.31659775*	.03017856	-.09380892	.44133223***
N	396	396	396	374
r2	.13419901		.28927346	
r2_a	.10939742		.1909597	

Depended variable: ΔKq

$$\Delta q_{K\,it} = a_{1\,it} + a_2 L.relatK_{it} + a_3 invest\ in\ R\&D_{it} + a_4 capital\ innovation\ ratio_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 fdi\ oppenness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} + a_{10} euro\ dummy_{it} + a_{11} 2008\ crisis\ dummy_{it} + b_i + u_{it} \quad (7.3.3.3)$$

```
. estimates table fixed random pooled gmmest , star stats(N r2 r2_a)
```

Variable	fixed	random	pooled	gmmest
lnrelatK				
L1.	.27180944***	-.01410062	.27291982***	.39660105***
lnpremK				
L1.	-.46372846***	-.13947613***	-.46642327***	-.68051296***
lngerd	.05048469	-.00741516	.02561751	.1533956*
FD	-.02711341	.05730945	-.01822066	-.09588395
k_inov	-.52141214	-.28831515	-.65138973	-.18479559
financial_~n	-.05300305**	-.00170714	-.06370456*	-.11917058***
op	.25099755*	.04901115	.2057055	.1268164
fdiopen	.01904621	-.02319287*	.01944956	.02130447*
eugini	.1657873	.56677226	8.3570306	.08806383
eurodumm	.03048398	.03295969	.05920743	.06943455
crisisdumm	-.09130896*	-.04501594*	-.02677614	-.16513952**
cou				
5			.22306569	
6			.69550791***	
7			.25956139***	
8			.16392656	
9			.31175032**	
10			.25841231	
11			-.00804704	
12			.16237376	
13			.32970971	
14			.11520881	
17			-.00169115	
18			.27650796***	
20			.26447734*	
21			.18834935	
22			-.10820946	
23			.38055374***	
year				
1997			.05113907	
1998			.1175875	
1999			.08309381	
2000			.05479407	
2001			.0950628	
2002			.14882177	
2003			.17461409	
2004			.17078006	
2005			.22666281	
2006			.20635015	
2007			.75279542	
2008			.54480073	
2009			.15847039	
2010			.12053733	
2011			.19556279	
2012			.30271586	
2013			.04666742	
2014			.01653145	
2015			-.06880086	
2016			-.01683288	
2017			.00563521	
2018			(omitted)	
2019			(omitted)	
growthpremK				
L1.				-.00071725
_cons	-.42711207	.20730572	-1.4628462	-.89833459
N	396	396	396	369
r2	.26916647		.30120839	
r2_a	.24823113		.20454557	

Depended variable: Δ InequalityK

$$\Delta InequalityK_{it} = a_{1_{it}} + a_2 L.relatK_{it} + a_3 invest\ in\ R\&D_{it} + a_4 capital\ innovation\ ratio_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 fdi\ oppenness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} + a_{10} euro\ dummy_{it} + a_{11} 2008\ crisis\ dummy_{it} + b_i + u_{it} \quad (7.3.3.4)$$

Variable	fixed	random	pooled	gmmest
lnrelatK				
L1.	.20789804**	-.01655754	.21437148**	.47121589***
lnpremK				
L1.	-.43264361***	-.14968003***	-.44152736***	-.63647083***
lngerd	.06867003*	-.00945191	.04887712	.20162863**
FD	-.07959011	.07430364	-.11335443	-.26506986
k_inov	-.38209876	-.24378766	-.46746252	.09154293
financial_~n	-.06176167**	-.01561811*	-.06761266**	-.08075175*
op	.10105629	.02877574	.05787507	-.03857602
fdiopen	.01246157	-.01780197*	.01433713	.02530415**
eugini	-.01248138	.34290462	3.0812328	-.01011816
eurodumm	.02501781	.02555163	.03563662	.05212096
crisisdumm	-.07850337*	-.03811186**	-.00861874	-.13592422**
cou				
5			.04812716	
6			.65504825*	
7			.33268395***	
8			.10641011	
9			.18497967**	
10			.05800416	
11			-.11989429	
12			.24658679	
13			.30960853	
14			.11640716	
17			-.02162269	
18			.17911348**	
20			.20409702	
21			.17301815	
22			-.04119719	
23			.26113402**	
year				
1997			.03014437	
1998			.03639513	
1999			.08672382	
2000			.00586461	
2001			.03744259	
2002			.0620768	
2003			.06061672	
2004			.08175067	
2005			.11412133	
2006			.11778296	
2007			.32418997	
2008			.20362792	
2009			.02158962	
2010			.01589063	
2011			.05194624	
2012			.06749291	
2013			.02716712	
2014			.00966835	
2015			-.05809097	
2016			-.02569658	
2017			.00140411	
2018			(omitted)	
2019			(omitted)	
growthIneq~K				
L1.				.00092672
_cons	-.23471137	.31376458**	-.59555587	-1.3404884
N	394	394	394	367
r2	.25232487		.28765422	
r2_a	.23079496		.18854524	

total Inequality

Depended variable: total Inequality

$$inequality_{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it} \quad (7.3.4.1)$$

```
. estimates table fixed random pooled gmmest , star stats(N r2 r2_a)
```

Variable	fixed	random	pooled	gmmest
InequalityF	.69095134***	.69733751***	.65744165***	.55934004***
InequalityL	.57523917***	.57321844***	.62798751***	.49011404***
InequalityK	.04599946*	.04854399**	.06697842**	.04102038*
unemplRT	.71140598***	.70916117***	.75211993***	.62565589***
cou				
5			.0232967***	
6			.00361	
7			-.00902536	
8			-.00783506*	
9			.01263387**	
10			.017354***	
11			.01428426	
12			-.00433708	
13			-.0035211	
14			-.04000856*	
15			.02410195*	
17			-.00276684	
18			.01707686**	
20			.01936776**	
21			-.00979107	
22			.02446788***	
23			.00255732	
year				
1996			-.00147467	
1997			-.00057921	
1998			-.00026243	
1999			-.00059725	
2000			-.00006408	
2001			-.00264688	
2002			-.00068195	
2003			.00048589	
2004			-.0035837	
2005			-.00266362	
2006			-.00324699	
2007			-.00365497	
2008			-.00374435	
2009			-.00500294	
2010			-.0075688*	
2011			-.00914496*	
2012			-.00676527	
2013			-.00685369	
2014			-.00623506	
2015			-.00719725	
2016			-.00950524	
2017			-.00795972*	
2018			-.00593071	
2019			-.00718511	
2020			-.00440955	
inequality				
L1.				.10763409**
_cons	.06141908***	.05908287***	.05083117**	.07069465***
N	419	419	419	380
r2	.93587384		.9910418	
r2_a	.93525427		.98993406	

$$inequality_{it} = a_{1_{it}} + a_2 \Delta w_{it} + a_3 \Delta A_{it} + a_4 \Delta l_{it} + a_5 \Delta q_{L_{it}} + a_6 \Delta \Lambda_L Ldummy1_{it} + a_7 \Delta \Lambda_L Ldummy2_{it} + a_8 \Delta \Lambda_{K_{it}} + a_8 \Delta q_{K_{it}} + a_8 unemployment\ rate_{it} + b_i + u_{it} + b_i + u_{it} \quad (7.3.4.8)$$

```
Instruments for differenced equation
        GMM-type: L(2/.).growthinequality
        Standard: D.growthw D.growthproductivity D.growthl D.growthq D.Ldummy1
                  D.Ldummy2 D.growthrelatK D.growthpremK D.growthunemplRT
Instruments for level equation
        Standard: _cons

. estimates store gmmest

. estimates table fixed random pooled gmmest , star stats(N r2 r2_a)
```

Variable	fixed	random	pooled	gmmest
growthw	-.39619597**	-.36300697***	-.47685478**	-.38083998**
growthprod~y	.35033169**	.34850494**	.4044908*	.30724392*
growthl	-.3669167	-.02309559	.01763795	-.23854238
growthq	.2517339***	.23730898***	.20964238***	.25425886***
Ldummy1	.37515118**	.33448417**	.25156834*	.40504084***
Ldummy2	-.08641005*	-.0809441*	-.10411446**	-.08119673*
growthrelatK	-.26196868	-.23033734*	-.14029533	-.24822907
growthpremK	-.03113927	-.03360584	-.04068616*	-.02988516*
growthunem~T	.11747825**	.12248781***	.15349153***	.12112102***
cou				
5			.0037905**	
6			.01204085*	
7			-.0003761	
8			.00240557	
9			-.0014553	
10			-.00886893***	
11			.00043509	
12			.01246381*	
13			.00984321*	
14			.02165385**	
15			-.01001725	
17			.00997525***	
18			-.00240752	
20			.00265661	
21			.00170244	
22			.0022267	
23			.00885005***	
year				
1996			-.02524393	
1997			-.01217036	
1998			-.02024524	
1999			-.02965788*	
2000			-.00482476	
2001			-.01843927	
2002			-.02857337	
2003			-.026239	
2004			-.02135942	
2005			-.02412808	
2006			-.01565477	
2007			-.01293911	
2008			-.0166456	
2009			-.05247531**	
2010			-.02889344*	
2011			-.02273297	
2012			-.01365034	
2013			-.02150593	
2014			-.0220688	
2015			-.03100147*	
2016			-.03025383	
2017			-.00456271	
2018			-.01368704	
2019			-.01494151	
2020			-.07790892**	
growthineq~y				
L1.				-.04620468
_cons	-.00307222**	-.00423384*	.01813969	-.00216341
N	403	403	403	364
r2	.48075816		.56481764	
r2_a	.46886712		.50158602	

legend: * p<0.05; ** p<0.01; *** p<0.001

Depended variable: Inequality Eurostat

$$Gini\ Eurostat_{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it}$$

```
Instruments for differenced equation
        GMM-type: L(2/.).GiniEUstat
        Standard: D.InequalityF D.InequalityL D.InequalityK D.unemplRT
Instruments for level equation
        Standard: _cons

. estimates store gmmest

. estimates table fixed random pooled gmmest , star stats(N r2 r2_a)
```

Variable	fixed	random	pooled	gmmest
InequalityF	.03661512	.05110462	.01780474	.05445214
InequalityL	.01374528	.02442802	.05117015	-.02215972
InequalityK	.01060766	.01849067	.03608438	-.02132802
unemplRT	.05673742	.06552245	.03822015	.0497817
cou				
5			.00909183	
6			.05628646***	
7			.03548362**	
8			.06440038***	
9			.06025271***	
10			.01798241**	
11			.05107878**	
12			.01436655	
13			.07936634***	
14			.05990224**	
15			-.0030013	
17			.00398023	
18			-.00192841	
20			.08516446***	
21			-.02788442	
22			-.02406571*	
23			-.01724311**	
year				
1996			-.00996515*	
1997			-.01787204**	
1998			-.01937555**	
1999			-.01626081**	
2000			-.01931351**	
2001			-.02120011***	
2002			-.01869086**	
2003			-.00578164	
2004			-.01190225	
2005			-.01128237**	
2006			-.0100965*	
2007			-.01366914***	
2008			-.01287358*	
2009			-.0122058*	
2010			-.01397093*	
2011			-.01466975*	
2012			-.01254372	
2013			-.01162038	
2014			-.00876758	
2015			-.01290085	
2016			-.01350454	
2017			-.0163966*	
2018			-.02131846*	
2019			-.0243533*	
2020			-.02776838*	
GiniEUstat				
L1.				.51719929***
_cons	.27953801***	.27325438***	.26330397***	.1343606***
N	371	371	371	303
r2	.01617526		.89036952	
r2_a	.00542307		.8748047	

Variable	fixed	random	pooled	gmmest
InequalityF	.30431499*	.27885447*	.40424091**	.05119056
InequalityL	.29879144***	.24914564***	.1521608*	.16965318***
InequalityK	.11686539	.10053833	.05675525	.01916474
unemplRT	.57259064***	.55242029***	.46205194**	.37202187***
cou				
5			.04651841**	
6			.00444566	
7			.03897884***	
8			.00358463	
9			-.05116356***	
10			.00247425	
11			-.04057698**	
12			-.10723988***	
13			-.02296496*	
14			-.04894284*	
15			-.04475333*	
17			.00529853	
18			-.00876916	
20			.04165156***	
21			-.00226086	
22			-.10274593***	
23			-.00353849	
year				
2004			.00114909	
2005			.00306042	
2006			.00530215	
2007			.00129173	
2008			-.00265312	
2009			-.00534329	
2010			.00227625	
2011			.00715482	
2012			.00960166	
2013			.01205745	
2014			.02251437	
2015			.01850311	
2016			.02135605	
2017			.0182822	
2018			.01667013	
2019			.01436688	
2020			.01268338	
GiniEUstat~s				
L1.				.56598722***
_cons	.2967875***	.30982957***	.32530423***	.13561057***
N	279	279	279	242
r2	.52733884		.89134654	
r2_a	.52043868		.87414308	

Depended variable: Inequality Eurostat before transfers

$$Gini\ Eurostat\ Before\ Taxes_{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it}$$

```
Instruments for differenced equation
        GMM-type: L(2/.).GiniEUstatBEFOREtransfers
        Standard: D.InequalityF D.InequalityL D.InequalityK D.unemplRT
Instruments for level equation
        Standard: _cons

. estimates store gmmest

. estimates table fixed random pooled gmmest , star stats(N r2 r2_a)
```

Variable	fixed	random	pooled	gmmest
InequalityF	.30352995*	.27864187*	.40532983**	.04521537
InequalityL	.29407832***	.24625945***	.14383333*	.16239447***
InequalityK	.11769891	.1012287	.0570523	.0194527
unemplRT	.57086036***	.55135885***	.45948196**	.37139519***
cou				
5			.04612548**	
6			.00378604	
7			.03844212***	
8			.00368466	
9			-.05155443***	
10			.00211938	
11			-.04079536**	
12			-.10553485***	
13			-.02215299*	
14			-.04706438*	
15			-.04417128*	
17			.00496209	
18			-.00943553	
20			.04092305***	
21			-.00296764	
22			-.10330297***	
23			-.00393035	
year				
2004			.00129757	
2005			.00318814	
2006			.00550454	
2007			.00149825	
2008			-.00236823	
2009			-.0050349	
2010			.00258954	
2011			.00751111	
2012			.01000267	
2013			.01246175	
2014			.02193994	
2015			.01900244	
2016			.02186624	
2017			.01878036	
2018			.01726651	
2019			.01491523	
2020			.01319116	
GiniEUstat~s				
L1.				.55926783***
_cons	.29736171***	.31026086***	.32631614***	.14096318***
N	280	280	280	244
r2	.52694555		.89091811	
r2_a	.52006476		.87371848	

Depended variable: Gini oecd

$$Gini\ OECD_{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it}$$

```
Instruments for differenced equation
        GMM-type: L(2/.).giniOECD
        Standard: D.InequalityF D.InequalityL D.InequalityK D.unemplRT
Instruments for level equation
        Standard: _cons

. estimates store gmmest

. estimates table fixed random pooled gmmest , star stats(N r2 r2_a)
```

Variable	fixed	random	pooled	gmmest
InequalityF	.05472802	.07680521	.02479548	-.01441153
InequalityL	.0082722	.02292225	.03459109	-.02288631
InequalityK	.03950029	.04658281	.05767921	.02816089
unemplRT	.12523323*	.13275429*	.11952671	.07233185*
cou				
5			.01910569	
6			.02969712*	
7			.03780751***	
8			.05432397***	
9			.04994862***	
10			.0322533***	
11			.06201471***	
12			.02796398	
13			.06264525***	
14			.06158993**	
15			.0259295	
17			.00663643	
18			.0198328*	
20			.07578105***	
21			-.03147372*	
22			-.02510105*	
23			-.01634315**	
year				
1996			.02370077*	
1997			-.0173883	
1998			.0132276	
1999			-.00685123	
2000			-.00584831	
2001			-.00702525	
2002			-.00878581	
2003			-.00486736	
2004			-.00453588	
2005			-.00457232	
2006			-.00692436	
2007			-.00683832	
2008			-.00537438	
2009			-.00670284	
2010			-.0088705	
2011			-.0059011	
2012			-.00465211	
2013			-.00154656	
2014			-.00763116	
2015			-.00645683	
2016			-.00953598	
2017			-.01109396	
2018			-.01089973	
giniOECD				
L1.				.53907503***
_cons	.28303769***	.2748262***	.26160715***	.13909927***
N	290	290	290	230
r2	.10241673		.89606778	
r2_a	.08981907		.8774024	

legend: * p<0.05; ** p<0.01; *** p<0.001

Depended variable: Gini pre tax oecd

$$Gini\ OECD\ pre\ tax_{it} = a_{1it} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it}$$

```
Instruments for differenced equation
        GMM-type: L(2/.).giniOECDpretax
        Standard: D.InequalityF D.InequalityL D.InequalityK D.unemplRT
Instruments for level equation
        Standard: _cons

. estimates store gmmest

. estimates table fixed random pooled gmmest , star stats(N r2 r2_a)
```

Variable	fixed	random	pooled	gmmest
InequalityF	.00581652	.00507526	.05433461	-.04312893
InequalityL	.14293612*	.13517762**	-.04035592	.00980893
InequalityK	.05718547	.05537119	-.00441279	-.03067206
unemplRT	.45587783***	.45131353***	.38030255***	.2521518***
cou				
5			.01379025	
6			-.01521401	
7			.0501523***	
8			.00208974	
9			-.0323702***	
10			.0100905	
11			.00688313	
13			-.0088951	
14			.0168523	
15			.01412746	
17			-.04423119***	
18			-.00765416	
20			.01888633	
21			-.03799264***	
22			-.10047093***	
23			.00227331	
year				
1996			.00075936	
1997			.01147985	
1998			.01368323	
1999			.0173537	
2000			.01809558*	
2001			.02232636	
2002			.01794652	
2003			.01839897	
2004			.03067157*	
2005			.03055746*	
2006			.02980298*	
2007			.0279622	
2008			.03179173*	
2009			.03195697*	
2010			.03311781*	
2011			.03769538**	
2012			.03755147*	
2013			.0399389**	
2014			.03850006**	
2015			.03977425*	
2016			.03843147*	
2017			.04074529**	
2018			.04063693*	
2019			.04468806**	
2020			.04677636*	
giniOECDpr~x				
L1.				.41675971***
_cons	.4089195***	.41095079***	.41956698***	.27447383***
N	250	250	250	195
r2	.50566845		.91388359	
r2_a	.49759773		.89488732	

legend: * p<0.05; ** p<0.01; *** p<0.001

Depended variable: Gini UN

$$Gini\ UN_{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it}$$

```
Instruments for differenced equation
        GMM-type: L(2/.).GiniWHO
        Standard: D.InequalityF D.InequalityL D.InequalityK D.unemplRT
Instruments for level equation
        Standard: _cons

. estimates store gmmest

. estimates table fixed random pooled gmmest , star stats(N r2 r2_a)
```

Variable	fixed	random	pooled	gmmest
InequalityF	-.02848134	-.01004498	-.03717289	.04861369
InequalityL	.12772158*	.13160185*	.06293571	.0071497
InequalityK	.09427159*	.0964407*	.04705352	.04994342
unemplRT	.16232457**	.16636462***	.12106018	.09342871**
cou				
5			.01906276	
6			.03335232*	
7			.03352938**	
8			.05192394***	
9			.05241562***	
10			.02740005***	
11			.06098126***	
12			.02037409	
13			.05907627***	
14			.05735687**	
15			.01530744	
17			.0031729	
18			.01249145	
20			.083002***	
21			-.03917406**	
22			-.03030899**	
23			-.02066613**	
year				
1996			-.00978292*	
1997			-.01908583**	
1998			-.01942445**	
1999			-.01168668*	
2000			.0063764	
2001			-.01111469	
2002			-.00342235	
2003			.01114654	
2004			.01229739*	
2005			.01215377*	
2006			.00947665	
2007			.00952678	
2008			.0106535	
2009			.00857063	
2010			.00652435	
2011			.00953549	
2012			.01061743	
2013			.01388994	
2014			.00749408	
2015			.00839113	
2016			.00517291	
2017			.00166804	
2018			.00035164	
2019			-.01536798	
GiniWHO				
L1.				.54102039***
_cons	.26190679***	.25685923***	.25955969***	.11160312***
N	391	391	391	354
r2	.10628699		.87410924	
r2_a	.09702571		.85768871	

legend: * p<0.05; ** p<0.01; *** p<0.001

Depended variable: Gini Texas University

$$Gini\ Texas\ Univercity_{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it}$$

```
Instruments for differenced equation
        GMM-type: L(2/.).Texasineq
        Standard: D.InequalityF D.InequalityL D.InequalityK D.unemplRT
Instruments for level equation
        Standard: _cons

. estimates store gmmest

. estimates table fixed random pooled gmmest , star stats(N r2 r2_a)
```

Variable	fixed	random	pooled	gmmest
InequalityF	-.11595643	-.09945511	-.06914514	-.15233694**
InequalityL	.14375184**	.13972595***	.08073323	.09435307*
InequalityK	.03728733	.03293517	.01314834	.04517888*
unemplRT	.16938253**	.17158222***	.12865541	.14826244***
cou				
5			-.02372988*	
6			-.02646451**	
7			-.03452328***	
8			.04001038***	
9			.000385	
10			-.02617175***	
11			-.02268864	
12			-.04539859**	
13			-.01763653*	
14			.00853687	
15			-.0331859*	
17			-.02336162*	
18			-.03174104***	
20			.02471256***	
21			-.06026976***	
22			-.02856362**	
23			-.0594415***	
year				
1996			-.00322258	
1997			.00557695	
1998			.00766866	
1999			-.00024454	
2000			.00205884	
2001			.00207004	
2002			.00195442	
2003			.00452959	
2004			.00318393	
2005			.00429054	
2006			.00575446	
2007			.00513535	
2008			.00725195	
2009			.01028802	
2010			.00905669	
2011			.00232798	
2012			.00915735	
2013			.00984008	
2014			.01057244	
2015			.00865583	
Texasineq				
L1.				.37744924***
_cons	.36409181***	.36074168***	.38571191***	.23498585***
N	319	319	319	265
r2	.22431229		.87493875	
r2_a	.21443092		.85642788	

legend: * p<0.05; ** p<0.01; *** p<0.001

Kuznets

Factor inequality

$$InequalityF_{it} = a_{1_{it}} + a_2 GDP\ per\ capita_{it} + a_3 GDP\ per\ capita^2{}_{it} + b_i + u_{it} \ (7.3.14)$$

```
Instruments for differenced equation
        GMM-type: L(2/.).growthInequalityF
        Standard: D.lnGDPpcapita D.lnGDPpcapita2
Instruments for level equation
        Standard: _cons

. estimates store gmmest

. estimates table fixed random pooled gmmest , star stats(N r2 r2_a)
```

Variable	fixed	random	pooled	gmmest
lnGDPpcapita	-.0426496	-.03818488	-.04541298	-.09067933
lnGDPpcapi~2	-.00053163	.00520573	-.00301349	.00512983
cou				
5			-.00197979	
6			-.102202*	
7			.02633376**	
8			-.03466865	
9			-.01322722	
10			.00279553	
11			-.00571723	
12			.00260107	
13			-.09462666*	
14			-.10362562*	
15			.03414836*	
17			.01449998**	
18			.00674366	
20			-.03927615	
21			-.06420644*	
22			-.08699377*	
23			.02073442***	
year				
1996			-.11181648	
1997			-.06623286	
1998			-.07793955	
1999			-.09881479	
2000			-.04087958	
2001			-.06819403	
2002			-.08450695	
2003			-.08134981	
2004			-.05304654	
2005			-.08176339	
2006			-.04652149	
2007			-.05999096	
2008			-.04662163	
2009			-.11279916	
2010			-.04163929	
2011			-.03278108	
2012			-.05266818	
2013			-.04511024	
2014			-.04469846	
2015			-.049367	
2016			-.05145228	
2017			-.04474793	
2018			-.04464915	
2019			-.05856034	
2020			-.12316372	
growthIneq~F				
L1.				-.10212585
_cons	.15355628	.06065211	.28467216	.25051491*
N	457	457	457	421
r2	.04798908		.20266249	
r2_a	.0437952		.11750994	

legend: * p<0.05; ** p<0.01; *** p<0.001

Labor inequality

$$InequalityL_{it} = a_{1_{it}} + a_2 GDP\ per\ capita_{it} + a_3 GDP\ per\ capita^2{}_{it} + b_i + u_{it}\ (7.3.15)$$

Variable	fixed	random	pooled	gmmest
lnGDPpcapita	.36090691*	.18686191	.43248355*	.63126785*
lnGDPpcapi~2	-.05502542*	-.02583172	-.07181858*	-.09508129*
cou				
5			-.0292283*	
6			-.07408249	
7			.07536695***	
8			-.08056511	
9			-.02592533	
10			-.01268249	
11			-.02048182	
12			-.06839463	
13			-.04997538	
14			-.06929353	
15			.10896273**	
17			.0160463*	
18			.02663935**	
20			-.05768094	
21			-.05917323	
22			-.0488473	
23			.02955886***	
year				
1996			-.11906526**	
1997			-.13672695**	
1998			-.1359566*	
1999			-.06379842	
2000			-.08763804*	
2001			-.08065361	
2002			-.13915706**	
2003			-.1132944*	
2004			-.01635113	
2005			-.16527789**	
2006			-.00206062	
2007			-.06792156	
2008			-.05798232	
2009			-.22644743**	
2010			-.13241582**	
2011			-.0506077	
2012			-.10629009	
2013			-.11108145*	
2014			-.05008191	
2015			-.04584532	
2016			-.06606999	
2017			-.04618233	
2018			-.03399217	
2019			-.03444444	
2020			-.15727935**	
growthIneq~L				
L1.				-.27898389*
_cons	-.53732197	-.30203698	-.46337243	-.96853078*
N	405	405	405	363
r2	.01869218		.16452591	
r2_a	.01381005		.06241241	

Profit inequality

$$InequalityK_{it} = a_{1_{it}} + a_2 GDP\ per\ capita_{it} + a_3 GDP\ per\ capita^2{}_{it} + b_i + u_{it} (7.3.16)$$

```
Instruments for differenced equation
        GMM-type: L(2/.).growthInequalityK
        Standard: D.lnGDPpcapita D.lnGDPpcapita2
Instruments for level equation
        Standard: _cons

. estimates store gmmest

. estimates table fixed random pooled gmmest , star stats(N r2 r2_a)
```

Variable	fixed	random	pooled	gmmest
lnGDPpcapita	-.18167479	-.16344246	-.17203275	-.28845477
lnGDPpcapi~2	.02239322	.02088649	.02712746	.04251531
cou				
5			.02256809	
6			-.00220461	
7			-.00720636	
8			.02800745	
9			.01655426	
10			-.00060856	
11			.01537476	
12			.00736472	
13			.05144543	
14			.03150007	
15			-.04120799	
17			-.00057238	
18			-.0033767	
20			.01712025	
21			.03493177	
22			.08443721	
23			.00734752	
year				
1996			-.134259	
1997			-.15599112	
1998			-.14029663	
1999			-.11254087	
2000			-.18825769	
2001			-.16170405	
2002			-.15315697	
2003			-.18144455	
2004			-.1371272	
2005			-.11920449	
2006			-.19218755	
2007			-.11358665	
2008			-.2321322	
2009			-.27170615	
2010			-.15964513	
2011			-.15832752	
2012			-.19553255	
2013			-.12246018	
2014			-.1481223	
2015			-.20706613	
2016			-.17052685	
2017			-.14860114	
2018			-.1722407	
2019			-.18529782	
2020			-.14250989	
growthIneq~K				
L1.				-.19114824**
_cons	.3712915	.32587859	.42029257	.48770334
N	456	456	456	420
r2	.01518312		.08416655	
r2_a	.01083514		-.01387888	

legend: * p<0.05; ** p<0.01; *** p<0.001

Total inequality

```
Instruments for differenced equation
        GMM-type: L(2/.).growthinequality
        Standard: D.lnGDPpcapita D.lnGDPpcapita2
Instruments for level equation
        Standard: _cons

. estimates store gmmest

. estimates table fixed random pooled gmmest , star stats(N r2 r2_a)
```

Variable	fixed	random	pooled	gmmest
lnGDPpcapita	-.14738658	-.14287643	-.18411807	.02563525
lnGDPpcapi~2	.0145889	.01841131	.02402554	-.0147979
cou				
5			-.0065981	
6			-.01608091	
7			.00930975	
8			.01501509	
9			.014717	
10			-.0003038	
11			.01036209	
12			.00623371	
13			.0003434	
14			-.0356489	
15			-.020256	
17			.021123***	
18			.0182377*	
20			.01146416	
21			.00578907	
22			-.01971068	
23			.01767132*	
year				
1996			-.14688553	
1997			-.13145307	
1998			-.14599227	
1999			-.16621596	
2000			-.12803677	
2001			-.13731852	
2002			-.14462559	
2003			-.14123531	
2004			-.11429212	
2005			-.15075675	
2006			-.13441767	
2007			-.14420584	
2008			-.11794892	
2009			-.11664387	
2010			-.13280254	
2011			-.12434486	
2012			-.10581637	
2013			-.12408415	
2014			-.15175359	
2015			-.14501301	
2016			-.15480375	
2017			-.14446662	
2018			-.1526356	
2019			-.19807661	
2020			-.15905577	
growthineq~y				
L1.				-.13179964**
_cons	.33560642	.26713475	.47649122	.10566629
N	435	435	435	393
r2	.05904854		.17421586	
r2_a	.05469228		.08105047	

legend: * p<0.05; ** p<0.01; *** p<0.001

Stata test

Growth

Depended variable: ΔGDPper capita

$$\Delta GDPpercapita_{it} = a_{1_{it}} + a_2 L.profit\ rate_{it} + a_3 L.interest\ rate_{it} + a_4 L.private\ dept_{it} + a_5 inequality_{it} + a_6 euro\ entrance_{it} + a_7 2008\ financial\ crisis_{it} + b_i + u_{it}\ (7.3.17)$$

```
Instruments for differenced equation
        GMM-type: L(2/.).growthGDPpcapita
        Standard: LD.growthr LD.growthir LD.lnDebtH1 D.inequality D.eurodumm
                  D.crisisdumm
Instruments for level equation
        Standard: _cons

. estimates store gmmest

. estimates table fixed random pooled gmmest , star stats(N r2 r2_a)
```

Variable	fixed	random	pooled	gmmest
growthr				
L1.	.19339977***	.18564184***	.14142258***	.16445722***
growthir				
L1.	-.05465182	-.03711583	-.05210005	-.06156484*
lnDebtH1				
L1.	-.00814004	-.00794952***	-.02109288***	-.00544937
inequality	.01015369	-.01559051	-.04237723	.02821708
eurodumm	.00818106	-.00016015	-.00649107	.00051843
crisisdumm	-.02674982**	-.02301452***	-.01481813	-.03197394***
cou				
5			.04429596***	
6			-.02538509*	
7			.01585607**	
8			-.03012166***	
9			.02992883***	
10			.03347636***	
11			.02348327***	
12			-.05396476***	
13			-.04104284**	
14			-.02751577*	
15			-.04075019***	
17			.02691693**	
18			-.00607433***	
20			-.0015154	
21			-.06176483***	
22			-.02531154*	
23			-.01224907***	
year				
1997			-.00082006	
1998			-.00530406	
1999			.00177193	
2000			.03457886	
2001			.01670203	
2002			.01063842	
2003			.00994669	
2004			.02898648	
2005			.03159605	
2006			.05910959**	
2007			.06717368**	
2008			.04114117*	
2009			-.04421374*	
2010			.04556694***	
2011			.04326949**	
2012			.01701173	
2013			.02495688*	
2014			.03404487**	
2015			.05329996**	
2016			.03185686*	
2017			.05371117***	
2018			.04826358***	
2019			.04666955***	
2020			(omitted)	
growthGDPp~a				
L1.				.06845812
_cons	.06949668***	.08225844***	.12790487***	.0585991**
N	430	430	430	410
r2	.27082422		.59107028	
r2_a	.2604813		.541956	

All types of inequalities

$$\Delta GDPpercapita_{it} = a_{1it} + a_2 L.profit\ rate_{it} + a_3 L.interest\ rate_{it} + a_4 L.private\ dept_{it} + a_5 InequalityF_{it} + a_6 InequalityL_{it} + a_7 InequalityK_{it} + a_8 unemployment\ rate_{it} + a_9 euro\ entrance_{it} + a_{10} 2008\ financial\ crisis_{it} + b_i + u_{it}\ (7.3.18)$$

```
Instruments for differenced equation
        GMM-type: L(2/.).growthGDPpcapita
        Standard: LD.growthr LD.growthir LD.lnDebtH1 D.InequalityF D.InequalityL
                  D.InequalityK D.unemplRT D.eurodumm D.crisisdumm
Instruments for level equation
        Standard: _cons

. estimates store gmmest

. estimates table fixed random pooled gmmest , star stats(N r2 r2_a)
```

Variable	fixed	random	pooled	gmmest
growthr				
L1.	.16286678**	.20401624***	.13179143***	.1419968**
growthir				
L1.	-.03127404*	-.04236648	-.02938462	-.02544647*
lnDebtH1				
L1.	-.01280178*	-.00713741***	-.02403464***	-.01584503*
InequalityF	.21436476*	.12668683	.1229499	.386773**
InequalityL	.2590017***	-.02403379	.13335065*	.30384773***
InequalityK	.20440042*	.09703232	.12500724	.2957542***
unemplRT	-.27289671*	-.17149197	-.38746962**	-.29376438*
eurodumm	-.00290362	-.00347459	-.01653638	-.01706238
crisisdumm	-.02175528**	-.01720973***	-.01877804	-.02294062**
cou				
5			.03378351	
6			-.05392713*	
7			.02208281	
8			-.01788417*	
9			.06001448***	
10			.0404957**	
11			.02648783	
12			-.1045856***	
13			-.06606328**	
14			-.08338326***	
15			-.1152745***	
17			.03987528***	
18			-.01624545*	
20			.00758005	
21			-.05274336*	
22			-.01087731	
23			-.01150685	
year				
1997			-.00454014	
1998			-.01012885	
1999			.00976227	
2000			.03007394	
2001			.01613164	
2002			.00954977	
2003			.01065763	
2004			.0268444	
2005			.0274904	
2006			.05199127*	
2007			.0562994*	
2008			.03541611*	
2009			-.03017241	
2010			.06256646***	
2011			.05281171**	
2012			.03336926*	
2013			.04427593**	
2014			.05258574***	
2015			.06722312***	
2016			.03886807*	
2017			.05575692***	
2018			.04710235***	
2019			.04238505***	
2020			(omitted)	
growthGDPp~a				
L1.				-.05834477
_cons	-.00339627	.04287618	.09931748*	-.03707087
N	402	402	402	382
r2	.34639932		.62292902	
r2_a	.33139318		.57043903	

legend: * p<0.05; ** p<0.01; *** p<0.001

InequalityF

Depended variable: ΔInequalityF

$$\Delta Inequality_{F_{it}} = a_{1_{it}} + a_2 \Delta l_{it} + a_3 \Delta \lambda_{it} + b_i + u_{it} \qquad (7.3.1.1)$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
-----------------------------------------------------------------------------------------------------------------------------------------------
growthInequal~F double  %10.0g                growthInequalityF
growthWS        double  %10.0g                growthWS
growthl         double  %10.0g                growthl

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
growthIneq~F |        457   -.0069697    .0718098   -.415333    .451739
    growthWS |        457    .0043803    .0219909  -.1271254   .1124499
     growthl |        465    .0019786    .0136038  -.0906467   .2328077
```

```
Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
growth~F overall | -.0069697   .0718098   -.415333    .451739 |     N =     457
         between |             .0134777  -.0282483   .0252856 |     n =      18
         within  |             .0706054  -.3940543   .4730177 | T-bar = 25.3889
                 |                                            |
growthWS overall |  .0043803   .0219909  -.1271254   .1124499 |     N =     457
         between |             .0043725   -.000713   .0158745 |     n =      18
         within  |             .0215788  -.1372923    .102283 | T-bar = 25.3889
                 |                                            |
growthl  overall |  .0019786   .0136038  -.0906467   .2328077 |     N =     465
         between |              .003175  -.0024879   .0103275 |     n =      18
         within  |             .0132496  -.0884096   .2244587 | T-bar = 25.8333
```

```
. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  15.cou = 0
 (12)  17.cou = 0
 (13)  18.cou = 0
 (14)  20.cou = 0
 (15)  21.cou = 0
 (16)  22.cou = 0
 (17)  23.cou = 0
       Constraint 1 dropped
       Constraint 2 dropped
       Constraint 3 dropped
       Constraint 5 dropped
       Constraint 6 dropped
       Constraint 7 dropped
       Constraint 9 dropped
       Constraint 10 dropped
       Constraint 11 dropped
       Constraint 12 dropped
       Constraint 13 dropped
       Constraint 14 dropped
       Constraint 15 dropped
       Constraint 17 dropped

       F(  3,    17) =   13.49
            Prob > F =    0.0001
```

Factor over pooled OLS

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
    growthWS |   -2.838919    -2.823221       -.0156982        .0101647
     growthl |    4.068591     4.177681       -.1090894        .0605455
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        4.77
                Prob>chi2 =      0.0919

.
```

Random over fixed

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthInequalityF[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                growthI~F |   .0051566       .0718098
                        e |   .0009461       .0307591
                        u |   5.89e-06       .0024263

        Test:   Var(u) = 0
                             chibar2(01) =     0.43
                          Prob > chibar2 =   0.2554
```

Random over pooled OLS

Depended variable: ΔInequalityF

$$\Delta Inequality_{F_{it}} = a_{1_{it}} + a_2 \Delta l_{it} + a_3 \Delta w_{it} + a_4 \Delta A_{it} + b_i + u_{it} \qquad (7.3.1.2)$$

```
. describe $id $t  $ylist $xlist

              storage  display    value
variable name   type   format     label      variable label
-------------------------------------------------------------------------------------------------------------------
growthInequal~F double  %10.0g               growthInequalityF
growthw         double  %10.0g               growthw
growthproduct~y double  %10.0g               growthproductivity
growthl         double  %10.0g               growthl

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
growthIneq~F |        457   -.0069697    .0718098   -.415333    .451739
     growthw |        457    .0384328    .0544271  -.1298405   .3662896
growthprod~y |        465    .0403902    .0551794  -.1109021   .4639426
     growthl |        465    .0019786    .0136038  -.0906467   .2328077
```

```
. xtdescribe

     cou:  3, 5, ..., 23                                      n =         18
    year:  1995, 1996, ..., 2020                              T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+---------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+---------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
growth~F overall | -.0069697    .0718098   -.415333    .451739 |     N =     457
         between |              .0134777  -.0282483   .0252856 |     n =      18
         within  |              .0706054  -.3940543   .4730177 | T-bar = 25.3889
                 |                                            |
growthw  overall |  .0384328    .0544271  -.1298405   .3662896 |     N =     457
         between |              .0320828    .016342   .1077623 |     n =      18
         within  |              .0446096  -.1867685   .3037861 | T-bar = 25.3889
                 |                                            |
gro~vity overall |  .0403902    .0551794  -.1109021   .4639426 |     N =     465
         between |              .0298193   .0141569    .105498 |     n =      18
         within  |              .0469135  -.1760099   .3988348 | T-bar = 25.8333
                 |                                            |
growthl  overall |  .0019786    .0136038  -.0906467   .2328077 |     N =     465
         between |               .003175  -.0024879   .0103275 |     n =      18
         within  |              .0132496  -.0884096   .2244587 | T-bar = 25.8333


Breusch and Pagan Lagrangian multiplier test for random effects

        growthInequalityF[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                growthI~F |   .0051566       .0718098
                        e |   .0041004       .0640344
                        u |          0              0

        Test:   Var(u) = 0
                             chibar2(01) =     0.00
                          Prob > chibar2 =   1.0000



. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  15.cou = 0
 (12)  17.cou = 0
 (13)  18.cou = 0
 (14)  20.cou = 0
 (15)  21.cou = 0
 (16)  22.cou = 0
 (17)  23.cou = 0
       Constraint 1 dropped
       Constraint 4 dropped
       Constraint 5 dropped
       Constraint 6 dropped
       Constraint 7 dropped
       Constraint 8 dropped
       Constraint 9 dropped
       Constraint 11 dropped
       Constraint 12 dropped
       Constraint 13 dropped
       Constraint 14 dropped
       Constraint 15 dropped
       Constraint 17 dropped

       F(  4,    17) =   23.10
            Prob > F =    0.0000
```

factor over pooled

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
     growthw |   -.8247243    -.8452265        .0205022        .0350381
growthprod~y |    .9083483     .8678212        .0405271        .0248399
     growthl |    3.408157     3.430738       -.0225812        .1429344
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        3.20
                Prob>chi2 =      0.3613
```

Random over fixed

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthInequalityF[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               growthI~F |   .0051566       .0718098
                       e |   .0041004       .0640344
                       u |          0              0

        Test:   Var(u) = 0
                             chibar2(01) =     0.00
                          Prob > chibar2 =   1.0000
```

Random over pooled OLS

Depended variable: Δw

$$\text{Wage growth}_{it} = a_{1_{it}} + a_2 relative\ Labor\ Employment_{it} + a_3 bargaining\ power_{it} + a_4 technological\ change_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 FDI\ oppenness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} + a_{10} house\ debth_{it} + a_{11} eurozone\ \text{participation}_{it} + a_{12} 2008\ financial\ crisis_{it} + b_i + u_{it} \qquad (7.3.1.3)$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
------------------------------------------------------------------------------------------------------------------------

growthw         double  %10.0g                growthw
lnrelatL        double  %10.0g                lnrelatL
BargainingL2    double  %10.0g                BargainingL2
k_inov          double  %10.0g                k_inov
fdiopen         double  %10.0g                fdiopen
financial_open  double  %10.0g                financial_open
op              double  %10.0g                op
eugini          double  %10.0g                eugini
FD              double  %10.0g                FD
DebtH           double  %10.0g                DebtH
caPC            double  %10.0g                caPC
eurodumm        byte    %10.0g                eurodumm
crisisdumm      byte    %10.0g                crisisdumm

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
     growthw |        457    .0384328    .0544271  -.1298405   .3662896
    lnrelatL |        446    .9175153    .5295423  -.0259337   2.343709
BargainingL2 |        312    .2793218    .1782628      .0449      .7661
      k_inov |        427    .0810127    .0470199   .0109361   .4950667
     fdiopen |        461    .1909102    .5714506  -.6764844   5.813815
-------------+---------------------------------------------------------
financial_~n |        420    1.966405    .8017374  -1.226155   2.321955
          op |        468    1.145204    .6537506   .3710993   4.122231
      eugini |        468    .1125057    .0221542   .0434832   .1532992
          FD |        450    .5361626    .2175712   .1004459   .9006572
       DebtH |        462     49.2671    28.12036        1.3      131.4
-------------+---------------------------------------------------------
        caPC |        468   -.6865568    5.553381  -21.00853   11.77953
    eurodumm |        468    .6923077    .4620323          0          1
  crisisdumm |        468          .5     .500535          0          1

. xtdescribe

     cou:  3, 5, ..., 23                                    n =         18
    year:  1995, 1996, ..., 2020                            T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
growthw  overall |  .0384328    .0544271  -.1298405   .3662896 |     N =     457
         between |              .0320828    .016342   .1077623 |     n =      18
         within  |              .0446096  -.1867685   .3037861 | T-bar = 25.3889
                 |                                             |
lnrelatL overall |  .9175153    .5295423  -.0259337   2.343709 |     N =     446
         between |              .4095628   .4658293   1.658096 |     n =      18
         within  |              .3488167   .0721636   1.868282 | T-bar = 24.7778
                 |                                             |
Bargai~2 overall |  .2793218    .1782628      .0449      .7661 |     N =     312
         between |              .1713674     .07889    .696535 |     n =      18
         within  |              .0383941     .16161   .4220218 |     T = 17.3333
                 |                                             |
k_inov   overall |  .0810127    .0470199   .0109361   .4950667 |     N =     427
         between |              .0307734   .0315929   .1474466 |     n =      18
         within  |              .0362544   -.014006   .4286328 |     T = 23.7222
                 |                                             |
fdiopen  overall |  .1909102    .5714506  -.6764844   5.813815 |     N =     461
         between |              .3251203   .0125404   1.316872 |     n =      18
         within  |               .477895  -1.465011   4.687854 | T-bar = 25.6111
                 |                                             |
financ~n overall |  1.966405    .8017374  -1.226155   2.321955 |     N =     420
         between |              .6206156   .3154293   2.321955 |     n =      17
         within  |              .5328385  -.3286934    3.44742 |     T = 24.7059
                 |                                             |
op       overall |  1.145204    .6537506   .3710993   4.122231 |     N =     468
         between |              .6281746   .5162591   3.121083 |     n =      18
         within  |              .2321872  -.1295407   2.146352 |     T =      26
                 |                                             |
eugini   overall |  .1125057    .0221542   .0434832   .1532992 |     N =     468
         between |                     0   .1125057   .1125057 |     n =      18
         within  |              .0221542   .0434832   .1532992 |     T =      26
                 |                                             |
FD       overall |  .5361626    .2175712   .1004459   .9006572 |     N =     450
         between |              .2126841   .2118398   .8086902 |     n =      18
         within  |              .0672352   .2284112   .6877019 |     T =      25
                 |                                             |
DebtH    overall |   49.2671    28.12036        1.3      131.4 |     N =     462
         between |               24.5646   15.78077   100.9692 |     n =      18
         within  |              14.84495   7.624792    91.3871 | T-bar = 25.6667
                 |                                             |
caPC     overall | -.6865568    5.553381  -21.00853   11.77953 |     N =     468
         between |              4.091556  -6.022415    6.79635 |     n =      18
         within  |               3.87239  -16.86258   12.20439 |     T =      26
                 |                                             |
eurodumm overall |  .6923077    .4620323          0          1 |     N =     468
         between |              .2258141   .2307692   .8461538 |     n =      18
         within  |              .4064624  -.1538462   1.461538 |     T =      26
                 |                                             |
crisis~m overall |        .5     .500535          0          1 |     N =     468
         between |                     0         .5         .5 |     n =      18
         within  |               .500535          0          1 |     T =      26
```

```
. testparm i.year

 ( 1)  2001.year = 0
 ( 2)  2002.year = 0
 ( 3)  2003.year = 0
 ( 4)  2004.year = 0
 ( 5)  2005.year = 0
 ( 6)  2006.year = 0
 ( 7)  2007.year = 0
 ( 8)  2008.year = 0
 ( 9)  2009.year = 0
 (10)  2010.year = 0
 (11)  2011.year = 0
 (12)  2012.year = 0
 (13)  2013.year = 0
 (14)  2014.year = 0
 (15)  2015.year = 0
 (16)  2016.year = 0
 (17)  2017.year = 0
       Constraint 11 dropped

       F( 16,    16) =   12.66
            Prob > F =    0.0000

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  17.cou = 0
 (12)  18.cou = 0
 (13)  20.cou = 0
 (14)  21.cou = 0
 (15)  22.cou = 0
 (16)  23.cou = 0

       F( 16,    16) = 1.4e+05
            Prob > F =    0.0000
```

Fixed over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthw[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                 growthw |   .0021031       .0458601
                       e |   .0008573       .0292803
                       u |   5.46e-08       .0002336

        Test:   Var(u) = 0
                             chibar2(01) =    15.58
                          Prob > chibar2 =   0.0000
```

pooled OLS over Random effects

. hausman fixed random

	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnrelatL	-.0302392	-.0075547	-.0226845	.0131941
BargainingL2	.1711934	-.0224276	.1936211	.0899214
k_inov	.3582158	.2024556	.1557602	.1292977
fdiopen	.0053911	.0002689	.0051222	.0016495
financial_~n	.0035409	.0045626	-.0010217	.0037722
op	.0416329	.0231189	.018514	.0190724
eugini	-.2406702	-.1929292	-.0477411	.
FD	-.0431662	-.0233007	-.0198655	.0507879
DebtH	-.0012849	-.0004942	-.0007907	.0001763
caPC	-.0056698	-.0026893	-.0029805	.000362
eurodumm	.0158831	-.0098033	.0256864	.0035031
crisisdumm	-.0107934	-.0217377	.0109443	.0037039

```
                       b = consistent under Ho and Ha; obtained from xtreg
        B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                chi2(12) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                         =      128.23
               Prob>chi2 =      0.0000
               (V_b-V_B is not positive definite)
```

.
. hausman fixed random,sigmamore

	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnrelatL	-.0302392	-.0075547	-.0226845	.0153991
BargainingL2	.1711934	-.0224276	.1936211	.1031874
k_inov	.3582158	.2024556	.1557602	.1535611
fdiopen	.0053911	.0002689	.0051222	.0028371
financial_~n	.0035409	.0045626	-.0010217	.004834
op	.0416329	.0231189	.018514	.0221361
eugini	-.2406702	-.1929292	-.0477411	.0503221
FD	-.0431662	-.0233007	-.0198655	.0592847
DebtH	-.0012849	-.0004942	-.0007907	.0002121
caPC	-.0056698	-.0026893	-.0029805	.0004858
eurodumm	.0158831	-.0098033	.0256864	.0061019
crisisdumm	-.0107934	-.0217377	.0109443	.0051033

```
                       b = consistent under Ho and Ha; obtained from xtreg
        B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                chi2(12) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                         =       74.36
               Prob>chi2 =      0.0000
```

. hausman fixed random, sigmaless

	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnrelatL	-.0302392	-.0075547	-.0226845	.0134497
BargainingL2	.1711934	-.0224276	.1936211	.0901246
k_inov	.3582158	.2024556	.1557602	.1341214
fdiopen	.0053911	.0002689	.0051222	.0024779
financial_~n	.0035409	.0045626	-.0010217	.004222
op	.0416329	.0231189	.018514	.0193339
eugini	-.2406702	-.1929292	-.0477411	.0439517
FD	-.0431662	-.0233007	-.0198655	.0517797
DebtH	-.0012849	-.0004942	-.0007907	.0001853
caPC	-.0056698	-.0026893	-.0029805	.0004243
eurodumm	.0158831	-.0098033	.0256864	.0053294
crisisdumm	-.0107934	-.0217377	.0109443	.0044573

```
                       b = consistent under Ho and Ha; obtained from xtreg
        B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                chi2(12) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                         =       97.48
               Prob>chi2 =      0.0000
```

Fixed over random

Depended variable: Δproducticity

$$\text{Productivity growth} = a_{1_{it}} + a_2 relative\ Labor\ Employment_{it} + a_3 bargaining\ power_{it} + a_4 technological\ change_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 FDI\ oppenness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} + a_{10} house\ debth_{it} + a_{11} eurozone\ \text{participation}_{it} + a_{12} 2008\ financial\ crisis_{it} + b_i + u_{it} \qquad (7.3.1.4)$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
-----------------------------------------------------------------------------------
growthproduct~y double  %10.0g                growthproductivity
lnrelatL        double  %10.0g                lnrelatL
BargainingL2    double  %10.0g                BargainingL2
k_inov          double  %10.0g                k_inov
fdiopen         double  %10.0g                fdiopen
financial_open  double  %10.0g                financial_open
op              double  %10.0g                op
eugini          double  %10.0g                eugini
FD              double  %10.0g                FD
DebtH           double  %10.0g                DebtH
caPC            double  %10.0g                caPC
eurodumm        byte    %10.0g                eurodumm
crisisdumm      byte    %10.0g                crisisdumm

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
growthprod~y |        465    .0403902    .0551794  -.1109021   .4639426
    lnrelatL |        446    .9175153    .5295423  -.0259337   2.343709
BargainingL2 |        312    .2793218    .1782628      .0449      .7661
      k_inov |        427    .0810127    .0470199   .0109361   .4950667
     fdiopen |        461    .1909102    .5714506  -.6764844   5.813815
-------------+---------------------------------------------------------
financial_~n |        420    1.966405    .8017374  -1.226155   2.321955
          op |        468    1.145204    .6537506   .3710993   4.122231
      eugini |        468    .1125057    .0221542   .0434832   .1532992
          FD |        450    .5361626    .2175712   .1004459   .9006572
       DebtH |        462     49.2671    28.12036        1.3      131.4
-------------+---------------------------------------------------------
        caPC |        468   -.6865568    5.553381  -21.00853   11.77953
    eurodumm |        468    .6923077    .4620323          0          1
  crisisdumm |        468          .5     .500535          0          1

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+---------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+---------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
gro~vity overall |  .0403902   .0551794  -.1109021   .4639426 |     N =     465
         between |             .0298193   .0141569    .105498 |     n =      18
         within  |             .0469135  -.1760099   .3988348 | T-bar = 25.8333
                 |                                            |
lnrelatL overall |  .9175153   .5295423  -.0259337   2.343709 |     N =     446
         between |             .4095628   .4658293   1.658096 |     n =      18
         within  |             .3488167   .0721636   1.868282 | T-bar = 24.7778
                 |                                            |
Bargai~2 overall |  .2793218   .1782628      .0449      .7661 |     N =     312
         between |             .1713674     .07889    .696535 |     n =      18
         within  |             .0383941     .16161   .4220218 |     T = 17.3333
                 |                                            |
k_inov   overall |  .0810127   .0470199   .0109361   .4950667 |     N =     427
         between |             .0307734   .0315929   .1474466 |     n =      18
         within  |             .0362544   -.014006   .4286328 |     T = 23.7222
                 |                                            |
fdiopen  overall |  .1909102   .5714506  -.6764844   5.813815 |     N =     461
         between |             .3251203   .0125404   1.316872 |     n =      18
         within  |              .477895  -1.465011   4.687854 | T-bar = 25.6111
                 |                                            |
financ~n overall |  1.966405   .8017374  -1.226155   2.321955 |     N =     420
         between |             .6206156   .3154293   2.321955 |     n =      17
         within  |             .5328385  -.3286934    3.44742 |     T = 24.7059
                 |                                            |
op       overall |  1.145204   .6537506   .3710993   4.122231 |     N =     468
         between |             .6281746   .5162591   3.121083 |     n =      18
         within  |             .2321872  -.1295407   2.146352 |     T =      26
                 |                                            |
eugini   overall |  .1125057   .0221542   .0434832   .1532992 |     N =     468
         between |                    0   .1125057   .1125057 |     n =      18
         within  |             .0221542   .0434832   .1532992 |     T =      26
                 |                                            |
FD       overall |  .5361626   .2175712   .1004459   .9006572 |     N =     450
         between |             .2126841   .2118398   .8086902 |     n =      18
         within  |             .0672352   .2284112   .6877019 |     T =      25
                 |                                            |
DebtH    overall |   49.2671   28.12036        1.3      131.4 |     N =     462
         between |              24.5646   15.78077   100.9692 |     n =      18
         within  |             14.84495   7.624792    91.3871 | T-bar = 25.6667
                 |                                            |
caPC     overall | -.6865568   5.553381  -21.00853   11.77953 |     N =     468
         between |             4.091556  -6.022415    6.79635 |     n =      18
         within  |              3.87239  -16.86258   12.20439 |     T =      26
                 |                                            |
eurodumm overall |  .6923077   .4620323          0          1 |     N =     468
         between |             .2258141   .2307692   .8461538 |     n =      18
         within  |             .4064624  -.1538462   1.461538 |     T =      26
                 |                                            |
crisis~m overall |        .5    .500535          0          1 |     N =     468
         between |                    0         .5         .5 |     n =      18
         within  |              .500535          0          1 |     T =      26
```

```
. testparm i.year

 ( 1)  2001.year = 0
 ( 2)  2002.year = 0
 ( 3)  2003.year = 0
 ( 4)  2004.year = 0
 ( 5)  2005.year = 0
 ( 6)  2006.year = 0
 ( 7)  2007.year = 0
 ( 8)  2008.year = 0
 ( 9)  2009.year = 0
 (10)  2010.year = 0
 (11)  2011.year = 0
 (12)  2012.year = 0
 (13)  2013.year = 0
 (14)  2014.year = 0
 (15)  2015.year = 0
 (16)  2016.year = 0
 (17)  2017.year = 0
       Constraint 5 dropped

       F( 16,    16) =   27.87
            Prob > F =    0.0000

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  17.cou = 0
 (12)  18.cou = 0
 (13)  20.cou = 0
 (14)  21.cou = 0
 (15)  22.cou = 0
 (16)  23.cou = 0

       F( 16,    16) =61689.99
            Prob > F =    0.0000
```

fixed over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthproductivity[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               growthp~y |   .0018287       .0427632
                       e |   .0007479       .0273475
                       u |   .0000492        .007016

        Test:   Var(u) = 0
                             chibar2(01) =    12.32
                          Prob > chibar2 =   0.0002
```

Pooled OLS over random effects

```
. hausman fixed random
```

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnrelatL	-.0236191	-.0034966	-.0201226	.0116767
BargainingL2	.153566	-.0324277	.1859937	.0833099
k_inov	.4335573	.194143	.2394143	.110319
fdiopen	.0161433	.0089794	.0071639	.0015743
financial_~n	.0032794	.0022017	.0010777	.0030493
op	.0890201	.0426715	.0463487	.0172055
eugini	-.1050718	-.0295751	-.0754967	.019162
FD	-.0323916	.0501137	-.0825053	.0461316
DebtH	-.0009524	-.0006949	-.0002575	.0001509
caPC	-.0037565	-.0024313	-.0013252	.0002955
eurodumm	-.0270769	-.0299154	.0028385	.003455
crisisdumm	-.0226719	-.0237183	.0010465	.0033458

```
                          b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(12) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       64.62
                Prob>chi2 =      0.0000
                (V_b-V_B is not positive definite)

.
. hausman fixed random,sigmamore

Note: the rank of the differenced variance matrix (11) does not equal the number of coefficients being tested (12);
        be sure this is what you expect, or there may be problems computing the test.  Examine the output of your
        estimators for anything unexpected and possibly consider scaling your variables so that the coefficients are
        on a similar scale.
```

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnrelatL	-.0236191	-.0034966	-.0201226	.0128688
BargainingL2	.153566	-.0324277	.1859937	.0901638
k_inov	.4335573	.194143	.2394143	.1239177
fdiopen	.0161433	.0089794	.0071639	.0022252
financial_~n	.0032794	.0022017	.0010777	.0036796
op	.0890201	.0426715	.0463487	.0188315
eugini	-.1050718	-.0295751	-.0754967	.0413558
FD	-.0323916	.0501137	-.0825053	.0506182
DebtH	-.0009524	-.0006949	-.0002575	.0001709
caPC	-.0037565	-.0024313	-.0013252	.0003689
eurodumm	-.0270769	-.0299154	.0028385	.00485
crisisdumm	-.0226719	-.0237183	.0010465	.0041127

```
                          b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       47.57
                Prob>chi2 =      0.0000

. hausman fixed random, sigmaless

Note: the rank of the differenced variance matrix (11) does not equal the number of coefficients being tested (12);
        be sure this is what you expect, or there may be problems computing the test.  Examine the output of your
        estimators for anything unexpected and possibly consider scaling your variables so that the coefficients are
        on a similar scale.
```

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnrelatL	-.0236191	-.0034966	-.0201226	.0119206
BargainingL2	.153566	-.0324277	.1859937	.0835206
k_inov	.4335573	.194143	.2394143	.1147875
fdiopen	.0161433	.0089794	.0071639	.0020612
financial_~n	.0032794	.0022017	.0010777	.0034085
op	.0890201	.0426715	.0463487	.017444
eugini	-.1050718	-.0295751	-.0754967	.0383087
FD	-.0323916	.0501137	-.0825053	.0468886
DebtH	-.0009524	-.0006949	-.0002575	.0001584
caPC	-.0037565	-.0024313	-.0013252	.0003417
eurodumm	-.0270769	-.0299154	.0028385	.0044926
crisisdumm	-.0226719	-.0237183	.0010465	.0038097

```
                          b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       55.44
                Prob>chi2 =      0.0000
```

Fixed over pooled

Depended variable: ΔWS

Wage Share growth

$$= a_{1_{it}} + a_2 relative\ Labor\ Employment_{it} + a_3 bargaining\ power_{it}$$
$$+ a_4 technological\ change_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it}$$
$$+ a_7 FDI\ oppenness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it}$$
$$+ a_{10} house\ debth_{it} + a_{11} eurozone\ \text{participation}_{it} + a_{12} 2008\ financial\ crisis_{it}$$
$$+ b_i + u_{it} \quad (7.3.1.5)$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
-------------------------------------------------------------------------------------------
growthWS        double  %10.0g                growthWS
lnrelatL        double  %10.0g                lnrelatL
BargainingL2    double  %10.0g                BargainingL2
k_inov          double  %10.0g                k_inov
fdiopen         double  %10.0g                fdiopen
financial_open  double  %10.0g                financial_open
op              double  %10.0g                op
eugini          double  %10.0g                eugini
FD              double  %10.0g                FD
DebtH           double  %10.0g                DebtH
caPC            double  %10.0g                caPC
eurodumm        byte    %10.0g                eurodumm
crisisdumm      byte    %10.0g                crisisdumm

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
    growthWS |        457    .0043803    .0219909  -.1271254   .1124499
    lnrelatL |        446    .9175153    .5295423  -.0259337   2.343709
BargainingL2 |        312    .2793218    .1782628      .0449      .7661
      k_inov |        427    .0810127    .0470199   .0109361   .4950667
     fdiopen |        461    .1909102    .5714506  -.6764844   5.813815
-------------+---------------------------------------------------------
financial_~n |        420    1.966405    .8017374  -1.226155   2.321955
          op |        468    1.145204    .6537506   .3710993   4.122231
      eugini |        468    .1125057    .0221542   .0434832   .1532992
          FD |        450    .5361626    .2175712   .1004459   .9006572
       DebtH |        462     49.2671    28.12036        1.3      131.4
-------------+---------------------------------------------------------
        caPC |        468   -.6865568    5.553381  -21.00853   11.77953
    eurodumm |        468    .6923077    .4620323          0          1
  crisisdumm |        468          .5     .500535          0          1

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
growthWS overall |  .0043803   .0219909  -.1271254   .1124499 |     N =     457
         between |             .0043725   -.000713   .0158745 |     n =      18
         within  |             .0215788  -.1372923    .102283 | T-bar = 25.3889
                 |                                            |
lnrelatL overall |  .9175153   .5295423  -.0259337   2.343709 |     N =     446
         between |             .4095628   .4658293   1.658096 |     n =      18
         within  |             .3488167   .0721636   1.868282 | T-bar = 24.7778
                 |                                            |
Bargai~2 overall |  .2793218   .1782628      .0449      .7661 |     N =     312
         between |             .1713674     .07889    .696535 |     n =      18
         within  |             .0383941     .16161   .4220218 |     T = 17.3333
                 |                                            |
k_inov   overall |  .0810127   .0470199   .0109361   .4950667 |     N =     427
         between |             .0307734   .0315929   .1474466 |     n =      18
         within  |             .0362544   -.014006   .4286328 |     T = 23.7222
                 |                                            |
fdiopen  overall |  .1909102   .5714506  -.6764844   5.813815 |     N =     461
         between |             .3251203   .0125404   1.316872 |     n =      18
         within  |              .477895  -1.465011   4.687854 | T-bar = 25.6111
                 |                                            |
financ~n overall |  1.966405   .8017374  -1.226155   2.321955 |     N =     420
         between |             .6206156   .3154293   2.321955 |     n =      17
         within  |             .5328385  -.3286934    3.44742 |     T = 24.7059
                 |                                            |
op       overall |  1.145204   .6537506   .3710993   4.122231 |     N =     468
         between |             .6281746   .5162591   3.121083 |     n =      18
         within  |             .2321872  -.1295407   2.146352 |     T =      26
                 |                                            |
eugini   overall |  .1125057   .0221542   .0434832   .1532992 |     N =     468
         between |                    0   .1125057   .1125057 |     n =      18
         within  |             .0221542   .0434832   .1532992 |     T =      26
                 |                                            |
FD       overall |  .5361626   .2175712   .1004459   .9006572 |     N =     450
         between |             .2126841   .2118398   .8086902 |     n =      18
         within  |             .0672352   .2284112   .6877019 |     T =      25
                 |                                            |
DebtH    overall |   49.2671   28.12036        1.3      131.4 |     N =     462
         between |              24.5646   15.78077   100.9692 |     n =      18
         within  |             14.84495   7.624792    91.3871 | T-bar = 25.6667
                 |                                            |
caPC     overall | -.6865568   5.553381  -21.00853   11.77953 |     N =     468
         between |             4.091556  -6.022415    6.79635 |     n =      18
         within  |              3.87239  -16.86258   12.20439 |     T =      26
                 |                                            |
eurodumm overall |  .6923077   .4620323          0          1 |     N =     468
         between |             .2258141   .2307692   .8461538 |     n =      18
         within  |             .4064624  -.1538462   1.461538 |     T =      26
                 |                                            |
crisis~m overall |        .5    .500535          0          1 |     N =     468
         between |                    0         .5         .5 |     n =      18
         within  |              .500535          0          1 |     T =      26

.
end of do-file

.
```

```
. testparm i.year

 ( 1)  2001.year = 0
 ( 2)  2002.year = 0
 ( 3)  2003.year = 0
 ( 4)  2004.year = 0
 ( 5)  2005.year = 0
 ( 6)  2006.year = 0
 ( 7)  2007.year = 0
 ( 8)  2008.year = 0
 ( 9)  2009.year = 0
 (10)  2010.year = 0
 (11)  2011.year = 0
 (12)  2012.year = 0
 (13)  2013.year = 0
 (14)  2014.year = 0
 (15)  2015.year = 0
 (16)  2016.year = 0
 (17)  2017.year = 0

       F( 17,    16) = 6.5e+06
            Prob > F =    0.0000

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  17.cou = 0
 (12)  18.cou = 0
 (13)  20.cou = 0
 (14)  21.cou = 0
 (15)  22.cou = 0
 (16)  23.cou = 0

       F( 16,    16) =12357.87
            Prob > F =    0.0000
```

fixed over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthWS[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                growthWS |   .0003387       .0184025
                       e |   .0002943       .0171549
                       u |   .0000202       .0044981

        Test:   Var(u) = 0
                             chibar2(01) =     0.75
                          Prob > chibar2 =   0.1932
```

random over pooled OLS

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
    lnrelatL |    -.003246    -.0037644        .0005184        .0074283
BargainingL2 |   -.0529494    -.0022272       -.0507222        .0523452
      k_inov |   -.0405528      .044567       -.0851198        .0711523
     fdiopen |   -.0016449     .0004332       -.0020782        .0012286
financial_~n |   -.0039936    -.0003203       -.0036732        .0020797
          op |   -.0262306     .0000217       -.0262523        .0108947
      eugini |   -.0028851    -.0004387       -.0024464         .021928
          FD |    .0272761    -.0014023        .0286783        .0292755
       DebtH |   -.0004388    -.0001892       -.0002496         .000098
        caPC |   -.0015097     -.001115       -.0003947        .0002073
    eurodumm |     .020013     .0106142        .0093988        .0026802
  crisisdumm |    .0055426     .0009023        .0046403         .002321
------------------------------------------------------------------------------
                          b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(12) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       21.28
                Prob>chi2 =      0.0465
                (V_b-V_B is not positive definite)

.
. hausman fixed random,sigmamore

Note: the rank of the differenced variance matrix (11) does not equal the number of coefficients being tested (12);
        be sure this is what you expect, or there may be problems computing the test.  Examine the output of your
        estimators for anything unexpected and possibly consider scaling your variables so that the coefficients are
        on a similar scale.

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
    lnrelatL |    -.003246    -.0037644        .0005184        .0075945
BargainingL2 |   -.0529494    -.0022272       -.0507222        .0533051
      k_inov |   -.0405528      .044567       -.0851198        .0730366
     fdiopen |   -.0016449     .0004332       -.0020782        .0013116
financial_~n |   -.0039936    -.0003203       -.0036732        .0021649
          op |   -.0262306     .0000217       -.0262523        .0111217
      eugini |   -.0028851    -.0004387       -.0024464        .0244008
          FD |    .0272761    -.0014023        .0286783        .0299012
       DebtH |   -.0004388    -.0001892       -.0002496        .0001008
        caPC |   -.0015097     -.001115       -.0003947        .0002171
    eurodumm |     .020013     .0106142        .0093988        .0028586
  crisisdumm |    .0055426     .0009023        .0046403        .0024239
------------------------------------------------------------------------------
                          b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       19.39
                Prob>chi2 =      0.0544

. hausman fixed random, sigmaless

Note: the rank of the differenced variance matrix (11) does not equal the number of coefficients being tested (12);
        be sure this is what you expect, or there may be problems computing the test.  Examine the output of your
        estimators for anything unexpected and possibly consider scaling your variables so that the coefficients are
        on a similar scale.

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
    lnrelatL |    -.003246    -.0037644        .0005184        .0074619
BargainingL2 |   -.0529494    -.0022272       -.0507222        .0523744
      k_inov |   -.0405528      .044567       -.0851198        .0717615
     fdiopen |   -.0016449     .0004332       -.0020782        .0012887
financial_~n |   -.0039936    -.0003203       -.0036732        .0021271
          op |   -.0262306     .0000217       -.0262523        .0109275
      eugini |   -.0028851    -.0004387       -.0024464        .0239748
          FD |    .0272761    -.0014023        .0286783        .0293792
       DebtH |   -.0004388    -.0001892       -.0002496         .000099
        caPC |   -.0015097     -.001115       -.0003947        .0002133
    eurodumm |     .020013     .0106142        .0093988        .0028087
  crisisdumm |    .0055426     .0009023        .0046403        .0023816
------------------------------------------------------------------------------
                          b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       20.09
                Prob>chi2 =      0.0442
```

Fixed over Random

Depended variable: Δl

$$\text{Relative Labor Employment growth} = a_{1_{it}} + a_2 relative\ Labor\ Employment_{it} + a_3 bargaining\ power_{it} + a_4 technological\ change_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 FDI\ oppenness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} + a_{10} house\ debth_{it} + a_{11} eurozone\ \text{participation}_{it} + a_{12} 2008\ financial\ crisis_{it} + b_i + u_{it} \qquad (7.3.1.6)$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
------------------------------------------------------------------------------------------
growthl         double  %10.0g                growthl
lnrelatL        double  %10.0g                lnrelatL
BargainingL2    double  %10.0g                BargainingL2
k_inov          double  %10.0g                k_inov
fdiopen         double  %10.0g                fdiopen
financial_open  double  %10.0g                financial_open
op              double  %10.0g                op
eugini          double  %10.0g                eugini
FD              double  %10.0g                FD
DebtH           double  %10.0g                DebtH
caPC            double  %10.0g                caPC
eurodumm        byte    %10.0g                eurodumm
crisisdumm      byte    %10.0g                crisisdumm

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
     growthl |        465    .0019786    .0136038  -.0906467   .2328077
    lnrelatL |        446    .9175153    .5295423  -.0259337   2.343709
BargainingL2 |        312    .2793218    .1782628      .0449      .7661
      k_inov |        427    .0810127    .0470199   .0109361   .4950667
     fdiopen |        461    .1909102    .5714506  -.6764844   5.813815
-------------+---------------------------------------------------------
financial_~n |        420    1.966405    .8017374  -1.226155   2.321955
          op |        468    1.145204    .6537506   .3710993   4.122231
      eugini |        468    .1125057    .0221542   .0434832   .1532992
          FD |        450    .5361626    .2175712   .1004459   .9006572
       DebtH |        462     49.2671    28.12036        1.3      131.4
-------------+---------------------------------------------------------
        caPC |        468   -.6865568    5.553381  -21.00853   11.77953
    eurodumm |        468    .6923077    .4620323          0          1
  crisisdumm |        468          .5     .500535          0          1

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
growthl  overall |  .0019786    .0136038  -.0906467   .2328077 |     N =     465
         between |               .003175  -.0024879   .0103275 |     n =      18
         within  |              .0132496  -.0884096   .2244587 | T-bar = 25.8333
                 |                                            |
lnrelatL overall |  .9175153    .5295423  -.0259337   2.343709 |     N =     446
         between |              .4095628   .4658293   1.658096 |     n =      18
         within  |              .3488167   .0721636   1.868282 | T-bar = 24.7778
                 |                                            |
Bargai~2 overall |  .2793218    .1782628      .0449      .7661 |     N =     312
         between |              .1713674     .07889    .696535 |     n =      18
         within  |              .0383941     .16161   .4220218 |     T = 17.3333
                 |                                            |
k_inov   overall |  .0810127    .0470199   .0109361   .4950667 |     N =     427
         between |              .0307734   .0315929   .1474466 |     n =      18
         within  |              .0362544   -.014006   .4286328 |     T = 23.7222
                 |                                            |
fdiopen  overall |  .1909102    .5714506  -.6764844   5.813815 |     N =     461
         between |              .3251203   .0125404   1.316872 |     n =      18
         within  |               .477895  -1.465011   4.687854 | T-bar = 25.6111
                 |                                            |
financ~n overall |  1.966405    .8017374  -1.226155   2.321955 |     N =     420
         between |              .6206156   .3154293   2.321955 |     n =      17
         within  |              .5328385  -.3286934    3.44742 |     T = 24.7059
                 |                                            |
op       overall |  1.145204    .6537506   .3710993   4.122231 |     N =     468
         between |              .6281746   .5162591   3.121083 |     n =      18
         within  |              .2321872  -.1295407   2.146352 |     T =      26
                 |                                            |
eugini   overall |  .1125057    .0221542   .0434832   .1532992 |     N =     468
         between |                     0   .1125057   .1125057 |     n =      18
         within  |              .0221542   .0434832   .1532992 |     T =      26
                 |                                            |
FD       overall |  .5361626    .2175712   .1004459   .9006572 |     N =     450
         between |              .2126841   .2118398   .8086902 |     n =      18
         within  |              .0672352   .2284112   .6877019 |     T =      25
                 |                                            |
DebtH    overall |   49.2671    28.12036        1.3      131.4 |     N =     462
         between |               24.5646   15.78077   100.9692 |     n =      18
         within  |              14.84495   7.624792    91.3871 | T-bar = 25.6667
                 |                                            |
caPC     overall | -.6865568    5.553381  -21.00853   11.77953 |     N =     468
         between |              4.091556  -6.022415    6.79635 |     n =      18
         within  |               3.87239  -16.86258   12.20439 |     T =      26
                 |                                            |
eurodumm overall |  .6923077    .4620323          0          1 |     N =     468
         between |              .2258141   .2307692   .8461538 |     n =      18
         within  |              .4064624  -.1538462   1.461538 |     T =      26
                 |                                            |
crisis~m overall |        .5     .500535          0          1 |     N =     468
         between |                     0         .5         .5 |     n =      18
         within  |               .500535          0          1 |     T =      26
```

```
. testparm i.year

 ( 1)  2001.year = 0
 ( 2)  2002.year = 0
 ( 3)  2003.year = 0
 ( 4)  2004.year = 0
 ( 5)  2005.year = 0
 ( 6)  2006.year = 0
 ( 7)  2007.year = 0
 ( 8)  2008.year = 0
 ( 9)  2009.year = 0
 (10)  2010.year = 0
 (11)  2011.year = 0
 (12)  2012.year = 0
 (13)  2013.year = 0
 (14)  2014.year = 0
 (15)  2015.year = 0
 (16)  2016.year = 0
 (17)  2017.year = 0
       Constraint 14 dropped

       F( 16,    16) =    7.79
            Prob > F =    0.0001

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  17.cou = 0
 (12)  18.cou = 0
 (13)  20.cou = 0
 (14)  21.cou = 0
 (15)  22.cou = 0
 (16)  23.cou = 0

       F( 16,    16) = 2.5e+05
            Prob > F =    0.0000
```

Fixed over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthl[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                 growthl |   .0000417       .0064568
                       e |   .0000301       .0054876
                       u |   .0000105       .0032364

        Test:   Var(u) = 0
                             chibar2(01) =     8.17
                          Prob > chibar2 =   0.0021
```

Pooled OLS over random effects

. hausman fixed random

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnrelatL	-.0035763	-.0023082	-.0012681	.0019983
BargainingL2	-.0096156	.0024028	-.0120183	.0162474
k_inov	.0311022	.0009613	.0301409	.0174785
fdiopen	-.00122	-.0007715	-.0004485	.0003152
financial_~n	.0040767	.0029251	.0011516	.0004526
op	.0019213	.0021358	-.0002145	.00312
eugini	-.0164316	-.0097882	-.0066434	.0051516
FD	.0208629	.008391	.0124718	.0085823
DebtH	-.0001383	-.0000648	-.0000735	.0000245
caPC	-.0002599	-.0003463	.0000864	.0000476
eurodumm	-.0000773	.000527	-.0006042	.0006386
crisisdumm	-.0004441	-.0003098	-.0001343	.0005416

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

```
chi2(12) = (b-B)'[(V_b-V_B)^(-1)](b-B)
         =       29.92
Prob>chi2 =      0.0029
(V_b-V_B is not positive definite)
```

.
. hausman fixed random,sigmamore

Note: the rank of the differenced variance matrix (11) does not equal the number of coefficients being tested (12); be sure this is what you expect, or there may be problems computing the test. Examine the output of your estimators for anything unexpected and possibly consider scaling your variables so that the coefficients are on a similar scale.

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnrelatL	-.0035763	-.0023082	-.0012681	.0021049
BargainingL2	-.0096156	.0024028	-.0120183	.0167857
k_inov	.0311022	.0009613	.0301409	.0187918
fdiopen	-.00122	-.0007715	-.0004485	.0003692
financial_~n	.0040767	.0029251	.0011516	.000518
op	.0019213	.0021358	-.0002145	.0032574
eugini	-.0164316	-.0097882	-.0066434	.0068283
FD	.0208629	.008391	.0124718	.0089525
DebtH	-.0001383	-.0000648	-.0000735	.0000264
caPC	-.0002599	-.0003463	.0000864	.0000547
eurodumm	-.0000773	.000527	-.0006042	.0007623
crisisdumm	-.0004441	-.0003098	-.0001343	.0006155

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

```
chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
         =       25.31
Prob>chi2 =      0.0082
```

. hausman fixed random, sigmaless

Note: the rank of the differenced variance matrix (11) does not equal the number of coefficients being tested (12); be sure this is what you expect, or there may be problems computing the test. Examine the output of your estimators for anything unexpected and possibly consider scaling your variables so that the coefficients are on a similar scale.

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnrelatL	-.0035763	-.0023082	-.0012681	.0020431
BargainingL2	-.0096156	.0024028	-.0120183	.0162927
k_inov	.0311022	.0009613	.0301409	.0182399
fdiopen	-.00122	-.0007715	-.0004485	.0003584
financial_~n	.0040767	.0029251	.0011516	.0005028
op	.0019213	.0021358	-.0002145	.0031617
eugini	-.0164316	-.0097882	-.0066434	.0066277
FD	.0208629	.008391	.0124718	.0086896
DebtH	-.0001383	-.0000648	-.0000735	.0000256
caPC	-.0002599	-.0003463	.0000864	.0000531
eurodumm	-.0000773	.000527	-.0006042	.0007399
crisisdumm	-.0004441	-.0003098	-.0001343	.0005974

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

```
chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
         =       26.87
Prob>chi2 =      0.0048
```

Fixed over Random

Depended variable: ΔInequalityF

$$\text{Factor Inequality growth} = a_{1_{it}} + a_2 relative\ Labor\ Employment_{it} + a_3 bargaining\ power_{it} + a_4 technological\ change_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 FDI\ oppenness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} + a_{10} house\ debth_{it} + a_{11} eurozone\ \text{participation}_{it} + a_{12} 2008\ financial\ crisis_{it} + b_i + u_{it} \quad (7.3.1.7)$$

```
. describe $id $t  $ylist $xlist

                storage   display    value
variable name     type    format     label      variable label
-------------------------------------------------------------------------------------------------------
growthInequal~F double  %10.0g                  growthInequalityF
lnrelatL        double  %10.0g                  lnrelatL
BargainingL2    double  %10.0g                  BargainingL2
k_inov          double  %10.0g                  k_inov
fdiopen         double  %10.0g                  fdiopen
financial_open  double  %10.0g                  financial_open
op              double  %10.0g                  op
eugini          double  %10.0g                  eugini
FD              double  %10.0g                  FD
lnDebtH1        double  %10.0g                  lnDebtH1
caPC            double  %10.0g                  caPC
eurodumm        byte    %10.0g                  eurodumm
crisisdumm      byte    %10.0g                  crisisdumm

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
growthIneq~F |        457   -.0069697    .0718098   -.415333    .451739
    lnrelatL |        446    .9175153    .5295423  -.0259337   2.343709
BargainingL2 |        312    .2793218    .1782628      .0449      .7661
      k_inov |        427    .0810127    .0470199   .0109361   .4950667
     fdiopen |        461    .1909102    .5714506  -.6764844   5.813815
-------------+---------------------------------------------------------
financial_~n |        420    1.966405    .8017374  -1.226155   2.321955
          op |        468    1.145204    .6537506   .3710993   4.122231
      eugini |        468    .1047732    .0099938   .0902179   .1369049
          FD |        450    .5361626    .2175712   .1004459   .9006572
    lnDebtH1 |        462    4.006271    2.315389  -2.951883   7.639548
-------------+---------------------------------------------------------
        caPC |        468   -.6865568    5.553381  -21.00853   11.77953
    eurodumm |        468    .6923077    .4620323          0          1
  crisisdumm |        468          .5     .500535          0          1

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
growth~F overall | -.0069697    .0718098   -.415333    .451739 |     N =     457
         between |              .0134777  -.0282483   .0252856 |     n =      18
         within  |              .0706054  -.3940543   .4730177 | T-bar = 25.3889
                 |                                            |
lnrelatL overall |  .9175153    .5295423  -.0259337   2.343709 |     N =     446
         between |              .4095628   .4658293   1.658096 |     n =      18
         within  |              .3488167   .0721636   1.868282 | T-bar = 24.7778
                 |                                            |
Bargai~2 overall |  .2793218    .1782628      .0449      .7661 |     N =     312
         between |              .1713674     .07889    .696535 |     n =      18
         within  |              .0383941     .16161   .4220218 |     T = 17.3333
                 |                                            |
k_inov   overall |  .0810127    .0470199   .0109361   .4950667 |     N =     427
         between |              .0307734   .0315929   .1474466 |     n =      18
         within  |              .0362544   -.014006   .4286328 |     T = 23.7222
                 |                                            |
fdiopen  overall |  .1909102    .5714506  -.6764844   5.813815 |     N =     461
         between |              .3251203   .0125404   1.316872 |     n =      18
         within  |               .477895  -1.465011   4.687854 | T-bar = 25.6111
                 |                                            |
financ~n overall |  1.966405    .8017374  -1.226155   2.321955 |     N =     420
         between |              .6206156   .3154293   2.321955 |     n =      17
         within  |              .5328385  -.3286934    3.44742 |     T = 24.7059
                 |                                            |
op       overall |  1.145204    .6537506   .3710993   4.122231 |     N =     468
         between |              .6281746   .5162591   3.121083 |     n =      18
         within  |              .2321872  -.1295407   2.146352 |     T =      26
                 |                                            |
eugini   overall |  .1047732    .0099938   .0902179   .1369049 |     N =     468
         between |                     0   .1047732   .1047732 |     n =      18
         within  |              .0099938   .0902179   .1369049 |     T =      26
                 |                                            |
FD       overall |  .5361626    .2175712   .1004459   .9006572 |     N =     450
         between |              .2126841   .2118398   .8086902 |     n =      18
         within  |              .0672352   .2284112   .6877019 |     T =      25
                 |                                            |
lnDebtH1 overall |  4.006271    2.315389  -2.951883   7.639548 |     N =     462
         between |              2.171727   .7389222   7.345015 |     n =      18
         within  |              .9220272   .0900429   6.030101 | T-bar = 25.6667
                 |                                            |
caPC     overall | -.6865568    5.553381  -21.00853   11.77953 |     N =     468
         between |              4.091556  -6.022415    6.79635 |     n =      18
         within  |               3.87239  -16.86258   12.20439 |     T =      26
                 |                                            |
eurodumm overall |  .6923077    .4620323          0          1 |     N =     468
         between |              .2258141   .2307692   .8461538 |     n =      18
         within  |              .4064624  -.1538462   1.461538 |     T =      26
                 |                                            |
crisis~m overall |        .5     .500535          0          1 |     N =     468
         between |                     0         .5         .5 |     n =      18
         within  |               .500535          0          1 |     T =      26
```

```
. testparm i.year

 ( 1)  2001.year = 0
 ( 2)  2002.year = 0
 ( 3)  2003.year = 0
 ( 4)  2004.year = 0
 ( 5)  2005.year = 0
 ( 6)  2006.year = 0
 ( 7)  2007.year = 0
 ( 8)  2008.year = 0
 ( 9)  2009.year = 0
 (10)  2010.year = 0
 (11)  2011.year = 0
 (12)  2012.year = 0
 (13)  2013.year = 0
 (14)  2014.year = 0
 (15)  2015.year = 0
 (16)  2016.year = 0
 (17)  2017.year = 0
       Constraint 6 dropped

       F( 16,    16) =  230.46
            Prob > F =    0.0000

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  17.cou = 0
 (12)  18.cou = 0
 (13)  20.cou = 0
 (14)  21.cou = 0
 (15)  22.cou = 0
 (16)  23.cou = 0

       F( 16,    16) = 8323.99
            Prob > F =    0.0000
```

Fixed effects over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthInequalityF[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               growthI~F |   .0034816        .059005
                       e |    .003138       .0560182
                       u |          0              0

        Test:   Var(u) = 0
                             chibar2(01) =     0.00
                          Prob > chibar2 =   1.0000
```

Random effects over pooled OLS

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
    lnrelatL |   -.0246722     .0126217      -.0372939        .0274299
BargainingL2 |    .0221185      .014239       .0078795        .1838344
      k_inov |    .4487612    -.0895148        .538276        .2620537
     fdiopen |   -.0000548     .0057268      -.0057816        .0057159
financial_~n |    .0361504     .0040915       .0320589        .0079337
          op |    .0897083     .0050449       .0846635        .0360257
      eugini |   -.9914678     .3022455      -1.293713        .4731434
          FD |    .0410297      .120313      -.0792833        .0949311
    lnDebtH1 |   -.0061487    -.0051251      -.0010236        .0099369
        caPC |    .0031368     .0013728        .001764         .000707
    eurodumm |   -.0644897    -.0311337       -.033356        .0094454
  crisisdumm |   -.0197081     .0091507      -.0288589        .0109006
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(12) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                           =       31.24
                Prob>chi2 =      0.0018
                (V_b-V_B is not positive definite)

.
. hausman fixed random,sigmamore

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
    lnrelatL |   -.0246722     .0126217      -.0372939        .0286261
BargainingL2 |    .0221185      .014239       .0078795        .1911144
      k_inov |    .4487612    -.0895148        .538276         .274638
     fdiopen |   -.0000548     .0057268      -.0057816        .0061544
financial_~n |    .0361504     .0040915       .0320589        .0084574
          op |    .0897083     .0050449       .0846635        .0375449
      eugini |   -.9914678     .3022455      -1.293713        .5238467
          FD |    .0410297      .120313      -.0792833        .0997985
    lnDebtH1 |   -.0061487    -.0051251      -.0010236        .0104545
        caPC |    .0031368     .0013728        .001764        .0007696
    eurodumm |   -.0644897    -.0311337       -.033356        .0106577
  crisisdumm |   -.0197081     .0091507      -.0288589        .0116484
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(12) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                           =       33.89
                Prob>chi2 =      0.0007

. hausman fixed random, sigmaless

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
    lnrelatL |   -.0246722     .0126217      -.0372939        .0275536
BargainingL2 |    .0221185      .014239       .0078795        .1839539
      k_inov |    .4487612    -.0895148        .538276        .2643482
     fdiopen |   -.0000548     .0057268      -.0057816        .0059238
financial_~n |    .0361504     .0040915       .0320589        .0081406
          op |    .0897083     .0050449       .0846635        .0361382
      eugini |   -.9914678     .3022455      -1.293713        .5042198
          FD |    .0410297      .120313      -.0792833        .0960593
    lnDebtH1 |   -.0061487    -.0051251      -.0010236        .0100628
        caPC |    .0031368     .0013728        .001764        .0007408
    eurodumm |   -.0644897    -.0311337       -.033356        .0102584
  crisisdumm |   -.0197081     .0091507      -.0288589         .011212
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(12) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                           =       36.58
                Prob>chi2 =      0.0003
```

Fixed effects over random effects

Depended variable: ΔInequalityL

$$\Delta Inequality_{L_{it}} = a_{1_{it}} + a_2 \Delta q_{L_{it}} + a_3 \Delta \Lambda_L Ldummy1_{it} + a_4 \Delta \Lambda_L Ldummy2_{it} + b_i + u_{it} (7.3.2.1)$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
-------------------------------------------------------------------------------------------------------------

growthInequal~L double  %10.0g                growthInequalityL
growthq         double  %10.0g                growthq
Ldummy1         double  %10.0g                Ldummy1
Ldummy2         double  %10.0g                Ldummy2

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
growthIneq~L |        405    .0270131    .1440789   -.716658   1.159001
     growthq |        404    .0111698     .108794  -.6867072   1.213311
     Ldummy1 |        431   -.0064165    .0326163  -.4018158   .2402902
     Ldummy2 |        428   -.0359111    .0854824  -.6549544   .7861568

. xtdescribe

     cou:  3, 5, ..., 23                                      n =         18
    year:  1995, 1996, ..., 2020                              T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
growt~yL overall |  .0270131   .1440789   -.716658   1.159001 |     N =     405
         between |             .0169949  -.0013351   .0475136 |     n =      18
         within  |              .143235  -.6978831   1.178458 | T-bar =    22.5
                 |                                            |
growthq  overall |  .0111698    .108794  -.6867072   1.213311 |     N =     404
         between |             .0283214  -.0060039   .1220693 |     n =      18
         within  |             .1057557  -.7976068   1.102412 | T-bar = 22.4444
                 |                                            |
Ldummy1  overall | -.0064165   .0326163  -.4018158   .2402902 |     N =     431
         between |             .0112997  -.0330754          0 |     n =      18
         within  |             .0308239  -.3786881   .2634179 | T-bar = 23.9444
                 |                                            |
Ldummy2  overall | -.0359111   .0854824  -.6549544   .7861568 |     N =     428
         between |              .021188  -.0718447   .0263221 |     n =      18
         within  |             .0830637  -.6515038   .7239235 | T-bar = 23.7778
```

```
. testparm i.year

 ( 1)  1996.year = 0
 ( 2)  1997.year = 0
 ( 3)  1998.year = 0
 ( 4)  1999.year = 0
 ( 5)  2000.year = 0
 ( 6)  2001.year = 0
 ( 7)  2002.year = 0
 ( 8)  2003.year = 0
 ( 9)  2004.year = 0
 (10)  2005.year = 0
 (11)  2006.year = 0
 (12)  2007.year = 0
 (13)  2008.year = 0
 (14)  2009.year = 0
 (15)  2010.year = 0
 (16)  2011.year = 0
 (17)  2012.year = 0
 (18)  2013.year = 0
 (19)  2014.year = 0
 (20)  2015.year = 0
 (21)  2016.year = 0
 (22)  2017.year = 0
 (23)  2018.year = 0
 (24)  2019.year = 0
 (25)  2020.year = 0
       Constraint 1 dropped
       Constraint 5 dropped
       Constraint 6 dropped
       Constraint 7 dropped
       Constraint 9 dropped
       Constraint 16 dropped
       Constraint 20 dropped
       Constraint 23 dropped

       F( 17,    17) =    8.36
            Prob > F =    0.0000

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  15.cou = 0
 (12)  17.cou = 0
 (13)  18.cou = 0
 (14)  20.cou = 0
 (15)  21.cou = 0
 (16)  22.cou = 0
 (17)  23.cou = 0
       Constraint 4 dropped
       Constraint 5 dropped
       Constraint 7 dropped
       Constraint 14 dropped
       Constraint 17 dropped

       F( 12,    17) = 1435.45
            Prob > F =    0.0000
```

fixed over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthInequalityL[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               growthI~L |   .0203849       .1427758
                       e |   .0112197       .1059232
                       u |          0              0

        Test:   Var(u) = 0
                             chibar2(01) =     0.00
                          Prob > chibar2 =   1.0000
```

random over pooled

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
     growthq |    1.036086     .9822457        .0538401         .017653
     Ldummy1 |    1.828208     1.690398        .1378098        .0706397
     Ldummy2 |   -.3976655    -.3892867       -.0083788        .0140204
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        9.48
                Prob>chi2 =      0.0236
```

fixed over pooled

Depended variable: Δrelative labor employment

$$\Delta\Lambda_{L_{it}} = a_{1_{it}} + a_2 wage\ premium_{it} + a_3 invest\ in\ R\&D_{it} + a_4 capital\ innovation\ ratio_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 fdi\ oppenness_{it} + a_8 convergence_{it} + a_9 education\ expenditure_{it} + a_{10} euro\ dummy_{it} + a_{11} 2008\ crisis\ dummy_{it} + b_i + u_{it} \qquad (7.3.2.3)$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
------------------------------------------------------------------------------------
growthrelatL    double  %10.0g                growthrelatL
lnq             double  %10.0g                lnq
lngerd          double  %10.0g                lngerd
k_inov          double  %10.0g                k_inov
financial_open  double  %10.0g                financial_open
op              double  %10.0g                op
fdiopen         double  %10.0g                fdiopen
eugini          double  %10.0g                eugini
eduexpe2        double  %10.0g                eduexpe2
eurodumm        byte    %10.0g                eurodumm
crisisdumm      byte    %10.0g                crisisdumm

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
growthrelatL |        434   -.0403526    .0951862  -.6549544   .7861568
         lnq |        422    .6437305    .4029339   .1012905    2.92957
      lngerd |        433     7.54516    2.150039   2.882172   11.60847
      k_inov |        427    .0810127    .0470199   .0109361   .4950667
financial_~n |        420    1.966405    .8017374  -1.226155   2.321955
-------------+---------------------------------------------------------
          op |        468    1.145204    .6537506   .3710993   4.122231
     fdiopen |        461    .1909102    .5714506  -.6764844   5.813815
      eugini |        468    .1125057    .0221542   .0434832   .1532992
    eduexpe2 |        468    .0512692    .0089968       .031       .073
    eurodumm |        468    .6923077    .4620323          0          1
-------------+---------------------------------------------------------
  crisisdumm |        468          .5     .500535          0          1

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
growt~tL overall | -.0403526    .0951862  -.6549544   .7861568 |     N =     434
         between |               .018339  -.0718447   .0070854 |     n =      18
         within  |              .0935498  -.6443039   .7525574 | T-bar = 24.1111
                 |                                            |
lnq      overall |  .6437305    .4029339   .1012905    2.92957 |     N =     422
         between |              .4350003   .3168834   1.644975 |     n =      18
         within  |               .173684   .0782745   2.013491 | T-bar = 23.4444
                 |                                            |
lngerd   overall |   7.54516    2.150039   2.882172   11.60847 |     N =     433
         between |              2.135548   4.127116   11.07295 |     n =      18
         within  |              .5305817   5.573098   8.670162 |     T = 24.0556
                 |                                            |
k_inov   overall |  .0810127    .0470199   .0109361   .4950667 |     N =     427
         between |              .0307734   .0315929   .1474466 |     n =      18
         within  |              .0362544   -.014006   .4286328 |     T = 23.7222
                 |                                            |
financ~n overall |  1.966405    .8017374  -1.226155   2.321955 |     N =     420
         between |              .6206156   .3154293   2.321955 |     n =      17
         within  |              .5328385  -.3286934    3.44742 |     T = 24.7059
                 |                                            |
op       overall |  1.145204    .6537506   .3710993   4.122231 |     N =     468
         between |              .6281746   .5162591   3.121083 |     n =      18
         within  |              .2321872  -.1295407   2.146352 |     T =      26
                 |                                            |
fdiopen  overall |  .1909102    .5714506  -.6764844   5.813815 |     N =     461
         between |              .3251203   .0125404   1.316872 |     n =      18
         within  |               .477895  -1.465011   4.687854 | T-bar = 25.6111
                 |                                            |
eugini   overall |  .1125057    .0221542   .0434832   .1532992 |     N =     468
         between |                     0   .1125057   .1125057 |     n =      18
         within  |              .0221542   .0434832   .1532992 |     T =      26
                 |                                            |
eduexpe2 overall |  .0512692    .0089968       .031       .073 |     N =     468
         between |              .0082944   .0391538   .0629615 |     n =      18
         within  |              .0039784   .0372308   .0659231 |     T =      26
                 |                                            |
eurodumm overall |  .6923077    .4620323          0          1 |     N =     468
         between |              .2258141   .2307692   .8461538 |     n =      18
         within  |              .4064624  -.1538462   1.461538 |     T =      26
                 |                                            |
crisis~m overall |        .5     .500535          0          1 |     N =     468
         between |                     0         .5         .5 |     n =      18
         within  |               .500535          0          1 |     T =      26
```

```
. testparm i.year

 ( 1)  1997.year = 0
 ( 2)  1998.year = 0
 ( 3)  1999.year = 0
 ( 4)  2000.year = 0
 ( 5)  2001.year = 0
 ( 6)  2002.year = 0
 ( 7)  2003.year = 0
 ( 8)  2004.year = 0
 ( 9)  2005.year = 0
 (10)  2006.year = 0
 (11)  2007.year = 0
 (12)  2008.year = 0
 (13)  2009.year = 0
 (14)  2010.year = 0
 (15)  2011.year = 0
 (16)  2012.year = 0
 (17)  2013.year = 0
 (18)  2014.year = 0
 (19)  2015.year = 0
 (20)  2016.year = 0
 (21)  2017.year = 0
       Constraint 10 dropped
       Constraint 14 dropped
       Constraint 16 dropped
       Constraint 17 dropped
       Constraint 20 dropped

       F( 16,    16) =    6.35
            Prob > F =    0.0003

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  17.cou = 0
 (12)  18.cou = 0
 (13)  20.cou = 0
 (14)  21.cou = 0
 (15)  22.cou = 0
 (16)  23.cou = 0

       F( 16,    16) = 1.1e+07
            Prob > F =    0.0000
```

fixed over pooled

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthrelatL[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               growthr~L |   .0055725       .0746489
                       e |   .0051715       .0719132
                       u |   .0001718       .0131089

        Test:   Var(u) = 0
                             chibar2(01) =     0.17
                          Prob > chibar2 =   0.3409
```

Random over pooled

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
       L.lnq |     .118792     .0005235        .1182685        .0418371
      lngerd |   -.0605427     .0006295       -.0611722        .0172047
      k_inov |    .1360834    -.0032481        .1393315        .0844207
financial_~n |     .005281     .0089172       -.0036363        .0075825
          op |    .1660144     .0187848        .1472296        .0381643
     fdiopen |    .0034305     .0024716        .0009588        .0040342
      eugini |    .0350542     .1716667       -.1366125               .
    eduexpe2 |   -.8514825    -.3064974        -.544985        1.013774
    eurodumm |   -.0057019    -.0091896        .0034877        .0068739
  crisisdumm |   -.0004372    -.0117401        .0113029        .0090447
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       20.27
                Prob>chi2 =      0.0268
                (V_b-V_B is not positive definite)

.
. hausman fixed random,sigmamore

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
       L.lnq |     .118792     .0005235        .1182685        .0434056
      lngerd |   -.0605427     .0006295       -.0611722        .0177905
      k_inov |    .1360834    -.0032481        .1393315        .0929168
financial_~n |     .005281     .0089172       -.0036363        .0081647
          op |    .1660144     .0187848        .1472296        .0395609
     fdiopen |    .0034305     .0024716        .0009588        .0046663
      eugini |    .0350542     .1716667       -.1366125         .039941
    eduexpe2 |   -.8514825    -.3064974        -.544985        1.059205
    eurodumm |   -.0057019    -.0091896        .0034877        .0078555
  crisisdumm |   -.0004372    -.0117401        .0113029        .0096637
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       30.59
                Prob>chi2 =      0.0007

. hausman fixed random, sigmaless

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
       L.lnq |     .118792     .0005235        .1182685        .0420449
      lngerd |   -.0605427     .0006295       -.0611722        .0172328
      k_inov |    .1360834    -.0032481        .1393315        .0900041
financial_~n |     .005281     .0089172       -.0036363        .0079087
          op |    .1660144     .0187848        .1472296        .0383208
     fdiopen |    .0034305     .0024716        .0009588          .00452
      eugini |    .0350542     .1716667       -.1366125        .0386889
    eduexpe2 |   -.8514825    -.3064974        -.544985        1.026002
    eurodumm |   -.0057019    -.0091896        .0034877        .0076092
  crisisdumm |   -.0004372    -.0117401        .0113029        .0093608
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       32.61
                Prob>chi2 =      0.0003
```

fixed over random

Depended variable Δq

$$
\begin{aligned}
\Delta q_{L_{it}} = a_{1_{it}} &+ a_2 wage\ premium_{it} + a_3 invest\ in\ R\&D_{it} + a_4 capital\ innovation\ ratio_{it} \\
&+ a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 fdi\ oppenness_{it} \\
&+ a_8 convergence_{it} + a_9 education\ expenditure_{it} + a_{10} euro\ dummy_{it} \\
&+ a_{11} 2008\ crisis\ dummy_{it} + b_i + u_{it} \qquad (7.3.2.4)
\end{aligned}
$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
------------------------------------------------------------------------------------------
growthq         double  %10.0g                growthq
lnq             double  %10.0g                lnq
lngerd          double  %10.0g                lngerd
k_inov          double  %10.0g                k_inov
financial_open  double  %10.0g                financial_open
op              double  %10.0g                op
fdiopen         double  %10.0g                fdiopen
eugini          double  %10.0g                eugini
eduexpe2        double  %10.0g                eduexpe2
eurodumm        byte    %10.0g                eurodumm
crisisdumm      byte    %10.0g                crisisdumm

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
     growthq |        404    .0111698     .108794  -.6867072   1.213311
         lnq |        422    .6437305    .4029339   .1012905    2.92957
      lngerd |        433     7.54516    2.150039   2.882172   11.60847
      k_inov |        427    .0810127    .0470199   .0109361   .4950667
financial_~n |        420    1.966405    .8017374  -1.226155   2.321955
-------------+---------------------------------------------------------
          op |        468    1.145204    .6537506   .3710993   4.122231
     fdiopen |        461    .1909102    .5714506  -.6764844   5.813815
      eugini |        468    .1047732    .0099938   .0902179   .1369049
    eduexpe2 |        468    .0512692    .0089968       .031       .073
    eurodumm |        468    .6923077    .4620323          0          1
-------------+---------------------------------------------------------
  crisisdumm |        468          .5     .500535          0          1

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
growthq  overall |  .0111698     .108794  -.6867072   1.213311 |     N =     404
         between |              .0283214  -.0060039   .1220693 |     n =      18
         within  |              .1057557  -.7976068   1.102412 | T-bar = 22.4444
                 |                                            |
lnq      overall |  .6437305    .4029339   .1012905    2.92957 |     N =     422
         between |              .4350003   .3168834   1.644975 |     n =      18
         within  |               .173684   .0782745   2.013491 | T-bar = 23.4444
                 |                                            |
lngerd   overall |   7.54516    2.150039   2.882172   11.60847 |     N =     433
         between |              2.135548   4.127116   11.07295 |     n =      18
         within  |              .5305817   5.573098   8.670162 |     T = 24.0556
                 |                                            |
k_inov   overall |  .0810127    .0470199   .0109361   .4950667 |     N =     427
         between |              .0307734   .0315929   .1474466 |     n =      18
         within  |              .0362544   -.014006   .4286328 |     T = 23.7222
                 |                                            |
financ~n overall |  1.966405    .8017374  -1.226155   2.321955 |     N =     420
         between |              .6206156   .3154293   2.321955 |     n =      17
         within  |              .5328385  -.3286934    3.44742 |     T = 24.7059
                 |                                            |
op       overall |  1.145204    .6537506   .3710993   4.122231 |     N =     468
         between |              .6281746   .5162591   3.121083 |     n =      18
         within  |              .2321872  -.1295407   2.146352 |     T =      26
                 |                                            |
fdiopen  overall |  .1909102    .5714506  -.6764844   5.813815 |     N =     461
         between |              .3251203   .0125404   1.316872 |     n =      18
         within  |               .477895  -1.465011   4.687854 | T-bar = 25.6111
                 |                                            |
eugini   overall |  .1047732    .0099938   .0902179   .1369049 |     N =     468
         between |                     0   .1047732   .1047732 |     n =      18
         within  |              .0099938   .0902179   .1369049 |     T =      26
                 |                                            |
eduexpe2 overall |  .0512692    .0089968       .031       .073 |     N =     468
         between |              .0082944   .0391538   .0629615 |     n =      18
         within  |              .0039784   .0372308   .0659231 |     T =      26
                 |                                            |
eurodumm overall |  .6923077    .4620323          0          1 |     N =     468
         between |              .2258141   .2307692   .8461538 |     n =      18
         within  |              .4064624  -.1538462   1.461538 |     T =      26
                 |                                            |
crisis~m overall |        .5     .500535          0          1 |     N =     468
         between |                     0         .5         .5 |     n =      18
         within  |               .500535          0          1 |     T =      26
```

```
. testparm i.year

 ( 1)  1997.year = 0
 ( 2)  1998.year = 0
 ( 3)  1999.year = 0
 ( 4)  2000.year = 0
 ( 5)  2001.year = 0
 ( 6)  2002.year = 0
 ( 7)  2003.year = 0
 ( 8)  2004.year = 0
 ( 9)  2005.year = 0
 (10)  2006.year = 0
 (11)  2007.year = 0
 (12)  2008.year = 0
 (13)  2009.year = 0
 (14)  2010.year = 0
 (15)  2011.year = 0
 (16)  2012.year = 0
 (17)  2013.year = 0
 (18)  2014.year = 0
 (19)  2015.year = 0
 (20)  2016.year = 0
 (21)  2017.year = 0
       Constraint 1 dropped
       Constraint 4 dropped
       Constraint 17 dropped
       Constraint 20 dropped
       Constraint 21 dropped

       F( 16,    16) =   21.15
            Prob > F =    0.0000

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  17.cou = 0
 (12)  18.cou = 0
 (13)  20.cou = 0
 (14)  21.cou = 0
 (15)  22.cou = 0
 (16)  23.cou = 0
       Constraint 13 dropped

       F( 15,    16) = 5230.76
            Prob > F =    0.0000
```

Random over Pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthq[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                 growthq |   .0043288       .0657934
                       e |    .003253       .0570351
                       u |          0              0

        Test:   Var(u) = 0
                             chibar2(01) =     0.00
                          Prob > chibar2 =   1.0000
```

Random over pooled OLS

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
       L.lnq |   -.2707986    -.0049827       -.2658159         .036364
      lngerd |    .0170184    -.0033444        .0203628        .0135921
      k_inov |    .3533687     .0594512        .2939175        .0729792
 financial_~n |     .043096     .0134468        .0296492        .0065752
          op |    .0591101     .0196299        .0394801        .0320532
     fdiopen |   -.0359187    -.0348927        -.001026        .0031798
      eugini |    1.254754     1.365284         -.11053        .1027521
    eduexpe2 |    -2.76055    -.4209995        -2.33955        .8724692
    eurodumm |    -.002612      .002918         -.00553        .0057026
  crisisdumm |   -.0104988    -.0021768       -.0083219        .0071082
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                           =       96.25
                Prob>chi2 =      0.0000
                (V_b-V_B is not positive definite)

.
. hausman fixed random,sigmamore

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
       L.lnq |   -.2707986    -.0049827       -.2658159        .0403456
      lngerd |    .0170184    -.0033444        .0203628        .0149897
      k_inov |    .3533687     .0594512        .2939175         .091453
 financial_~n |     .043096     .0134468        .0296492        .0078538
          op |    .0591101     .0196299        .0394801        .0354899
     fdiopen |   -.0359187    -.0348927        -.001026        .0048802
      eugini |    1.254754     1.365284         -.11053        .2795157
    eduexpe2 |    -2.76055    -.4209995        -2.33955        .9801693
    eurodumm |    -.002612      .002918         -.00553         .007999
  crisisdumm |   -.0104988    -.0021768       -.0083219        .0086482
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                           =       70.29
                Prob>chi2 =      0.0000

. hausman fixed random, sigmaless

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
       L.lnq |   -.2707986    -.0049827       -.2658159         .036714
      lngerd |    .0170184    -.0033444        .0203628        .0136404
      k_inov |    .3533687     .0594512        .2939175         .083221
 financial_~n |     .043096     .0134468        .0296492        .0071468
          op |    .0591101     .0196299        .0394801        .0322953
     fdiopen |   -.0359187    -.0348927        -.001026         .004441
      eugini |    1.254754     1.365284         -.11053        .2543555
    eduexpe2 |    -2.76055    -.4209995        -2.33955        .8919406
    eurodumm |    -.002612      .002918         -.00553         .007279
  crisisdumm |   -.0104988    -.0021768       -.0083219        .0078698
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                           =       84.88
                Prob>chi2 =      0.0000
```

Fixed over random

Depended variable: Δ InequalityL

$$\Delta Inequality_{L_{it}} = a_{1_{it}} + a_2 invest\ in\ R\&D_{it} + a_3 capital\ innovation\ ratio_{it} + a_4 financial\ oppenness_{it} + a_5 trade\ openness_{it} + a_6 fdi\ oppenness_{it} + a_7 convergence_{it} + a_8 education\ expenditure_{it} + a_9 euro\ dummy_{it} + a_9 2008\ crisis\ dummy_{it} + b_i + u_{it} (7.3.12.)$$

```
. testparm i.year

 ( 1)  1997.year = 0
 ( 2)  1998.year = 0
 ( 3)  1999.year = 0
 ( 4)  2000.year = 0
 ( 5)  2001.year = 0
 ( 6)  2002.year = 0
 ( 7)  2003.year = 0
 ( 8)  2004.year = 0
 ( 9)  2005.year = 0
 (10)  2006.year = 0
 (11)  2007.year = 0
 (12)  2008.year = 0
 (13)  2009.year = 0
 (14)  2010.year = 0
 (15)  2011.year = 0
 (16)  2012.year = 0
 (17)  2013.year = 0
 (18)  2014.year = 0
 (19)  2015.year = 0
 (20)  2016.year = 0
 (21)  2017.year = 0
       Constraint 1 dropped
       Constraint 6 dropped
       Constraint 7 dropped
       Constraint 17 dropped

       F( 17,    16) = 8.8e+07
            Prob > F =    0.0000

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  17.cou = 0
 (12)  18.cou = 0
 (13)  20.cou = 0
 (14)  21.cou = 0
 (15)  22.cou = 0
 (16)  23.cou = 0
       Constraint 13 dropped

       F( 15,    16) = 5230.76
            Prob > F =    0.0000
```

Random over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthq[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                 growthq |   .0043288       .0657934
                       e |   .0032977       .0574254
                       u |          0              0

        Test:   Var(u) = 0
                             chibar2(01) =     0.00
                          Prob > chibar2 =   1.0000
```

Random over pooled OLS

```
. hausman fixed random
```

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
L.lnq	-.2579043	-.0064443	-.2514601	.0361419
lngerd	.0163723	-.0021912	.0185634	.0138249
k_inov	.3605095	.0563725	.304137	.0731715
financial_~n	.0411387	.0127374	.0284013	.0066819
op	.0822454	.0220309	.0602145	.0310342
fdiopen	-.0370731	-.0369697	-.0001034	.0032422
eugini	-.0765148	-.112756	.0362412	.
eduexpe2	-3.214159	-.537261	-2.676898	.8540404
eurodumm	-.0108953	-.0023353	-.00856	.0047126
crisisdumm	-.0159329	-.0061499	-.009783	.0069413

```
                  b = consistent under Ho and Ha; obtained from xtreg
   B = inconsistent under Ha, efficient under Ho; obtained from xtreg

   Test:  Ho:  difference in coefficients not systematic

                chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                         =      100.84
               Prob>chi2 =      0.0000
               (V_b-V_B is not positive definite)

.
. hausman fixed random,sigmamore
```

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
L.lnq	-.2579043	-.0064443	-.2514601	.0401511
lngerd	.0163723	-.0021912	.0185634	.0152585
k_inov	.3605095	.0563725	.304137	.0919932
financial_~n	.0411387	.0127374	.0284013	.0079898
op	.0822454	.0220309	.0602145	.034412
fdiopen	-.0370731	-.0369697	-.0001034	.004954
eugini	-.0765148	-.112756	.0362412	.0366116
eduexpe2	-3.214159	-.537261	-2.676898	.9614431
eurodumm	-.0108953	-.0023353	-.00856	.0071843
crisisdumm	-.0159329	-.0061499	-.009783	.008474

```
                  b = consistent under Ho and Ha; obtained from xtreg
   B = inconsistent under Ha, efficient under Ho; obtained from xtreg

   Test:  Ho:  difference in coefficients not systematic

                chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                         =       70.70
               Prob>chi2 =      0.0000

. hausman fixed random, sigmaless
```

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
L.lnq	-.2579043	-.0064443	-.2514601	.0365052
lngerd	.0163723	-.0021912	.0185634	.0138729
k_inov	.3605095	.0563725	.304137	.08364
financial_~n	.0411387	.0127374	.0284013	.0072643
op	.0822454	.0220309	.0602145	.0312873
fdiopen	-.0370731	-.0369697	-.0001034	.0045041
eugini	-.0765148	-.112756	.0362412	.0332872
eduexpe2	-3.214159	-.537261	-2.676898	.8741416
eurodumm	-.0108953	-.0023353	-.00856	.006532
crisisdumm	-.0159329	-.0061499	-.009783	.0077046

```
                  b = consistent under Ho and Ha; obtained from xtreg
   B = inconsistent under Ha, efficient under Ho; obtained from xtreg

   Test:  Ho:  difference in coefficients not systematic

                chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                         =       85.53
               Prob>chi2 =      0.0000
```

fixed over Random

Depended variable: Δ InequalityK

$$\Delta Inequality_{K\,it} = a_{1\,it} + a_2 \Delta q_{K\,it} + a_3 \Delta \Lambda_{K\,it} + b_i + u_{it} \tag{7.3.11}$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
------------------------------------------------------------------------------------------------------------------------
growthInequal~K double  %10.0g                growthInequalityK
growthrelatK    double  %10.0g                growthrelatK
growthpremK     double  %10.0g                growthpremK

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
growthIneq~K |        456    .0177396    .1726881  -.5998913   1.470415
growthrelatK |        465   -.0070282    .0643164  -.8362134   .5429749
 growthpremK |        458    .0094547    .1739107  -.7347902   .7700615

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
growt~yK overall |  .0177396    .1726881  -.5998913   1.470415 |     N =     456
         between |              .0219224  -.0085433   .0754785 |     n =      18
         within  |              .1714091  -.5736084   1.423961 | T-bar = 25.3333
                 |                                            |
growt~tK overall | -.0070282    .0643164  -.8362134   .5429749 |     N =     465
         between |              .0147827  -.0385275   .0265513 |     n =      18
         within  |               .062712  -.8047142    .535717 | T-bar = 25.8333
                 |                                            |
growt~mK overall |  .0094547    .1739107  -.7347902   .7700615 |     N =     458
         between |              .0179815  -.0311956   .0466506 |     n =      18
         within  |              .1730391  -.7399868   .7648649 | T-bar = 25.4444
```

```
. testparm i.year

 ( 1)  1996.year = 0
 ( 2)  1997.year = 0
 ( 3)  1998.year = 0
 ( 4)  1999.year = 0
 ( 5)  2000.year = 0
 ( 6)  2001.year = 0
 ( 7)  2002.year = 0
 ( 8)  2003.year = 0
 ( 9)  2004.year = 0
 (10)  2005.year = 0
 (11)  2006.year = 0
 (12)  2007.year = 0
 (13)  2008.year = 0
 (14)  2009.year = 0
 (15)  2010.year = 0
 (16)  2011.year = 0
 (17)  2012.year = 0
 (18)  2013.year = 0
 (19)  2014.year = 0
 (20)  2015.year = 0
 (21)  2016.year = 0
 (22)  2017.year = 0
 (23)  2018.year = 0
 (24)  2019.year = 0
 (25)  2020.year = 0
       Constraint 2 dropped
       Constraint 5 dropped
       Constraint 7 dropped
       Constraint 9 dropped
       Constraint 14 dropped
       Constraint 19 dropped
       Constraint 20 dropped
       Constraint 24 dropped

       F( 17,    17) =    6.11
            Prob > F =    0.0003

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  15.cou = 0
 (12)  17.cou = 0
 (13)  18.cou = 0
 (14)  20.cou = 0
 (15)  21.cou = 0
 (16)  22.cou = 0
 (17)  23.cou = 0
       Constraint 1 dropped
       Constraint 2 dropped
       Constraint 3 dropped
       Constraint 4 dropped
       Constraint 5 dropped
       Constraint 6 dropped
       Constraint 7 dropped
       Constraint 10 dropped
       Constraint 11 dropped
       Constraint 12 dropped
       Constraint 13 dropped
       Constraint 14 dropped
       Constraint 17 dropped

       F(  4,    17) =20884.16
            Prob > F =    0.0000
```

Fixed effects over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthInequalityK[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               growthI~K |   .0298212       .1726881
                       e |    .005052       .0710774
                       u |          0              0

        Test:   Var(u) = 0
                             chibar2(01) =     0.00
                          Prob > chibar2 =   1.0000
```

Random over pooled OLS

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
growthrelatK |   -.7385299    -.7113487       -.0271812        .0140896
 growthpremK |    .8789272     .8827646       -.0038374        .0018886
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        5.85
                Prob>chi2 =      0.0538

.
end of do-file

. do "C:\Users\addez\AppData\Local\Temp\STD01000000.tmp"

. hausman fixed random,sigmamore

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
growthrelatK |   -.7385299    -.7113487       -.0271812        .0139078
 growthpremK |    .8789272     .8827646       -.0038374        .0017327
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        6.34
                Prob>chi2 =      0.0420

. hausman fixed random, sigmaless

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
growthrelatK |   -.7385299    -.7113487       -.0271812        .0139184
 growthpremK |    .8789272     .8827646       -.0038374         .001734
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        6.33
                Prob>chi2 =      0.0422
```

Choose random over fixed

Depended variable: Δ relatK

$$\Delta\Lambda_{K_{it}} = a_{1_{it}} + a_2 L.relatK_{it} + a_3 invest\ in\ R\&D_{it} + a_4 capital\ innovation\ ratio_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 fdi\ oppenness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} + a_{10} euro\ dummy_{it} + a_{11} 2008\ crisis\ dummy_{it} + b_i + u_{it} \qquad (7.3.3.2)$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
------------------------------------------------------------------------------------------------
growthrelatK    double  %10.0g                growthrelatK
lnrelatK        double  %10.0g                lnrelatK
lnpremK         double  %10.0g                lnpremK
lngerd          double  %10.0g                lngerd
FD              double  %10.0g                FD
k_inov          double  %10.0g                k_inov
financial_open  double  %10.0g                financial_open
op              double  %10.0g                op
fdiopen         double  %10.0g                fdiopen
eugini          double  %10.0g                eugini
eurodumm        byte    %10.0g                eurodumm
crisisdumm      byte    %10.0g                crisisdumm

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
growthrelatK |        465   -.0070282    .0643164  -.8362134   .5429749
    lnrelatK |        468    2.492184    .4222285   1.563131   3.579892
     lnpremK |        468    1.585921    .3796331  -.1074219   3.142471
      lngerd |        433     7.54516    2.150039   2.882172   11.60847
          FD |        450    .5361626    .2175712   .1004459   .9006572
-------------+---------------------------------------------------------
      k_inov |        427    .0810127    .0470199   .0109361   .4950667
financial_~n |        420    1.966405    .8017374  -1.226155   2.321955
          op |        468    1.145204    .6537506   .3710993   4.122231
     fdiopen |        461    .1909102    .5714506  -.6764844   5.813815
      eugini |        468    .1125057    .0221542   .0434832   .1532992
-------------+---------------------------------------------------------
    eurodumm |        468    .6923077    .4620323          0          1
  crisisdumm |        468          .5     .500535          0          1

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%      25%       50%       75%      95%      max
                        26      26       26        26        26       26       26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
growt~tK overall | -.0070282    .0643164  -.8362134   .5429749 |     N =     465
         between |              .0147827  -.0385275   .0265513 |     n =      18
         within  |               .062712  -.8047142    .535717 | T-bar = 25.8333
                 |                                            |
lnrelatK overall |  2.492184    .4222285   1.563131   3.579892 |     N =     468
         between |              .4029183   1.681473   3.346412 |     n =      18
         within  |              .1569219   1.993741   2.985862 |     T =      26
                 |                                            |
lnpremK  overall |  1.585921    .3796331  -.1074219   3.142471 |     N =     468
         between |              .3111824   .9542603   2.237374 |     n =      18
         within  |              .2290647   .5242391   2.491018 |     T =      26
                 |                                            |
lngerd   overall |   7.54516    2.150039   2.882172   11.60847 |     N =     433
         between |              2.135548   4.127116   11.07295 |     n =      18
         within  |              .5305817   5.573098   8.670162 |     T = 24.0556
                 |                                            |
FD       overall |  .5361626    .2175712   .1004459   .9006572 |     N =     450
         between |              .2126841   .2118398   .8086902 |     n =      18
         within  |              .0672352   .2284112   .6877019 |     T =      25
                 |                                            |
k_inov   overall |  .0810127    .0470199   .0109361   .4950667 |     N =     427
         between |              .0307734   .0315929   .1474466 |     n =      18
         within  |              .0362544   -.014006   .4286328 |     T = 23.7222
                 |                                            |
financ~n overall |  1.966405    .8017374  -1.226155   2.321955 |     N =     420
         between |              .6206156   .3154293   2.321955 |     n =      17
         within  |              .5328385  -.3286934    3.44742 |     T = 24.7059
                 |                                            |
op       overall |  1.145204    .6537506   .3710993   4.122231 |     N =     468
         between |              .6281746   .5162591   3.121083 |     n =      18
         within  |              .2321872  -.1295407   2.146352 |     T =      26
                 |                                            |
fdiopen  overall |  .1909102    .5714506  -.6764844   5.813815 |     N =     461
         between |              .3251203   .0125404   1.316872 |     n =      18
         within  |               .477895  -1.465011   4.687854 | T-bar = 25.6111
                 |                                            |
eugini   overall |  .1125057    .0221542   .0434832   .1532992 |     N =     468
         between |                     0   .1125057   .1125057 |     n =      18
         within  |              .0221542   .0434832   .1532992 |     T =      26
                 |                                            |
eurodumm overall |  .6923077    .4620323          0          1 |     N =     468
         between |              .2258141   .2307692   .8461538 |     n =      18
         within  |              .4064624  -.1538462   1.461538 |     T =      26
                 |                                            |
crisis~m overall |        .5     .500535          0          1 |     N =     468
         between |                     0         .5         .5 |     n =      18
         within  |               .500535          0          1 |     T =      26
```

```
. testparm i.year

 ( 1)  1997.year = 0
 ( 2)  1998.year = 0
 ( 3)  1999.year = 0
 ( 4)  2000.year = 0
 ( 5)  2001.year = 0
 ( 6)  2002.year = 0
 ( 7)  2003.year = 0
 ( 8)  2004.year = 0
 ( 9)  2005.year = 0
 (10)  2006.year = 0
 (11)  2007.year = 0
 (12)  2008.year = 0
 (13)  2009.year = 0
 (14)  2010.year = 0
 (15)  2011.year = 0
 (16)  2012.year = 0
 (17)  2013.year = 0
 (18)  2014.year = 0
 (19)  2015.year = 0
 (20)  2016.year = 0
 (21)  2017.year = 0
       Constraint 3 dropped
       Constraint 4 dropped
       Constraint 6 dropped
       Constraint 8 dropped
       Constraint 16 dropped

       F( 16,    16) =    2.83
            Prob > F =    0.0225

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  17.cou = 0
 (12)  18.cou = 0
 (13)  20.cou = 0
 (14)  21.cou = 0
 (15)  22.cou = 0
 (16)  23.cou = 0
       Constraint 1 dropped
       Constraint 10 dropped
       Constraint 11 dropped
       Constraint 12 dropped

       F( 12,    16) = 5987.45
            Prob > F =    0.0000
```

Fixed over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthrelatK[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               growthr~K |   .0019901         .04461
                       e |   .0016593       .0407342
                       u |          0              0

        Test:   Var(u) = 0
                             chibar2(01) =     0.00
                          Prob > chibar2 =   1.0000
```

random effects over pooled OLS

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
  L.lnrelatK |   -.0774403    -.0234378       -.0540024         .0180779
   L.lnpremK |   -.0021201     -.002046       -.0000741         .0101831
      lngerd |   -.0271204     .0037966       -.0309169         .0085874
          FD |    .0273808    -.0254718        .0528527         .0390547
      k_inov |   -.0711194    -.0533714        -.017748          .044527
financial_~n |   -.0115984    -.0113744        -.000224         .0037965
          op |    .0724478     .0155789        .0568689         .0198265
     fdiopen |   -.0060316    -.0093312        .0032996         .0029837
      eugini |    .1760653     .2062786       -.0302134         .0453604
    eurodumm |    .0129101     .0122695        .0006406         .0034458
  crisisdumm |    -.008431    -.0130151        .0045842         .0045708
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       32.65
                Prob>chi2 =      0.0006
                (V_b-V_B is not positive definite)

.
. hausman fixed random,sigmamore

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
  L.lnrelatK |   -.0774403    -.0234378       -.0540024         .0187544
   L.lnpremK |   -.0021201     -.002046       -.0000741         .0106791
      lngerd |   -.0271204     .0037966       -.0309169         .0088934
          FD |    .0273808    -.0254718        .0528527          .040753
      k_inov |   -.0711194    -.0533714        -.017748         .0479311
financial_~n |   -.0115984    -.0113744        -.000224         .0040361
          op |    .0724478     .0155789        .0568689         .0205509
     fdiopen |   -.0060316    -.0093312        .0032996         .0032713
      eugini |    .1760653     .2062786       -.0302134         .0538682
    eurodumm |    .0129101     .0122695        .0006406         .0040098
  crisisdumm |    -.008431    -.0130151        .0045842         .0049125
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       35.90
                Prob>chi2 =      0.0002

. hausman fixed random, sigmaless

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
  L.lnrelatK |   -.0774403    -.0234378       -.0540024         .0181483
   L.lnpremK |   -.0021201     -.002046       -.0000741          .010334
      lngerd |   -.0271204     .0037966       -.0309169          .008606
          FD |    .0273808    -.0254718        .0528527         .0394361
      k_inov |   -.0711194    -.0533714        -.017748         .0463822
financial_~n |   -.0115984    -.0113744        -.000224         .0039057
          op |    .0724478     .0155789        .0568689         .0198868
     fdiopen |   -.0060316    -.0093312        .0032996         .0031656
      eugini |    .1760653     .2062786       -.0302134         .0521275
    eurodumm |    .0129101     .0122695        .0006406         .0038802
  crisisdumm |    -.008431    -.0130151        .0045842         .0047537
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       38.34
                Prob>chi2 =      0.0001
```

Fixed over random

Depended variable: ΔpremK

$$\Delta q_{K_{it}} = a_{1_{it}} + a_2 L.relatK_{it} + a_3 invest\ in\ R\&D_{it} + a_4 capital\ innovation\ ratio_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 fdi\ oppenness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} + a_{10} euro\ dummy_{it} + a_{11} 2008\ crisis\ dummy_{it} + b_i + u_{it} \qquad (7.3.3.3)$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
-------------------------------------------------------------------------------------------------------------------------
growthpremK     double  %10.0g                growthpremK
lnrelatK        double  %10.0g                lnrelatK
lnpremK         double  %10.0g                lnpremK
lngerd          double  %10.0g                lngerd
FD              double  %10.0g                FD
k_inov          double  %10.0g                k_inov
financial_open  double  %10.0g                financial_open
op              double  %10.0g                op
fdiopen         double  %10.0g                fdiopen
eugini          double  %10.0g                eugini
eurodumm        byte    %10.0g                eurodumm
crisisdumm      byte    %10.0g                crisisdumm

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
 growthpremK |        458    .0094547    .1739107  -.7347902   .7700615
    lnrelatK |        468    2.492184    .4222285   1.563131   3.579892
     lnpremK |        468    1.585921    .3796331  -.1074219   3.142471
      lngerd |        433     7.54516    2.150039   2.882172   11.60847
          FD |        450    .5361626    .2175712   .1004459   .9006572
-------------+---------------------------------------------------------
      k_inov |        427    .0810127    .0470199   .0109361   .4950667
 financial_~n |       420    1.966405    .8017374  -1.226155   2.321955
          op |        468    1.145204    .6537506   .3710993   4.122231
     fdiopen |        461    .1909102    .5714506  -.6764844   5.813815
      eugini |        468    .1125057    .0221542   .0434832   .1532992
-------------+---------------------------------------------------------
    eurodumm |        468    .6923077    .4620323          0          1
  crisisdumm |        468          .5     .500535          0          1

. xtdescribe

     cou:  3, 5, ..., 23                                       n =         18
    year:  1995, 1996, ..., 2020                               T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
growt~mK overall |  .0094547    .1739107  -.7347902   .7700615 |     N =     458
         between |              .0179815  -.0311956   .0466506 |     n =      18
         within  |              .1730391  -.7399868   .7648649 | T-bar = 25.4444
                 |                                            |
lnrelatK overall |  2.492184    .4222285   1.563131   3.579892 |     N =     468
         between |              .4029183   1.681473   3.346412 |     n =      18
         within  |              .1569219   1.993741   2.985862 |     T =      26
                 |                                            |
lnpremK  overall |  1.585921    .3796331  -.1074219   3.142471 |     N =     468
         between |              .3111824   .9542603   2.237374 |     n =      18
         within  |              .2290647   .5242391   2.491018 |     T =      26
                 |                                            |
lngerd   overall |   7.54516    2.150039   2.882172   11.60847 |     N =     433
         between |              2.135548   4.127116   11.07295 |     n =      18
         within  |              .5305817   5.573098   8.670162 |     T = 24.0556
                 |                                            |
FD       overall |  .5361626    .2175712   .1004459   .9006572 |     N =     450
         between |              .2126841   .2118398   .8086902 |     n =      18
         within  |              .0672352   .2284112   .6877019 |     T =      25
                 |                                            |
k_inov   overall |  .0810127    .0470199   .0109361   .4950667 |     N =     427
         between |              .0307734   .0315929   .1474466 |     n =      18
         within  |              .0362544   -.014006   .4286328 |     T = 23.7222
                 |                                            |
financ~n overall |  1.966405    .8017374  -1.226155   2.321955 |     N =     420
         between |              .6206156   .3154293   2.321955 |     n =      17
         within  |              .5328385  -.3286934    3.44742 |     T = 24.7059
                 |                                            |
op       overall |  1.145204    .6537506   .3710993   4.122231 |     N =     468
         between |              .6281746   .5162591   3.121083 |     n =      18
         within  |              .2321872  -.1295407   2.146352 |     T =      26
                 |                                            |
fdiopen  overall |  .1909102    .5714506  -.6764844   5.813815 |     N =     461
         between |              .3251203   .0125404   1.316872 |     n =      18
         within  |               .477895  -1.465011   4.687854 | T-bar = 25.6111
                 |                                            |
eugini   overall |  .1125057    .0221542   .0434832   .1532992 |     N =     468
         between |                     0   .1125057   .1125057 |     n =      18
         within  |              .0221542   .0434832   .1532992 |     T =      26
                 |                                            |
eurodumm overall |  .6923077    .4620323          0          1 |     N =     468
         between |              .2258141   .2307692   .8461538 |     n =      18
         within  |              .4064624  -.1538462   1.461538 |     T =      26
                 |                                            |
crisis~m overall |        .5     .500535          0          1 |     N =     468
         between |                     0         .5         .5 |     n =      18
         within  |               .500535          0          1 |     T =      26
```

```
. testparm i.year

 ( 1)  1997.year = 0
 ( 2)  1998.year = 0
 ( 3)  1999.year = 0
 ( 4)  2000.year = 0
 ( 5)  2001.year = 0
 ( 6)  2002.year = 0
 ( 7)  2003.year = 0
 ( 8)  2004.year = 0
 ( 9)  2005.year = 0
 (10)  2006.year = 0
 (11)  2007.year = 0
 (12)  2008.year = 0
 (13)  2009.year = 0
 (14)  2010.year = 0
 (15)  2011.year = 0
 (16)  2012.year = 0
 (17)  2013.year = 0
 (18)  2014.year = 0
 (19)  2015.year = 0
 (20)  2016.year = 0
 (21)  2017.year = 0
       Constraint 4 dropped
       Constraint 6 dropped
       Constraint 7 dropped
       Constraint 20 dropped
       Constraint 21 dropped

       F( 16,    16) =    4.81
            Prob > F =    0.0016

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  17.cou = 0
 (12)  18.cou = 0
 (13)  20.cou = 0
 (14)  21.cou = 0
 (15)  22.cou = 0
 (16)  23.cou = 0
       Constraint 1 dropped
       Constraint 5 dropped
       Constraint 12 dropped
       Constraint 16 dropped

       F( 12,    16) =  371.81
            Prob > F =    0.0000
```

Fixed effects over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthpremK[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               growthp~K |    .025888       .1608975
                       e |   .0200997       .1417735
                       u |          0              0

        Test:   Var(u) = 0
                             chibar2(01) =     0.00
                          Prob > chibar2 =   1.0000
```

Random over pooled OLS

```
. hausman fixed random
```

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
L.lnrelatK	.2718094	-.0141006	.2859101	.062482
L.lnpremK	-.4637285	-.1394761	-.3242523	.0344906
lngerd	.0504847	-.0074152	.0578999	.0297726
FD	-.0271134	.0573094	-.0844229	.133541
k_inov	-.5214121	-.2883152	-.233097	.1428052
financial_~n	-.0530031	-.0017071	-.0512959	.0125105
op	.2509975	.0490111	.2019864	.0686307
fdiopen	.0190462	-.0231929	.0422391	.0091548
eugini	.1657873	.5667723	-.400985	.1036869
eurodumm	.030484	.0329597	-.0024757	.0086869
crisisdumm	-.091309	-.0450159	-.046293	.0147115

```
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       92.20
                Prob>chi2 =      0.0000
                (V_b-V_B is not positive definite)

.
. hausman fixed random,sigmamore
```

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
L.lnrelatK	.2718094	-.0141006	.2859101	.0688559
L.lnpremK	-.4637285	-.1394761	-.3242523	.0392079
lngerd	.0504847	-.0074152	.0578999	.0326518
FD	-.0271134	.0573094	-.0844229	.1496229
k_inov	-.5214121	-.2883152	-.233097	.175977
financial_~n	-.0530031	-.0017071	-.0512959	.0148186
op	.2509975	.0490111	.2019864	.0754519
fdiopen	.0190462	-.0231929	.0422391	.0120106
eugini	.1657873	.5667723	-.400985	.1977748
eurodumm	.030484	.0329597	-.0024757	.0147217
crisisdumm	-.091309	-.0450159	-.046293	.018036

```
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       74.07
                Prob>chi2 =      0.0000

. hausman fixed random, sigmaless
```

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
L.lnrelatK	.2718094	-.0141006	.2859101	.0631644
L.lnpremK	-.4637285	-.1394761	-.3242523	.035967
lngerd	.0504847	-.0074152	.0578999	.0299528
FD	-.0271134	.0573094	-.0844229	.1372554
k_inov	-.5214121	-.2883152	-.233097	.1614311
financial_~n	-.0530031	-.0017071	-.0512959	.0135937
op	.2509975	.0490111	.2019864	.0692152
fdiopen	.0190462	-.0231929	.0422391	.0110178
eugini	.1657873	.5667723	-.400985	.1814272
eurodumm	.030484	.0329597	-.0024757	.0135048
crisisdumm	-.091309	-.0450159	-.046293	.0165452

```
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       88.02
                Prob>chi2 =      0.0000
```

Fixed over random

Depended variable: Δ InequalityK

$$\Delta InequalityK_{it} = a_{1_{it}} + a_2 L.relatK_{it} + a_3 invest\ in\ R\&D_{it} + a_4 capital\ innovation\ ratio_{it} + a_5 financial\ oppenness_{it} + a_6 trade\ openness_{it} + a_7 fdi\ oppenness_{it} + a_8 convergence_{it} + a_9 financial\ development_{it} + a_{10} euro\ dummy_{it} + a_{11} 2008\ crisis\ dummy_{it} + b_i + u_{it} \quad (7.3.3.4)$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
------------------------------------------------------------------------------
growthInequal~K double  %10.0g                growthInequalityK
lnrelatK        double  %10.0g                lnrelatK
lnpremK         double  %10.0g                lnpremK
lngerd          double  %10.0g                lngerd
FD              double  %10.0g                FD
k_inov          double  %10.0g                k_inov
financial_open  double  %10.0g                financial_open
op              double  %10.0g                op
fdiopen         double  %10.0g                fdiopen
eugini          double  %10.0g                eugini
eurodumm        byte    %10.0g                eurodumm
crisisdumm      byte    %10.0g                crisisdumm

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
growthIneq~K |        456    .0177396    .1726881  -.5998913   1.470415
    lnrelatK |        468    2.492184    .4222285   1.563131   3.579892
     lnpremK |        468    1.585921    .3796331  -.1074219   3.142471
      lngerd |        433     7.54516    2.150039   2.882172   11.60847
          FD |        450    .5361626    .2175712   .1004459   .9006572
-------------+---------------------------------------------------------
      k_inov |        427    .0810127    .0470199   .0109361   .4950667
financial_~n |        420    1.966405    .8017374  -1.226155   2.321955
          op |        468    1.145204    .6537506   .3710993   4.122231
     fdiopen |        461    .1909102    .5714506  -.6764844   5.813815
      eugini |        468    .1047732    .0099938   .0902179   .1369049
-------------+---------------------------------------------------------
    eurodumm |        468    .6923077    .4620323          0          1
  crisisdumm |        468          .5     .500535          0          1

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
growt~yK overall |  .0177396   .1726881  -.5998913   1.470415 |     N =     456
         between |             .0219224  -.0085433   .0754785 |     n =      18
         within  |             .1714091  -.5736084   1.423961 | T-bar = 25.3333
                 |                                            |
lnrelatK overall |  2.492184   .4222285   1.563131   3.579892 |     N =     468
         between |             .4029183   1.681473   3.346412 |     n =      18
         within  |             .1569219   1.993741   2.985862 |     T =      26
                 |                                            |
lnpremK  overall |  1.585921   .3796331  -.1074219   3.142471 |     N =     468
         between |             .3111824   .9542603   2.237374 |     n =      18
         within  |             .2290647   .5242391   2.491018 |     T =      26
                 |                                            |
lngerd   overall |   7.54516   2.150039   2.882172   11.60847 |     N =     433
         between |             2.135548   4.127116   11.07295 |     n =      18
         within  |             .5305817   5.573098   8.670162 |     T = 24.0556
                 |                                            |
FD       overall |  .5361626   .2175712   .1004459   .9006572 |     N =     450
         between |             .2126841   .2118398   .8086902 |     n =      18
         within  |             .0672352   .2284112   .6877019 |     T =      25
                 |                                            |
k_inov   overall |  .0810127   .0470199   .0109361   .4950667 |     N =     427
         between |             .0307734   .0315929   .1474466 |     n =      18
         within  |             .0362544   -.014006   .4286328 |     T = 23.7222
                 |                                            |
financ~n overall |  1.966405   .8017374  -1.226155   2.321955 |     N =     420
         between |             .6206156   .3154293   2.321955 |     n =      17
         within  |             .5328385  -.3286934    3.44742 |     T = 24.7059
                 |                                            |
op       overall |  1.145204   .6537506   .3710993   4.122231 |     N =     468
         between |             .6281746   .5162591   3.121083 |     n =      18
         within  |             .2321872  -.1295407   2.146352 |     T =      26
                 |                                            |
fdiopen  overall |  .1909102   .5714506  -.6764844   5.813815 |     N =     461
         between |             .3251203   .0125404   1.316872 |     n =      18
         within  |              .477895  -1.465011   4.687854 | T-bar = 25.6111
                 |                                            |
eugini   overall |  .1047732   .0099938   .0902179   .1369049 |     N =     468
         between |                    0   .1047732   .1047732 |     n =      18
         within  |             .0099938   .0902179   .1369049 |     T =      26
                 |                                            |
eurodumm overall |  .6923077   .4620323          0          1 |     N =     468
         between |             .2258141   .2307692   .8461538 |     n =      18
         within  |             .4064624  -.1538462   1.461538 |     T =      26
                 |                                            |
crisis~m overall |        .5    .500535          0          1 |     N =     468
         between |                    0         .5         .5 |     n =      18
         within  |              .500535          0          1 |     T =      26
```

```
. testparm i.year

 ( 1)  1997.year = 0
 ( 2)  1998.year = 0
 ( 3)  1999.year = 0
 ( 4)  2000.year = 0
 ( 5)  2001.year = 0
 ( 6)  2002.year = 0
 ( 7)  2003.year = 0
 ( 8)  2004.year = 0
 ( 9)  2005.year = 0
 (10)  2006.year = 0
 (11)  2007.year = 0
 (12)  2008.year = 0
 (13)  2009.year = 0
 (14)  2010.year = 0
 (15)  2011.year = 0
 (16)  2012.year = 0
 (17)  2013.year = 0
 (18)  2014.year = 0
 (19)  2015.year = 0
 (20)  2016.year = 0
 (21)  2017.year = 0
       Constraint 5 dropped
       Constraint 6 dropped
       Constraint 11 dropped
       Constraint 20 dropped
       Constraint 21 dropped

       F( 16,    16) =    5.76
            Prob > F =    0.0006

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  17.cou = 0
 (12)  18.cou = 0
 (13)  20.cou = 0
 (14)  21.cou = 0
 (15)  22.cou = 0
 (16)  23.cou = 0
       Constraint 1 dropped
       Constraint 5 dropped
       Constraint 12 dropped
       Constraint 16 dropped

       F( 12,    16) = 1868.31
            Prob > F =    0.0000
```

Fixed over pooled

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthInequalityK[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               growthI~K |   .0242645       .1557706
                       e |   .0191723       .1384639
                       u |          0              0

        Test:   Var(u) = 0
                             chibar2(01) =     0.00
                          Prob > chibar2 =   1.0000
```

random over pooled

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
   L.lnrelatK |    .2081925    -.0184027        .2265952        .0613005
   L.lnpremK |   -.4334593    -.1524899       -.2809694        .0340515
      lngerd |    .0671759    -.0107534        .0779293        .0290712
          FD |    -.019905     .0828835       -.1027885        .1316097
      k_inov |   -.4218735     -.254747       -.1671265        .1637545
 financial_~n |   -.0627114    -.0160134        -.046698        .0124683
          op |    .0878523     .0266269        .0612254        .0687977
     fdiopen |    .0142996    -.0175134         .031813          .00945
      eugini |    1.148596     1.629199       -.4806025        .4493639
    eurodumm |    .0264824      .027915       -.0014326        .0091036
  crisisdumm |   -.0727918    -.0304832       -.0423086        .0150893
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       86.01
                Prob>chi2 =      0.0000
                (V_b-V_B is not positive definite)

.
. hausman fixed random,sigmamore

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
   L.lnrelatK |    .2081925    -.0184027        .2265952        .0661209
   L.lnpremK |   -.4334593    -.1524899       -.2809694        .0376427
      lngerd |    .0671759    -.0107534        .0779293        .0312431
          FD |    -.019905     .0828835       -.1027885        .1437595
      k_inov |   -.4218735     -.254747       -.1671265        .1888913
 financial_~n |   -.0627114    -.0160134        -.046698        .0141972
          op |    .0878523     .0266269        .0612254        .0740389
     fdiopen |    .0142996    -.0175134         .031813        .0115574
      eugini |    1.148596     1.629199       -.4806025        .6731096
    eurodumm |    .0264824      .027915       -.0014326        .0136097
  crisisdumm |   -.0727918    -.0304832       -.0423086        .0176554
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       61.75
                Prob>chi2 =      0.0000

. hausman fixed random, sigmaless

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
   L.lnrelatK |    .2081925    -.0184027        .2265952        .0618216
   L.lnpremK |   -.4334593    -.1524899       -.2809694        .0351952
      lngerd |    .0671759    -.0107534        .0779293        .0292116
          FD |    -.019905     .0828835       -.1027885        .1344121
      k_inov |   -.4218735     -.254747       -.1671265        .1766094
 financial_~n |   -.0627114    -.0160134        -.046698        .0132741
          op |    .0878523     .0266269        .0612254        .0692249
     fdiopen |    .0142996    -.0175134         .031813        .0108059
      eugini |    1.148596     1.629199       -.4806025        .6293434
    eurodumm |    .0264824      .027915       -.0014326        .0127247
  crisisdumm |   -.0727918    -.0304832       -.0423086        .0165074
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       70.64
                Prob>chi2 =      0.0000
```

Fixed over random

Depended variable: total Inequality

a

$$inequality_{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it}$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
-------------------------------------------------------------------------------
inequality      double  %10.0g                inequality
InequalityF     double  %10.0g                InequalityF
InequalityL     double  %10.0g                InequalityL
InequalityK     double  %10.0g                InequalityK
unemplRT        double  %10.0g                unemplRT

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
  inequality |        450    .3574031    .0804257   .1889477   .5817417
 InequalityF |        468      .21256    .0597226   .0548225   .3568762
 InequalityL |        419    .1393459    .0922131   .0236261   .4972983
 InequalityK |        468    .2156319    .0880923  -.0127943   .6496873
    unemplRT |        468    .0892579    .0446446          0   .2536703

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%      25%       50%       75%     95%     max
                        26      26       26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
inequa~y overall |  .3574031    .0804257   .1889477   .5817417 |     N =     450
         between |              .0694712   .2093809   .4515983 |     n =      18
         within  |              .0437959   .1309115   .4975451 | T-bar =      25
                 |                                            |
Inequa~F overall |    .21256    .0597226   .0548225   .3568762 |     N =     468
         between |              .0548904   .1028658   .3068195 |     n =      18
         within  |              .0267419   .1037394   .2961591 |     T =      26
                 |                                            |
Inequa~L overall |  .1393459    .0922131   .0236261   .4972983 |     N =     419
         between |              .1019473   .0650486    .386775 |     n =      18
         within  |              .0373289  -.0102071   .3054036 | T-bar = 23.2778
                 |                                            |
Inequa~K overall |  .2156319    .0880923  -.0127943   .6496873 |     N =     468
         between |              .0795978   .1025687   .4444758 |     n =      18
         within  |              .0419955   .0568985   .4208435 |     T =      26
                 |                                            |
unemplRT overall |  .0892579    .0446446          0   .2536703 |     N =     468
         between |               .033309   .0286401   .1602017 |     n =      18
         within  |              .0307091   .0092509   .1973715 |     T =      26
```

```
. testparm i.year

 ( 1)  1996.year = 0
 ( 2)  1997.year = 0
 ( 3)  1998.year = 0
 ( 4)  1999.year = 0
 ( 5)  2000.year = 0
 ( 6)  2001.year = 0
 ( 7)  2002.year = 0
 ( 8)  2003.year = 0
 ( 9)  2004.year = 0
 (10)  2005.year = 0
 (11)  2006.year = 0
 (12)  2007.year = 0
 (13)  2008.year = 0
 (14)  2009.year = 0
 (15)  2010.year = 0
 (16)  2011.year = 0
 (17)  2012.year = 0
 (18)  2013.year = 0
 (19)  2014.year = 0
 (20)  2015.year = 0
 (21)  2016.year = 0
 (22)  2017.year = 0
 (23)  2018.year = 0
 (24)  2019.year = 0
 (25)  2020.year = 0
       Constraint 1 dropped
       Constraint 7 dropped
       Constraint 9 dropped
       Constraint 11 dropped
       Constraint 15 dropped
       Constraint 17 dropped
       Constraint 20 dropped
       Constraint 23 dropped

       F( 17,    17) =    3.99
            Prob > F =    0.0033

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  15.cou = 0
 (12)  17.cou = 0
 (13)  18.cou = 0
 (14)  20.cou = 0
 (15)  21.cou = 0
 (16)  22.cou = 0
 (17)  23.cou = 0
       Constraint 4 dropped
       Constraint 14 dropped
       Constraint 15 dropped
       Constraint 17 dropped

       F( 13,    17) = 5.7e+06
            Prob > F =    0.0000
```

Fixed over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        inequality[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                inequal~y |   .0065624       .0810088
                        e |   .0000667       .0081678
                        u |   .0001643       .0128164

        Test:   Var(u) = 0
                             chibar2(01) =   768.44
                          Prob > chibar2 =   0.0000
```

Pooled OLS over random

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |    .6909513     .6973375       -.0063862         .0053177
 InequalityL |    .5752392     .5732184        .0020207         .0042292
 InequalityK |    .0459995      .048544       -.0025445         .0029309
    unemplRT |     .711406     .7091612        .0022448         .0019572
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       10.74
                Prob>chi2 =      0.0296
```

Fixed over random

B

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
------------------------------------------------------------------------------------------
growthinequal~y double  %10.0g                growthinequality
growthw         double  %10.0g                growthw
growthproduct~y double  %10.0g                growthproductivity
growthl         double  %10.0g                growthl
growthq         double  %10.0g                growthq
Ldummy1         double  %10.0g                Ldummy1
Ldummy2         double  %10.0g                Ldummy2
growthrelatK    double  %10.0g                growthrelatK
growthpremK     double  %10.0g                growthpremK
growthunemplRT  double  %10.0g                growthunemplRT

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
growthineq~y |        435   -.0009907    .0796395  -.8765261   .8245583
     growthw |        457    .0384328    .0544271  -.1298405   .3662896
growthprod~y |        465    .0403902    .0551794  -.1109021   .4639426
     growthl |        465    .0019786    .0136038  -.0906467   .2328077
     growthq |        404    .0111698     .108794  -.6867072   1.213311
-------------+---------------------------------------------------------
     Ldummy1 |        431   -.0064165    .0326163  -.4018158   .2402902
     Ldummy2 |        428   -.0359111    .0854824  -.6549544   .7861568
growthrelatK |        465   -.0070282    .0643164  -.8362134   .5429749
 growthpremK |        458    .0094547    .1739107  -.7347902   .7700615
growthunem~T |        463   -.0080313    .1595351  -.3598715   .9105727

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
gro~lity overall | -.0009907    .0796395  -.8765261   .8245583 |     N =     435
         between |              .0135844  -.0232379   .0405596 |     n =      18
         within  |              .0785065  -.8542789    .783008 | T-bar = 24.1667
                 |                                            |
growthw  overall |  .0384328    .0544271  -.1298405   .3662896 |     N =     457
         between |              .0320828    .016342   .1077623 |     n =      18
         within  |              .0446096  -.1867685   .3037861 | T-bar = 25.3889
                 |                                            |
gro~vity overall |  .0403902    .0551794  -.1109021   .4639426 |     N =     465
         between |              .0298193   .0141569    .105498 |     n =      18
         within  |              .0469135  -.1760099   .3988348 | T-bar = 25.8333
                 |                                            |
growthl  overall |  .0019786    .0136038  -.0906467   .2328077 |     N =     465
         between |               .003175  -.0024879   .0103275 |     n =      18
         within  |              .0132496  -.0884096   .2244587 | T-bar = 25.8333
                 |                                            |
growthq  overall |  .0111698     .108794  -.6867072   1.213311 |     N =     404
         between |              .0283214  -.0060039   .1220693 |     n =      18
         within  |              .1057557  -.7976068   1.102412 | T-bar = 22.4444
                 |                                            |
Ldummy1  overall | -.0064165    .0326163  -.4018158   .2402902 |     N =     431
         between |              .0112997  -.0330754          0 |     n =      18
         within  |              .0308239  -.3786881   .2634179 | T-bar = 23.9444
                 |                                            |
Ldummy2  overall | -.0359111    .0854824  -.6549544   .7861568 |     N =     428
         between |               .021188  -.0718447   .0263221 |     n =      18
         within  |              .0830637  -.6515038   .7239235 | T-bar = 23.7778
                 |                                            |
growt~tK overall | -.0070282    .0643164  -.8362134   .5429749 |     N =     465
         between |              .0147827  -.0385275   .0265513 |     n =      18
         within  |               .062712  -.8047142    .535717 | T-bar = 25.8333
                 |                                            |
growt~mK overall |  .0094547    .1739107  -.7347902   .7700615 |     N =     458
         between |              .0179815  -.0311956   .0466506 |     n =      18
         within  |              .1730391  -.7399868   .7648649 | T-bar = 25.4444
                 |                                            |
growt~RT overall | -.0080313    .1595351  -.3598715   .9105727 |     N =     463
         between |              .0197656  -.0330619   .0287936 |     n =      18
         within  |              .1583741  -.3966964    .913392 | T-bar = 25.7222
```

```
. testparm i.year

 ( 1)  1996.year = 0
 ( 2)  1997.year = 0
 ( 3)  1998.year = 0
 ( 4)  1999.year = 0
 ( 5)  2000.year = 0
 ( 6)  2001.year = 0
 ( 7)  2002.year = 0
 ( 8)  2003.year = 0
 ( 9)  2004.year = 0
 (10)  2005.year = 0
 (11)  2006.year = 0
 (12)  2007.year = 0
 (13)  2008.year = 0
 (14)  2009.year = 0
 (15)  2010.year = 0
 (16)  2011.year = 0
 (17)  2012.year = 0
 (18)  2013.year = 0
 (19)  2014.year = 0
 (20)  2015.year = 0
 (21)  2016.year = 0
 (22)  2017.year = 0
 (23)  2018.year = 0
 (24)  2019.year = 0
 (25)  2020.year = 0
       Constraint 6 dropped
       Constraint 8 dropped
       Constraint 12 dropped
       Constraint 16 dropped
       Constraint 18 dropped
       Constraint 20 dropped
       Constraint 23 dropped
       Constraint 24 dropped

       F( 17,    17) =    4.44
            Prob > F =    0.0018

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  15.cou = 0
 (12)  17.cou = 0
 (13)  18.cou = 0
 (14)  20.cou = 0
 (15)  21.cou = 0
 (16)  22.cou = 0
 (17)  23.cou = 0

       F( 17,    17) = 1.7e+09
            Prob > F =    0.0000
```

Fixed over pooled

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthinequality[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               growthi~y |   .0022747       .0476934
                       e |   .0012278       .0350406
                       u |          0              0

        Test:   Var(u) = 0
                             chibar2(01) =     0.00
                          Prob > chibar2 =   1.0000
```

Random over pooled

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
     growthw |   -.396196     -.363007       -.033189        .0254628
growthprod~y |   .3503317     .3485049       .0018268         .020191
     growthl |  -.3669167    -.0230956      -.3438211        .3201055
     growthq |   .2517339      .237309       .0144249        .0109089
     Ldummy1 |   .3751512     .3344842        .040667        .0296301
     Ldummy2 |  -.0864101    -.0809441       -.005466        .0060424
growthrelatK |  -.2619687    -.2303373      -.0316313        .0404602
 growthpremK |  -.0311393    -.0336058       .0024666        .0036003
growthunem~T |   .1174782     .1224878      -.0050096          .00573
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(9) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        4.76
                Prob>chi2 =      0.8547
```

Random over fixed

Depended variable: Inequality Eurostat

$$Gini\ Eurostat_{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it}$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
------------------------------------------------------------------------------------------------------------------------------
GiniEUstat      double  %10.0g                GiniEUstat
InequalityF     double  %10.0g                InequalityF
InequalityL     double  %10.0g                InequalityL
InequalityK     double  %10.0g                InequalityK
unemplRT        double  %10.0g                unemplRT

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
  GiniEUstat |        401    .2984065    .0393419       .209       .389
 InequalityF |        468      .21256    .0597226   .0548225   .3568762
 InequalityL |        419    .1393459    .0922131   .0236261   .4972983
 InequalityK |        468    .2156319    .0880923  -.0127943   .6496873
    unemplRT |        468    .0892579    .0446446          0   .2536703

. xtdescribe

     cou:  3, 5, ..., 23                                       n =         18
    year:  1995, 1996, ..., 2020                               T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+---------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+---------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
GiniEU~t overall |  .2984065   .0393419       .209       .389 |     N =     401
         between |             .0387538   .2352105   .3568235 |     n =      18
         within  |             .0149403   .2586148   .3418065 | T-bar = 22.2778
                 |                                            |
Inequa~F overall |    .21256   .0597226   .0548225   .3568762 |     N =     468
         between |             .0548904   .1028658   .3068195 |     n =      18
         within  |             .0267419   .1037394   .2961591 |     T =      26
                 |                                            |
Inequa~L overall |  .1393459   .0922131   .0236261   .4972983 |     N =     419
         between |             .1019473   .0650486    .386775 |     n =      18
         within  |             .0373289  -.0102071   .3054036 | T-bar = 23.2778
                 |                                            |
Inequa~K overall |  .2156319   .0880923  -.0127943   .6496873 |     N =     468
         between |             .0795978   .1025687   .4444758 |     n =      18
         within  |             .0419955   .0568985   .4208435 |     T =      26
                 |                                            |
unemplRT overall |  .0892579   .0446446          0   .2536703 |     N =     468
         between |              .033309   .0286401   .1602017 |     n =      18
         within  |             .0307091   .0092509   .1973715 |     T =      26
```

```
. testparm i.year

 ( 1)  1996.year = 0
 ( 2)  1997.year = 0
 ( 3)  1998.year = 0
 ( 4)  1999.year = 0
 ( 5)  2000.year = 0
 ( 6)  2001.year = 0
 ( 7)  2002.year = 0
 ( 8)  2003.year = 0
 ( 9)  2004.year = 0
 (10)  2005.year = 0
 (11)  2006.year = 0
 (12)  2007.year = 0
 (13)  2008.year = 0
 (14)  2009.year = 0
 (15)  2010.year = 0
 (16)  2011.year = 0
 (17)  2012.year = 0
 (18)  2013.year = 0
 (19)  2014.year = 0
 (20)  2015.year = 0
 (21)  2016.year = 0
 (22)  2017.year = 0
 (23)  2018.year = 0
 (24)  2019.year = 0
 (25)  2020.year = 0
       Constraint 10 dropped
       Constraint 12 dropped
       Constraint 14 dropped
       Constraint 15 dropped
       Constraint 17 dropped
       Constraint 20 dropped
       Constraint 21 dropped
       Constraint 22 dropped

       F( 17,    17) =  119.73
            Prob > F =    0.0000

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  15.cou = 0
 (12)  17.cou = 0
 (13)  18.cou = 0
 (14)  20.cou = 0
 (15)  21.cou = 0
 (16)  22.cou = 0
 (17)  23.cou = 0

       F( 17,    17) = 7.5e+07
            Prob > F =    0.0000
```

Fixed over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        GiniEUstat[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               GiniEUs~t |   .0015298       .0391126
                       e |   .0002029       .0142455
                       u |   .0010425       .0322873

        Test:   Var(u) = 0
                             chibar2(01) =  1892.15
                          Prob > chibar2 =   0.0000
```

Pooled OLS over random

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random        Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |    .0366151     .0511046       -.0144895        .0087728
 InequalityL |    .0137453      .024428       -.0106827        .0066095
 InequalityK |    .0106077     .0184907        -.007883        .0041733
    unemplRT |    .0567374     .0655224        -.008785        .0017755
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =    -5.71    chi2<0 ==> model fitted on these
                                        data fails to meet the asymptotic
                                        assumptions of the Hausman test;
                                        see suest for a generalized test

.
. hausman fixed random,sigmamore

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random        Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |    .0366151     .0511046       -.0144895        .0096546
 InequalityL |    .0137453      .024428       -.0106827        .0070586
 InequalityK |    .0106077     .0184907        -.007883        .0047717
    unemplRT |    .0567374     .0655224        -.008785        .0033422
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        8.08
                Prob>chi2 =      0.0887

. hausman fixed random, sigmaless

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random        Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |    .0366151     .0511046       -.0144895        .0095999
 InequalityL |    .0137453      .024428       -.0106827        .0070186
 InequalityK |    .0106077     .0184907        -.007883        .0047447
    unemplRT |    .0567374     .0655224        -.008785        .0033233
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        8.17
                Prob>chi2 =      0.0855
```

Random over fixed

Depended variable: Inequality Eurostat before transfers

$$Gini\ Eurostat\ Before\ Taxes_{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it}$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
------------------------------------------------------------------------------------------------
GiniEUstatBEF~s double  %10.0g                GiniEUstatBEFOREtransfers
InequalityF     double  %10.0g                InequalityF
InequalityL     double  %10.0g                InequalityL
InequalityK     double  %10.0g                InequalityK
unemplRT        double  %10.0g                unemplRT

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
GiniEUstat~s |        304    .4837993    .0450628       .372       .617
 InequalityF |        468      .21256    .0597226   .0548225   .3568762
 InequalityL |        419    .1393459    .0922131   .0236261   .4972983
 InequalityK |        468    .2156319    .0880923  -.0127943   .6496873
    unemplRT |        468    .0892579    .0446446          0   .2536703

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
GiniEU~s overall |  .4837993   .0450628       .372       .617 |     N =     304
         between |             .0382885    .413875   .5551875 |     n =      18
         within  |             .0260273   .4181118   .5925771 | T-bar = 16.8889
                 |                                            |
Inequa~F overall |    .21256   .0597226   .0548225   .3568762 |     N =     468
         between |             .0548904   .1028658   .3068195 |     n =      18
         within  |             .0267419   .1037394   .2961591 |     T =      26
                 |                                            |
Inequa~L overall |  .1393459   .0922131   .0236261   .4972983 |     N =     419
         between |             .1019473   .0650486    .386775 |     n =      18
         within  |             .0373289  -.0102071   .3054036 | T-bar = 23.2778
                 |                                            |
Inequa~K overall |  .2156319   .0880923  -.0127943   .6496873 |     N =     468
         between |             .0795978   .1025687   .4444758 |     n =      18
         within  |             .0419955   .0568985   .4208435 |     T =      26
                 |                                            |
unemplRT overall |  .0892579   .0446446          0   .2536703 |     N =     468
         between |              .033309   .0286401   .1602017 |     n =      18
         within  |             .0307091   .0092509   .1973715 |     T =      26
```

```
. testparm i.year

 ( 1)  2004.year = 0
 ( 2)  2005.year = 0
 ( 3)  2006.year = 0
 ( 4)  2007.year = 0
 ( 5)  2008.year = 0
 ( 6)  2009.year = 0
 ( 7)  2010.year = 0
 ( 8)  2011.year = 0
 ( 9)  2012.year = 0
 (10)  2013.year = 0
 (11)  2014.year = 0
 (12)  2015.year = 0
 (13)  2016.year = 0
 (14)  2017.year = 0
 (15)  2018.year = 0
 (16)  2019.year = 0
 (17)  2020.year = 0

       F( 17,    17) =  102.34
            Prob > F =    0.0000

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  15.cou = 0
 (12)  17.cou = 0
 (13)  18.cou = 0
 (14)  20.cou = 0
 (15)  21.cou = 0
 (16)  22.cou = 0
 (17)  23.cou = 0
       Constraint 3 dropped
       Constraint 4 dropped
       Constraint 12 dropped
       Constraint 13 dropped
       Constraint 14 dropped
       Constraint 17 dropped

       F( 11,    17) = 3.7e+05
            Prob > F =    0.0000
```

Fixed over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        GiniEUstatBEFOREtransfers[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                GiniEUs~s |   .0019453       .0441058
                        e |   .0002774       .0166556
                        u |    .001502       .0387561

        Test:   Var(u) = 0
                             chibar2(01) =  1010.34
                          Prob > chibar2 =   0.0000
```

Pooled over random

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |    .3035299     .2786419        .0248881        .0135197
 InequalityL |    .2940783     .2462594        .0478189        .0119564
 InequalityK |    .1176989     .1012287        .0164702        .0054813
    unemplRT |    .5708604     .5513588        .0195015               .
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       10.60
                Prob>chi2 =      0.0314
                (V_b-V_B is not positive definite)

.
. hausman fixed random,sigmamore

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |    .3035299     .2786419        .0248881        .0175563
 InequalityL |    .2940783     .2462594        .0478189            .014
 InequalityK |    .1176989     .1012287        .0164702        .0081164
    unemplRT |    .5708604     .5513588        .0195015        .0060116
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       14.46
                Prob>chi2 =      0.0060

. hausman fixed random, sigmaless

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |    .3035299     .2786419        .0248881        .0172139
 InequalityL |    .2940783     .2462594        .0478189        .0137269
 InequalityK |    .1176989     .1012287        .0164702        .0079581
    unemplRT |    .5708604     .5513588        .0195015        .0058943
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       15.05
                Prob>chi2 =      0.0046
```

Fixed over pooled

Depended variable: Gini oecd

$$Gini\ OECD_{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it}$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
------------------------------------------------------------------------------------------------------------------------------------------------------------
giniOECD        double  %10.0g                giniOECD
InequalityF     double  %10.0g                InequalityF
InequalityL     double  %10.0g                InequalityL
InequalityK     double  %10.0g                InequalityK
unemplRT        double  %10.0g                unemplRT

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
    giniOECD |        305    .3171016    .0351379       .235        .39
 InequalityF |        468      .21256    .0597226   .0548225   .3568762
 InequalityL |        419    .1393459    .0922131   .0236261   .4972983
 InequalityK |        468    .2156319    .0880923  -.0127943   .6496873
    unemplRT |        468    .0892579    .0446446          0   .2536703

. xtdescribe

     cou:  3, 5, ..., 23                                      n =         18
    year:  1995, 1996, ..., 2020                              T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
giniOECD overall |  .3171016   .0351379       .235        .39 |     N =     305
         between |             .0345992   .2486667   .3628125 |     n =      18
         within  |             .0127215    .279435   .3637858 |     T = 16.9444
                 |                                            |
Inequa~F overall |    .21256   .0597226   .0548225   .3568762 |     N =     468
         between |             .0548904   .1028658   .3068195 |     n =      18
         within  |             .0267419   .1037394   .2961591 |     T =      26
                 |                                            |
Inequa~L overall |  .1393459   .0922131   .0236261   .4972983 |     N =     419
         between |             .1019473   .0650486    .386775 |     n =      18
         within  |             .0373289  -.0102071   .3054036 | T-bar = 23.2778
                 |                                            |
Inequa~K overall |  .2156319   .0880923  -.0127943   .6496873 |     N =     468
         between |             .0795978   .1025687   .4444758 |     n =      18
         within  |             .0419955   .0568985   .4208435 |     T =      26
                 |                                            |
unemplRT overall |  .0892579   .0446446          0   .2536703 |     N =     468
         between |              .033309   .0286401   .1602017 |     n =      18
         within  |             .0307091   .0092509   .1973715 |     T =      26
```

```
. testparm i.year

 ( 1)  1996.year = 0
 ( 2)  1997.year = 0
 ( 3)  1998.year = 0
 ( 4)  1999.year = 0
 ( 5)  2000.year = 0
 ( 6)  2001.year = 0
 ( 7)  2002.year = 0
 ( 8)  2003.year = 0
 ( 9)  2004.year = 0
 (10)  2005.year = 0
 (11)  2006.year = 0
 (12)  2007.year = 0
 (13)  2008.year = 0
 (14)  2009.year = 0
 (15)  2010.year = 0
 (16)  2011.year = 0
 (17)  2012.year = 0
 (18)  2013.year = 0
 (19)  2014.year = 0
 (20)  2015.year = 0
 (21)  2016.year = 0
 (22)  2017.year = 0
 (23)  2018.year = 0
       Constraint 3 dropped
       Constraint 6 dropped
       Constraint 7 dropped
       Constraint 14 dropped
       Constraint 16 dropped
       Constraint 20 dropped

       F( 17,    17) =   76.93
            Prob > F =    0.0000

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  15.cou = 0
 (12)  17.cou = 0
 (13)  18.cou = 0
 (14)  20.cou = 0
 (15)  21.cou = 0
 (16)  22.cou = 0
 (17)  23.cou = 0
       Constraint 4 dropped
       Constraint 6 dropped
       Constraint 12 dropped
       Constraint 17 dropped

       F( 13,    17) = 2.2e+05
            Prob > F =    0.0000
```

Fixed over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        giniOECD[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                giniOECD |   .0012194       .0349196
                       e |   .0001476       .0121505
                       u |   .0008289       .0287906

        Test:   Var(u) = 0
                             chibar2(01) =  1208.77
                          Prob > chibar2 =   0.0000
```

Pooled OLS over random

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |     .054728     .0768052       -.0220772        .0104214
 InequalityL |    .0082722     .0229223       -.0146501        .0083659
 InequalityK |    .0395003     .0465828       -.0070825        .0045359
    unemplRT |    .1252332     .1327543       -.0075211         .002516
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       14.03
                Prob>chi2 =      0.0072

.
. hausman fixed random,sigmamore

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |     .054728     .0768052       -.0220772        .0110394
 InequalityL |    .0082722     .0229223       -.0146501        .0086902
 InequalityK |    .0395003     .0465828       -.0070825        .0049307
    unemplRT |    .1252332     .1327543       -.0075211        .0034703
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        6.52
                Prob>chi2 =      0.1634

. hausman fixed random, sigmaless

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |     .054728     .0768052       -.0220772        .0109896
 InequalityL |    .0082722     .0229223       -.0146501         .008651
 InequalityK |    .0395003     .0465828       -.0070825        .0049085
    unemplRT |    .1252332     .1327543       -.0075211        .0034546
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        6.58
                Prob>chi2 =      0.1598

.
end of do-file

.
```

random over fixed OLS

Depended variable: Gini pre tax oecd

$$Gini\ OECD\ pre\ tax\ _{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it}$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
-------------------------------------------------------------------------------------------------------------------------------------------------------------

giniOECDpretax  double  %10.0g                giniOECDpretax
InequalityF     double  %10.0g                InequalityF
InequalityL     double  %10.0g                InequalityL
InequalityK     double  %10.0g                InequalityK
unemplRT        double  %10.0g                unemplRT

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
giniOECDpr~x |        263    .4867262    .0364532       .378        .58
 InequalityF |        468      .21256    .0597226   .0548225   .3568762
 InequalityL |        419    .1393459    .0922131   .0236261   .4972983
 InequalityK |        468    .2156319    .0880923  -.0127943   .6496873
    unemplRT |        468    .0892579    .0446446          0   .2536703

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------

giniOE~x overall |  .4867262   .0364532       .378        .58 |     N =     263
         between |             .0326083     .41375      .5432 |     n =      17
         within  |             .0175029   .4352647   .5324909 |     T = 15.4706
                 |                                            |
Inequa~F overall |    .21256   .0597226   .0548225   .3568762 |     N =     468
         between |             .0548904   .1028658   .3068195 |     n =      18
         within  |             .0267419   .1037394   .2961591 |     T =      26
                 |                                            |
Inequa~L overall |  .1393459   .0922131   .0236261   .4972983 |     N =     419
         between |             .1019473   .0650486    .386775 |     n =      18
         within  |             .0373289  -.0102071   .3054036 | T-bar = 23.2778
                 |                                            |
Inequa~K overall |  .2156319   .0880923  -.0127943   .6496873 |     N =     468
         between |             .0795978   .1025687   .4444758 |     n =      18
         within  |             .0419955   .0568985   .4208435 |     T =      26
                 |                                            |
unemplRT overall |  .0892579   .0446446          0   .2536703 |     N =     468
         between |              .033309   .0286401   .1602017 |     n =      18
         within  |             .0307091   .0092509   .1973715 |     T =      26
```

```
. testparm i.year

 ( 1)  1996.year = 0
 ( 2)  1997.year = 0
 ( 3)  1998.year = 0
 ( 4)  1999.year = 0
 ( 5)  2000.year = 0
 ( 6)  2001.year = 0
 ( 7)  2002.year = 0
 ( 8)  2003.year = 0
 ( 9)  2004.year = 0
 (10)  2005.year = 0
 (11)  2006.year = 0
 (12)  2007.year = 0
 (13)  2008.year = 0
 (14)  2009.year = 0
 (15)  2010.year = 0
 (16)  2011.year = 0
 (17)  2012.year = 0
 (18)  2013.year = 0
 (19)  2014.year = 0
 (20)  2015.year = 0
 (21)  2016.year = 0
 (22)  2017.year = 0
 (23)  2018.year = 0
 (24)  2019.year = 0
 (25)  2020.year = 0
       Constraint 3 dropped
       Constraint 4 dropped
       Constraint 7 dropped
       Constraint 8 dropped
       Constraint 12 dropped
       Constraint 14 dropped
       Constraint 20 dropped
       Constraint 21 dropped
       Constraint 24 dropped

       F( 16,    16) =   83.14
            Prob > F =    0.0000

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  13.cou = 0
 ( 9)  14.cou = 0
 (10)  15.cou = 0
 (11)  17.cou = 0
 (12)  18.cou = 0
 (13)  20.cou = 0
 (14)  21.cou = 0
 (15)  22.cou = 0
 (16)  23.cou = 0
       Constraint 13 dropped

       F( 15,    16) = 8.9e+07
            Prob > F =    0.0000
```

Fixed over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        giniOECDpretax[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               giniOEC~x |   .0013604       .0368833
                       e |   .0001627       .0127556
                       u |   .0011762       .0342959

        Test:   Var(u) = 0
                             chibar2(01) =  1265.80
                          Prob > chibar2 =   0.0000
```

Pooled OLS over random

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |    .0058165     .0050753        .0007413        .0137274
 InequalityL |    .1429361     .1351776        .0077585        .0115724
 InequalityK |    .0571855     .0553712        .0018143        .0065179
    unemplRT |    .4558778     .4513135        .0045643        .0063152
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        1.03
                Prob>chi2 =      0.9060

.
. hausman fixed random,sigmamore

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |    .0058165     .0050753        .0007413         .012965
 InequalityL |    .1429361     .1351776        .0077585        .0111206
 InequalityK |    .0571855     .0553712        .0018143         .006055
    unemplRT |    .4558778     .4513135        .0045643        .0055134
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        1.57
                Prob>chi2 =      0.8138

. hausman fixed random, sigmaless

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |    .0058165     .0050753        .0007413        .0130298
 InequalityL |    .1429361     .1351776        .0077585        .0111761
 InequalityK |    .0571855     .0553712        .0018143        .0060853
    unemplRT |    .4558778     .4513135        .0045643        .0055409
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        1.56
                Prob>chi2 =      0.8166
```

Random over fixed

Depended variable: Gini UN

$$Gini\ UN_{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it}$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
------------------------------------------------------------------------
GiniWHO         double  %10.0g                GiniWHO
InequalityF     double  %10.0g                InequalityF
InequalityL     double  %10.0g                InequalityL
InequalityK     double  %10.0g                InequalityK
unemplRT        double  %10.0g                unemplRT

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
     GiniWHO |        418      .31011    .0386805       .209        .39
 InequalityF |        468      .21256    .0597226   .0548225   .3568762
 InequalityL |        419    .1393459    .0922131   .0236261   .4972983
 InequalityK |        468    .2156319    .0880923  -.0127943   .6496873
    unemplRT |        468    .0892579    .0446446          0   .2536703

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
GiniWHO  overall |    .31011    .0386805       .209        .39 |     N =     418
         between |              .0360673   .2434762     .36052 |     n =      18
         within  |              .0177574     .25375   .3595646 |     T = 23.2222
                 |                                            |
Inequa~F overall |    .21256    .0597226   .0548225   .3568762 |     N =     468
         between |              .0548904   .1028658   .3068195 |     n =      18
         within  |              .0267419   .1037394   .2961591 |     T =      26
                 |                                            |
Inequa~L overall |  .1393459    .0922131   .0236261   .4972983 |     N =     419
         between |              .1019473   .0650486    .386775 |     n =      18
         within  |              .0373289  -.0102071   .3054036 | T-bar = 23.2778
                 |                                            |
Inequa~K overall |  .2156319    .0880923  -.0127943   .6496873 |     N =     468
         between |              .0795978   .1025687   .4444758 |     n =      18
         within  |              .0419955   .0568985   .4208435 |     T =      26
                 |                                            |
unemplRT overall |  .0892579    .0446446          0   .2536703 |     N =     468
         between |               .033309   .0286401   .1602017 |     n =      18
         within  |              .0307091   .0092509   .1973715 |     T =      26
```

```
. testparm i.year

 ( 1)  1996.year = 0
 ( 2)  1997.year = 0
 ( 3)  1998.year = 0
 ( 4)  1999.year = 0
 ( 5)  2000.year = 0
 ( 6)  2001.year = 0
 ( 7)  2002.year = 0
 ( 8)  2003.year = 0
 ( 9)  2004.year = 0
 (10)  2005.year = 0
 (11)  2006.year = 0
 (12)  2007.year = 0
 (13)  2008.year = 0
 (14)  2009.year = 0
 (15)  2010.year = 0
 (16)  2011.year = 0
 (17)  2012.year = 0
 (18)  2013.year = 0
 (19)  2014.year = 0
 (20)  2015.year = 0
 (21)  2016.year = 0
 (22)  2017.year = 0
 (23)  2018.year = 0
 (24)  2019.year = 0
       Constraint 12 dropped
       Constraint 14 dropped
       Constraint 16 dropped
       Constraint 17 dropped
       Constraint 18 dropped
       Constraint 19 dropped
       Constraint 20 dropped

       F( 17,    17) =   17.08
            Prob > F =    0.0000

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  15.cou = 0
 (12)  17.cou = 0
 (13)  18.cou = 0
 (14)  20.cou = 0
 (15)  21.cou = 0
 (16)  22.cou = 0
 (17)  23.cou = 0
       Constraint 6 dropped
       Constraint 13 dropped
       Constraint 14 dropped
       Constraint 15 dropped
       Constraint 17 dropped

       F( 12,    17) = 4.9e+06
            Prob > F =    0.0000
```

Fixed over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        GiniWHO[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                 GiniWHO |   .0014948       .0386621
                       e |   .0002854       .0168951
                       u |   .0010181       .0319069

        Test:   Var(u) = 0
                             chibar2(01) =  2197.75
                          Prob > chibar2 =   0.0000
```

Pooled OLS over random

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random        Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |   -.0284813     -.010045       -.0184364        .0112491
 InequalityL |    .1277216     .1316018       -.0038803        .0082318
 InequalityK |    .0942716     .0964407       -.0021691        .0057737
    unemplRT |    .1623246     .1663646         -.00404        .0043054
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        3.94
                Prob>chi2 =      0.4136

.
. hausman fixed random,sigmamore

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random        Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |   -.0284813     -.010045       -.0184364        .0112432
 InequalityL |    .1277216     .1316018       -.0038803        .0082287
 InequalityK |    .0942716     .0964407       -.0021691        .0057697
    unemplRT |    .1623246     .1663646         -.00404        .0042969
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        3.95
                Prob>chi2 =      0.4125

. hausman fixed random, sigmaless

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random        Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |   -.0284813     -.010045       -.0184364        .0112436
 InequalityL |    .1277216     .1316018       -.0038803         .008229
 InequalityK |    .0942716     .0964407       -.0021691        .0057699
    unemplRT |    .1623246     .1663646         -.00404        .0042971
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        3.95
                Prob>chi2 =      0.4125
```

Random over fixed

Depended variable: Gini Texas University

$$Gini\ Texas\ Univercity_{it} = a_{1_{it}} + a_2 InequalityF_{it} + a_3 InequalityL_{it} + a_4 InequalityK_{it} + b_i + u_{it} + b_i + u_{it}$$

```
. testparm i.year

 ( 1)  1996.year = 0
 ( 2)  1997.year = 0
 ( 3)  1998.year = 0
 ( 4)  1999.year = 0
 ( 5)  2000.year = 0
 ( 6)  2001.year = 0
 ( 7)  2002.year = 0
 ( 8)  2003.year = 0
 ( 9)  2004.year = 0
 (10)  2005.year = 0
 (11)  2006.year = 0
 (12)  2007.year = 0
 (13)  2008.year = 0
 (14)  2009.year = 0
 (15)  2010.year = 0
 (16)  2011.year = 0
 (17)  2012.year = 0
 (18)  2013.year = 0
 (19)  2014.year = 0
 (20)  2015.year = 0
       Constraint 6 dropped
       Constraint 10 dropped
       Constraint 11 dropped

       F( 17,    17) =    3.51
            Prob > F =    0.0067

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  15.cou = 0
 (12)  17.cou = 0
 (13)  18.cou = 0
 (14)  20.cou = 0
 (15)  21.cou = 0
 (16)  22.cou = 0
 (17)  23.cou = 0
       Constraint 4 dropped
       Constraint 6 dropped
       Constraint 15 dropped

       F( 14,    17) = 1.2e+06
            Prob > F =    0.0000
```

Fixed over pooled

```
Breusch and Pagan Lagrangian multiplier test for random effects

        Texasineq[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               Texasineq |   .0009102       .0301692
                       e |   .0001309       .0114393
                       u |   .0006089       .0246762

        Test:   Var(u) = 0
                             chibar2(01) =  1679.38
                          Prob > chibar2 =   0.0000
```

Pooled OLS over random

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |   -.1159564    -.0994551      -.0165013        .0078389
 InequalityL |    .1437518      .139726       .0040259        .0069642
 InequalityK |    .0372873     .0329352       .0043522        .0036915
    unemplRT |    .1693825     .1715822      -.0021997         .002409
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       17.34
                Prob>chi2 =      0.0017

.
. hausman fixed random,sigmamore

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |   -.1159564    -.0994551      -.0165013        .0085562
 InequalityL |    .1437518      .139726       .0040259        .0073357
 InequalityK |    .0372873     .0329352       .0043522        .0041461
    unemplRT |    .1693825     .1715822      -.0021997        .0034197
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        7.42
                Prob>chi2 =      0.1153

. hausman fixed random, sigmaless

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
 InequalityF |   -.1159564    -.0994551      -.0165013        .0085087
 InequalityL |    .1437518      .139726       .0040259         .007295
 InequalityK |    .0372873     .0329352       .0043522        .0041231
    unemplRT |    .1693825     .1715822      -.0021997        .0034007
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        7.50
                Prob>chi2 =      0.1115
```

Random over fixed

Kuznets

Factor inequality

$$InequalityF_{it} = {a_1}_{it} + a_2 GDP\ per\ capita_{it} + a_3 GDP\ per\ capita^2{}_{it} + b_i + u_{it} \quad (7.3.14)$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
--------------------------------------------------------------------------------
growthInequal~F double  %10.0g                growthInequalityF
lnGDPpcapita    double  %10.0g                lnGDPpcapita
lnGDPpcapita2   double  %10.0g                lnGDPpcapita2

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
growthIneq~F |        457   -.0069697    .0718098   -.415333    .451739
lnGDPpcapita |        468    3.577002     .696516   1.053507   4.980603
lnGDPpcapi~2 |        468    13.27904    4.515063   1.109877   24.80641

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
growth~F overall | -.0069697   .0718098   -.415333    .451739 |     N =     457
         between |             .0134777  -.0282483   .0252856 |     n =      18
         within  |             .0706054  -.3940543   .4730177 | T-bar = 25.3889
                 |                                            |
lnGDPp~a overall |  3.577002    .696516   1.053507   4.980603 |     N =     468
         between |             .6151704   2.519646   4.493712 |     n =      18
         within  |             .3563127   2.089838   4.441503 |     T =      26
                 |                                            |
lnGDPp~2 overall |  13.27904   4.515063   1.109877   24.80641 |     N =     468
         between |              4.12096   6.773964   20.23075 |     n =      18
         within  |             2.076681   6.764756    19.6758 |     T =      26
```

```
. testparm i.year

 ( 1)  1996.year = 0
 ( 2)  1997.year = 0
 ( 3)  1998.year = 0
 ( 4)  1999.year = 0
 ( 5)  2000.year = 0
 ( 6)  2001.year = 0
 ( 7)  2002.year = 0
 ( 8)  2003.year = 0
 ( 9)  2004.year = 0
 (10)  2005.year = 0
 (11)  2006.year = 0
 (12)  2007.year = 0
 (13)  2008.year = 0
 (14)  2009.year = 0
 (15)  2010.year = 0
 (16)  2011.year = 0
 (17)  2012.year = 0
 (18)  2013.year = 0
 (19)  2014.year = 0
 (20)  2015.year = 0
 (21)  2016.year = 0
 (22)  2017.year = 0
 (23)  2018.year = 0
 (24)  2019.year = 0
 (25)  2020.year = 0
       Constraint 3 dropped
       Constraint 6 dropped
       Constraint 8 dropped
       Constraint 11 dropped
       Constraint 14 dropped
       Constraint 16 dropped
       Constraint 21 dropped
       Constraint 23 dropped

       F( 17,    17) =   13.60
            Prob > F =    0.0000

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  15.cou = 0
 (12)  17.cou = 0
 (13)  18.cou = 0
 (14)  20.cou = 0
 (15)  21.cou = 0
 (16)  22.cou = 0
 (17)  23.cou = 0
       Constraint 1 dropped
       Constraint 2 dropped
       Constraint 3 dropped
       Constraint 4 dropped
       Constraint 5 dropped
       Constraint 6 dropped
       Constraint 7 dropped
       Constraint 8 dropped
       Constraint 10 dropped
       Constraint 12 dropped
       Constraint 13 dropped
       Constraint 15 dropped
       Constraint 16 dropped
       Constraint 17 dropped

       F(  3,    17) =   15.49
            Prob > F =    0.0000
```

Facor over pooled OLS

```
. testparm i.year

 ( 1)  1996.year = 0
 ( 2)  1997.year = 0
 ( 3)  1998.year = 0
 ( 4)  1999.year = 0
 ( 5)  2000.year = 0
 ( 6)  2001.year = 0
 ( 7)  2002.year = 0
 ( 8)  2003.year = 0
 ( 9)  2004.year = 0
 (10)  2005.year = 0
 (11)  2006.year = 0
 (12)  2007.year = 0
 (13)  2008.year = 0
 (14)  2009.year = 0
 (15)  2010.year = 0
 (16)  2011.year = 0
 (17)  2012.year = 0
 (18)  2013.year = 0
 (19)  2014.year = 0
 (20)  2015.year = 0
 (21)  2016.year = 0
 (22)  2017.year = 0
 (23)  2018.year = 0
 (24)  2019.year = 0
 (25)  2020.year = 0
       Constraint 3 dropped
       Constraint 6 dropped
       Constraint 8 dropped
       Constraint 11 dropped
       Constraint 14 dropped
       Constraint 16 dropped
       Constraint 21 dropped
       Constraint 23 dropped

       F( 17,    17) =   13.60
            Prob > F =    0.0000

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  15.cou = 0
 (12)  17.cou = 0
 (13)  18.cou = 0
 (14)  20.cou = 0
 (15)  21.cou = 0
 (16)  22.cou = 0
 (17)  23.cou = 0
       Constraint 1 dropped
       Constraint 2 dropped
       Constraint 3 dropped
       Constraint 4 dropped
       Constraint 5 dropped
       Constraint 6 dropped
       Constraint 7 dropped
       Constraint 8 dropped
       Constraint 10 dropped
       Constraint 12 dropped
       Constraint 13 dropped
       Constraint 15 dropped
       Constraint 16 dropped
       Constraint 17 dropped

       F(  3,    17) =   15.49
            Prob > F =    0.0000

.
end of do-file

. do "C:\Users\addez\AppData\Local\Temp\STD00000000.tmp"

. quietly xtreg $ylist $xlist, re

. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        growthInequalityF[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               growthI~F |   .0051566       .0718098
                       e |   .0049522       .0703721
                       u |          0              0

        Test:   Var(u) = 0
                             chibar2(01) =     0.00
                          Prob > chibar2 =   1.0000
```

Random over OLS

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
lnGDPpcapita |   -.0426496    -.0381849       -.0044647        .0252725
lnGDPpcapi~2 |   -.0005316     .0052057       -.0057374        .0049132
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       27.52
                Prob>chi2 =      0.0000
```

fixed over random

Labor inequality

$$InequalityL_{it} = a_{1_{it}} + a_2 GDP\ per\ capita_{it} + a_3 GDP\ per\ capita^2{}_{it} + b_i + u_{it} \quad (7.3.15)$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
-----------------------------------------------------------------------------------------------------------------------------------------------
growthInequal~L double  %10.0g                growthInequalityL
lnGDPpcapita    double  %10.0g                lnGDPpcapita
lnGDPpcapita2   double  %10.0g                lnGDPpcapita2

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
growthIneq~L |        405    .0270131    .1440789   -.716658   1.159001
lnGDPpcapita |        468    3.577002     .696516   1.053507   4.980603
lnGDPpcapi~2 |        468    13.27904    4.515063   1.109877   24.80641

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
growt~yL overall |  .0270131    .1440789   -.716658   1.159001 |     N =     405
         between |              .0169949  -.0013351   .0475136 |     n =      18
         within  |               .143235  -.6978831   1.178458 | T-bar =    22.5
                 |                                            |
lnGDPp~a overall |  3.577002     .696516   1.053507   4.980603 |     N =     468
         between |              .6151704   2.519646   4.493712 |     n =      18
         within  |              .3563127   2.089838   4.441503 |     T =      26
                 |                                            |
lnGDPp~2 overall |  13.27904    4.515063   1.109877   24.80641 |     N =     468
         between |               4.12096   6.773964   20.23075 |     n =      18
         within  |              2.076681   6.764756    19.6758 |     T =      26

.
end of do-file

.
```

```
. testparm i.year

 ( 1)  1996.year = 0
 ( 2)  1997.year = 0
 ( 3)  1998.year = 0
 ( 4)  1999.year = 0
 ( 5)  2000.year = 0
 ( 6)  2001.year = 0
 ( 7)  2002.year = 0
 ( 8)  2003.year = 0
 ( 9)  2004.year = 0
 (10)  2005.year = 0
 (11)  2006.year = 0
 (12)  2007.year = 0
 (13)  2008.year = 0
 (14)  2009.year = 0
 (15)  2010.year = 0
 (16)  2011.year = 0
 (17)  2012.year = 0
 (18)  2013.year = 0
 (19)  2014.year = 0
 (20)  2015.year = 0
 (21)  2016.year = 0
 (22)  2017.year = 0
 (23)  2018.year = 0
 (24)  2019.year = 0
 (25)  2020.year = 0
       Constraint 1 dropped
       Constraint 10 dropped
       Constraint 13 dropped
       Constraint 16 dropped
       Constraint 22 dropped
       Constraint 23 dropped
       Constraint 24 dropped
       Constraint 25 dropped

       F( 17,    17) =   18.40
            Prob > F =    0.0000

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  15.cou = 0
 (12)  17.cou = 0
 (13)  18.cou = 0
 (14)  20.cou = 0
 (15)  21.cou = 0
 (16)  22.cou = 0
 (17)  23.cou = 0
       Constraint 4 dropped
       Constraint 5 dropped
       Constraint 7 dropped
       Constraint 12 dropped
       Constraint 16 dropped
       Constraint 17 dropped

       F( 11,    17) =  473.80
            Prob > F =    0.0000
```

Fixed over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthInequalityL[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               growthI~L |   .0207587       .1440789
                       e |   .0211263       .1453491
                       u |          0              0

        Test:   Var(u) = 0
                             chibar2(01) =     0.00
                          Prob > chibar2 =   1.0000
```

Random over pooled OLS

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
lnGDPpcapita |    .3609069     .1868619         .174045        .0865008
lnGDPpcapi~2 |   -.0550254    -.0258317        -.0291937        .0141838
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        4.24
                Prob>chi2 =      0.1198

.
. hausman fixed random,sigmamore

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
lnGDPpcapita |    .3609069     .1868619         .174045        .0842735
lnGDPpcapi~2 |   -.0550254    -.0258317        -.0291937        .0138684
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        4.45
                Prob>chi2 =      0.1082

. hausman fixed random, sigmaless

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
lnGDPpcapita |    .3609069     .1868619         .174045        .0851811
lnGDPpcapi~2 |   -.0550254    -.0258317        -.0291937        .0140177
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        4.35
                Prob>chi2 =      0.1135
```

Random over fixed

Profit inequality

$$InequalityK_{it} = a_{1_{it}} + a_2 GDP\ per\ capita_{it} + a_3 GDP\ per\ capita^2{}_{it} + b_i + u_{it} (7.3.16)$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
-------------------------------------------------------------------------------------------------------------------------------------------------
growthInequal~K double  %10.0g                growthInequalityK
lnGDPpcapita    double  %10.0g                lnGDPpcapita
lnGDPpcapita2   double  %10.0g                lnGDPpcapita2

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
growthIneq~K |        456    .0177396    .1726881  -.5998913   1.470415
lnGDPpcapita |        468    3.577002     .696516   1.053507   4.980603
lnGDPpcapi~2 |        468    13.27904    4.515063   1.109877   24.80641

. xtdescribe

     cou:  3, 5, ..., 23                                   n =         18
    year:  1995, 1996, ..., 2020                           T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
growt~yK overall |  .0177396   .1726881  -.5998913   1.470415 |     N =     456
         between |             .0219224  -.0085433   .0754785 |     n =      18
         within  |             .1714091  -.5736084   1.423961 | T-bar = 25.3333
                 |                                            |
lnGDPp~a overall |  3.577002    .696516   1.053507   4.980603 |     N =     468
         between |             .6151704   2.519646   4.493712 |     n =      18
         within  |             .3563127   2.089838   4.441503 |     T =      26
                 |                                            |
lnGDPp~2 overall |  13.27904   4.515063   1.109877   24.80641 |     N =     468
         between |              4.12096   6.773964   20.23075 |     n =      18
         within  |             2.076681   6.764756    19.6758 |     T =      26
```

```
. testparm i.year

 ( 1)  1996.year = 0
 ( 2)  1997.year = 0
 ( 3)  1998.year = 0
 ( 4)  1999.year = 0
 ( 5)  2000.year = 0
 ( 6)  2001.year = 0
 ( 7)  2002.year = 0
 ( 8)  2003.year = 0
 ( 9)  2004.year = 0
 (10)  2005.year = 0
 (11)  2006.year = 0
 (12)  2007.year = 0
 (13)  2008.year = 0
 (14)  2009.year = 0
 (15)  2010.year = 0
 (16)  2011.year = 0
 (17)  2012.year = 0
 (18)  2013.year = 0
 (19)  2014.year = 0
 (20)  2015.year = 0
 (21)  2016.year = 0
 (22)  2017.year = 0
 (23)  2018.year = 0
 (24)  2019.year = 0
 (25)  2020.year = 0
       Constraint 1 dropped
       Constraint 2 dropped
       Constraint 4 dropped
       Constraint 5 dropped
       Constraint 7 dropped
       Constraint 9 dropped
       Constraint 24 dropped
       Constraint 25 dropped

       F( 17,    17) =    6.08
            Prob > F =    0.0003

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  15.cou = 0
 (12)  17.cou = 0
 (13)  18.cou = 0
 (14)  20.cou = 0
 (15)  21.cou = 0
 (16)  22.cou = 0
 (17)  23.cou = 0
       Constraint 1 dropped
       Constraint 2 dropped
       Constraint 3 dropped
       Constraint 4 dropped
       Constraint 5 dropped
       Constraint 6 dropped
       Constraint 7 dropped
       Constraint 8 dropped
       Constraint 10 dropped
       Constraint 12 dropped
       Constraint 13 dropped
       Constraint 15 dropped
       Constraint 17 dropped

       F(  4,    17) =  503.97
            Prob > F =    0.0000
```

Fixed over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthInequalityK[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               growthI~K |   .0298212       .1726881
                       e |   .0301959       .1737697
                       u |          0              0

        Test:   Var(u) = 0
                             chibar2(01) =     0.00
                          Prob > chibar2 =   1.0000
```

Random over OLS

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
 lnGDPpcapita |   -.1816748    -.1634425       -.0182323        .0641915
 lnGDPpcapi~2 |    .0223932     .0208865        .0015067        .0123082
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        0.41
                Prob>chi2 =      0.8150
```

Random over fixed

Total inequality

$$Inequality_{it} = a_{1_{it}} + a_2 GDP\ per\ capita_{it} + a_3 GDP\ per\ capita^2{}_{it} + b_i + u_{it} (7.3.17)$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
------------------------------------------------------------------------------------------------------------------------
growthinequal~y double  %10.0g                growthinequality
lnGDPpcapita    double  %10.0g                lnGDPpcapita
lnGDPpcapita2   double  %10.0g                lnGDPpcapita2

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
growthineq~y |        435   -.0015933    .0805592  -.8765261   .8245583
lnGDPpcapita |        468    3.577002     .696516   1.053507   4.980603
lnGDPpcapi~2 |        468    13.27904    4.515063   1.109877   24.80641

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
gro~lity overall | -.0015933    .0805592  -.8765261   .8245583 |     N =     435
         between |              .0139599  -.0232379   .0405596 |     n =      18
         within  |              .0793743  -.8548815   .7824054 | T-bar = 24.1667
                 |                                             |
lnGDPp~a overall |  3.577002     .696516   1.053507   4.980603 |     N =     468
         between |              .6151704   2.519646   4.493712 |     n =      18
         within  |              .3563127   2.089838   4.441503 |     T =      26
                 |                                             |
lnGDPp~2 overall |  13.27904    4.515063   1.109877   24.80641 |     N =     468
         between |               4.12096   6.773964   20.23075 |     n =      18
         within  |              2.076681   6.764756    19.6758 |     T =      26
```

```
. testparm i.year

 ( 1)  1996.year = 0
 ( 2)  1997.year = 0
 ( 3)  1998.year = 0
 ( 4)  1999.year = 0
 ( 5)  2000.year = 0
 ( 6)  2001.year = 0
 ( 7)  2002.year = 0
 ( 8)  2003.year = 0
 ( 9)  2004.year = 0
 (10)  2005.year = 0
 (11)  2006.year = 0
 (12)  2007.year = 0
 (13)  2008.year = 0
 (14)  2009.year = 0
 (15)  2010.year = 0
 (16)  2011.year = 0
 (17)  2012.year = 0
 (18)  2013.year = 0
 (19)  2014.year = 0
 (20)  2015.year = 0
 (21)  2016.year = 0
 (22)  2017.year = 0
 (23)  2018.year = 0
 (24)  2019.year = 0
 (25)  2020.year = 0
       Constraint 2 dropped
       Constraint 5 dropped
       Constraint 8 dropped
       Constraint 9 dropped
       Constraint 11 dropped
       Constraint 12 dropped
       Constraint 18 dropped
       Constraint 21 dropped

       F( 17,    17) =    4.94
            Prob > F =    0.0010

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  15.cou = 0
 (12)  17.cou = 0
 (13)  18.cou = 0
 (14)  20.cou = 0
 (15)  21.cou = 0
 (16)  22.cou = 0
 (17)  23.cou = 0
       Constraint 2 dropped
       Constraint 3 dropped
       Constraint 4 dropped
       Constraint 5 dropped
       Constraint 6 dropped
       Constraint 7 dropped
       Constraint 12 dropped
       Constraint 13 dropped
       Constraint 17 dropped

       F(  8,    17) = 1272.83
            Prob > F =    0.0000
```

Fixed over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthinequality[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                        |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                growthi~y |   .0064898       .0805592
                        e |   .0061997        .078738
                        u |          0              0

        Test:   Var(u) = 0
                             chibar2(01) =     0.00
                          Prob > chibar2 =   1.0000
```

Random over pooled OLS

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random        Difference          S.E.
-------------+----------------------------------------------------------------
 lnGDPpcapita |   -.1473866    -.1428764       -.0045101        .0344454
 lnGDPpcapi~2 |    .0145889     .0184113       -.0038224         .006283
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        7.53
                Prob>chi2 =      0.0232
```

Fixed over random effects

Depended variable: ΔGDPper capita

Total inequality

$$\Delta GDPpercapita_{it} = a_{1_{it}} + a_2 L.profit\ rate_{it} + a_3 L.interest\ rate_{it} + a_4 L.private\ dept_{it} + a_5 inequality_{it} + a_6 euro\ entrance_{it} + a_7 2008\ financial\ crisis_{it} + b_i + u_{it}\ (7.3.17)$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
------------------------------------------------------------------------------------------------------------------------------------------------------
growthGDPpcap~a double  %10.0g                growthGDPpcapita
growthr         double  %10.0g                growthr
growthir        double  %10.0g                growthir
lnDebtH1        double  %10.0g                lnDebtH1
inequality      double  %10.0g                inequality
eurodumm        byte    %10.0g                eurodumm
crisisdumm      byte    %10.0g                crisisdumm

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
growthGDPp~a |        465    .0406442    .0605026   -.217647    .409613
     growthr |        463    .0235549    .0944998  -.4369912   .5567241
    growthir |        450    .0098039    .0939562  -.4369218   .6638064
    lnDebtH1 |        462    4.006271    2.315389  -2.951883   7.639548
  inequality |        450    .3574031    .0804257   .1889477   .5817417
-------------+---------------------------------------------------------
    eurodumm |        468    .6923077    .4620323          0          1
  crisisdumm |        468          .5     .500535          0          1

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+---------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+---------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
growth~a overall |  .0406442    .0605026   -.217647    .409613 |     N =     465
         between |               .030097    .011982   .1029395 |     n =      18
         within  |              .0529168   -.264816    .348506 | T-bar = 25.8333
                 |                                            |
growthr  overall |  .0235549    .0944998  -.4369912   .5567241 |     N =     463
         between |              .0266985  -.0032978    .098276 |     n =      18
         within  |              .0909177  -.4573123    .482003 | T-bar = 25.7222
                 |                                            |
growthir overall |  .0098039    .0939562  -.4369218   .6638064 |     N =     450
         between |              .0217585  -.0147823   .0757606 |     n =      18
         within  |              .0915404  -.5028786   .6396248 |     T =      25
                 |                                            |
lnDebtH1 overall |  4.006271    2.315389  -2.951883   7.639548 |     N =     462
         between |              2.171727   .7389222   7.345015 |     n =      18
         within  |              .9220272   .0900429   6.030101 | T-bar = 25.6667
                 |                                            |
inequa~y overall |  .3574031    .0804257   .1889477   .5817417 |     N =     450
         between |              .0694712   .2093809   .4515983 |     n =      18
         within  |              .0437959   .1309115   .4975451 | T-bar =      25
                 |                                            |
eurodumm overall |  .6923077    .4620323          0          1 |     N =     468
         between |              .2258141   .2307692   .8461538 |     n =      18
         within  |              .4064624  -.1538462   1.461538 |     T =      26
                 |                                            |
crisis~m overall |        .5     .500535          0          1 |     N =     468
         between |                     0         .5         .5 |     n =      18
         within  |               .500535          0          1 |     T =      26
```

```
. testparm i.year

 ( 1)  1997.year = 0
 ( 2)  1998.year = 0
 ( 3)  1999.year = 0
 ( 4)  2000.year = 0
 ( 5)  2001.year = 0
 ( 6)  2002.year = 0
 ( 7)  2003.year = 0
 ( 8)  2004.year = 0
 ( 9)  2005.year = 0
 (10)  2006.year = 0
 (11)  2007.year = 0
 (12)  2008.year = 0
 (13)  2009.year = 0
 (14)  2010.year = 0
 (15)  2011.year = 0
 (16)  2012.year = 0
 (17)  2013.year = 0
 (18)  2014.year = 0
 (19)  2015.year = 0
 (20)  2016.year = 0
 (21)  2017.year = 0
 (22)  2018.year = 0
 (23)  2019.year = 0
       Constraint 6 dropped
       Constraint 9 dropped
       Constraint 12 dropped
       Constraint 16 dropped
       Constraint 22 dropped
       Constraint 23 dropped

       F( 17,    17) =   89.50
            Prob > F =    0.0000

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  15.cou = 0
 (12)  17.cou = 0
 (13)  18.cou = 0
 (14)  20.cou = 0
 (15)  21.cou = 0
 (16)  22.cou = 0
 (17)  23.cou = 0
       Constraint 4 dropped
       Constraint 5 dropped
       Constraint 6 dropped
       Constraint 12 dropped
       Constraint 13 dropped
       Constraint 14 dropped
       Constraint 17 dropped

       F( 10,    17) = 7441.47
            Prob > F =    0.0000
```

Fixed over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthGDPpcapita[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               growthG~a |   .0029238       .0540723
                       e |   .0018027       .0424588
                       u |    .000026       .0050963

        Test:   Var(u) = 0
                             chibar2(01) =    21.60
                          Prob > chibar2 =   0.0000
```

Pooled OLS over random effects

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
   L.growthr |    .1933998     .1856418        .0077579        .0095786
  L.growthir |   -.0546518    -.0371158        -.017536        .0057649
  L.lnDebtH1 |     -.00814    -.0079495       -.0001905        .0036761
  inequality |    .0101537    -.0155905        .0257442         .038388
    eurodumm |    .0081811    -.0001602        .0083412        .0020302
  crisisdumm |   -.0267498    -.0230145       -.0037353        .0035497
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       35.08
                Prob>chi2 =      0.0000
                (V_b-V_B is not positive definite)

.
. hausman fixed random,sigmamore

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
   L.growthr |    .1933998     .1856418        .0077579        .0126712
  L.growthir |   -.0546518    -.0371158        -.017536        .0093509
  L.lnDebtH1 |     -.00814    -.0079495       -.0001905        .0037895
  inequality |    .0101537    -.0155905        .0257442        .0400366
    eurodumm |    .0081811    -.0001602        .0083412        .0026185
  crisisdumm |   -.0267498    -.0230145       -.0037353        .0038243
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       28.10
                Prob>chi2 =      0.0001

. hausman fixed random, sigmaless

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
   L.growthr |    .1933998     .1856418        .0077579        .0123349
  L.growthir |   -.0546518    -.0371158        -.017536        .0091027
  L.lnDebtH1 |     -.00814    -.0079495       -.0001905        .0036889
  inequality |    .0101537    -.0155905        .0257442         .038974
    eurodumm |    .0081811    -.0001602        .0083412         .002549
  crisisdumm |   -.0267498    -.0230145       -.0037353        .0037228
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       29.66
                Prob>chi2 =      0.0000
```

Fixed over random effects

All types of inequalities

$$\begin{aligned} \Delta GDPpercapita_{it} &= a_{1_{it}} + a_2 L.profit\ rate_{it} + a_3 L.interest\ rate_{it} + a_4 L.private\ dept_{it} \\ &+ a_5 InequalityF_{it} + a_6 InequalityL_{it} + a_7 InequalityK_{it} \\ &+ a_8 unemployment\ rate_{it} + a_9 euro\ entrance_{it} \\ &+ a_{10} 2008\ financial\ crisis_{it} + b_i + u_{it} \ (7.3.18) \end{aligned}$$

```
. describe $id $t  $ylist $xlist

              storage   display    value
variable name   type    format     label      variable label
---------------------------------------------------------------------------------------------------------------------------------------------

growthGDPpcap~a double  %10.0g                growthGDPpcapita
growthr         double  %10.0g                growthr
growthir        double  %10.0g                growthir
lnDebtH1        double  %10.0g                lnDebtH1
InequalityF     double  %10.0g                InequalityF
InequalityL     double  %10.0g                InequalityL
InequalityK     double  %10.0g                InequalityK
unemplRT        double  %10.0g                unemplRT
eurodumm        byte    %10.0g                eurodumm
crisisdumm      byte    %10.0g                crisisdumm

. summarize $id $t  $ylist $xlist

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
growthGDPp~a |        465    .0406442    .0605026   -.217647    .409613
     growthr |        463    .0235549    .0944998  -.4369912   .5567241
    growthir |        450    .0098039    .0939562  -.4369218   .6638064
    lnDebtH1 |        462    4.006271    2.315389  -2.951883   7.639548
 InequalityF |        468      .21256    .0597226   .0548225   .3568762
-------------+---------------------------------------------------------
 InequalityL |        419    .1393459    .0922131   .0236261   .4972983
 InequalityK |        468    .2156319    .0880923  -.0127943   .6496873
    unemplRT |        468    .0892579    .0446446          0   .2536703
    eurodumm |        468    .6923077    .4620323          0          1
  crisisdumm |        468          .5     .500535          0          1

. xtdescribe

     cou:  3, 5, ..., 23                                     n =         18
    year:  1995, 1996, ..., 2020                             T =         26
           Delta(year) = 1 year
           Span(year)  = 26 periods
           (cou*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                        26      26      26        26        26      26      26

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+----------------------------
       18    100.00  100.00 |  11111111111111111111111111
 ---------------------------+----------------------------
       18    100.00         |  XXXXXXXXXXXXXXXXXXXXXXXXXX

. xtsum $t $id $ylist $xlist

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
growth~a overall |  .0406442    .0605026   -.217647    .409613 |     N =     465
         between |               .030097    .011982   .1029395 |     n =      18
         within  |              .0529168   -.264816    .348506 | T-bar = 25.8333
                 |                                            |
growthr  overall |  .0235549    .0944998  -.4369912   .5567241 |     N =     463
         between |              .0266985  -.0032978    .098276 |     n =      18
         within  |              .0909177  -.4573123    .482003 | T-bar = 25.7222
                 |                                            |
growthir overall |  .0098039    .0939562  -.4369218   .6638064 |     N =     450
         between |              .0217585  -.0147823   .0757606 |     n =      18
         within  |              .0915404  -.5028786   .6396248 |     T =      25
                 |                                            |
lnDebtH1 overall |  4.006271    2.315389  -2.951883   7.639548 |     N =     462
         between |              2.171727   .7389222   7.345015 |     n =      18
         within  |              .9220272   .0900429   6.030101 | T-bar = 25.6667
                 |                                            |
Inequa~F overall |    .21256    .0597226   .0548225   .3568762 |     N =     468
         between |              .0548904   .1028658   .3068195 |     n =      18
         within  |              .0267419   .1037394   .2961591 |     T =      26
                 |                                            |
Inequa~L overall |  .1393459    .0922131   .0236261   .4972983 |     N =     419
         between |              .1019473   .0650486    .386775 |     n =      18
         within  |              .0373289  -.0102071   .3054036 | T-bar = 23.2778
                 |                                            |
Inequa~K overall |  .2156319    .0880923  -.0127943   .6496873 |     N =     468
         between |              .0795978   .1025687   .4444758 |     n =      18
         within  |              .0419955   .0568985   .4208435 |     T =      26
                 |                                            |
unemplRT overall |  .0892579    .0446446          0   .2536703 |     N =     468
         between |               .033309   .0286401   .1602017 |     n =      18
         within  |              .0307091   .0092509   .1973715 |     T =      26
                 |                                            |
eurodumm overall |  .6923077    .4620323          0          1 |     N =     468
         between |              .2258141   .2307692   .8461538 |     n =      18
         within  |              .4064624  -.1538462   1.461538 |     T =      26
                 |                                            |
crisis~m overall |        .5     .500535          0          1 |     N =     468
         between |                     0         .5         .5 |     n =      18
         within  |               .500535          0          1 |     T =      26
```

```
. testparm i.year

 ( 1)  1997.year = 0
 ( 2)  1998.year = 0
 ( 3)  1999.year = 0
 ( 4)  2000.year = 0
 ( 5)  2001.year = 0
 ( 6)  2002.year = 0
 ( 7)  2003.year = 0
 ( 8)  2004.year = 0
 ( 9)  2005.year = 0
 (10)  2006.year = 0
 (11)  2007.year = 0
 (12)  2008.year = 0
 (13)  2009.year = 0
 (14)  2010.year = 0
 (15)  2011.year = 0
 (16)  2012.year = 0
 (17)  2013.year = 0
 (18)  2014.year = 0
 (19)  2015.year = 0
 (20)  2016.year = 0
 (21)  2017.year = 0
 (22)  2018.year = 0
 (23)  2019.year = 0
       Constraint 8 dropped
       Constraint 17 dropped
       Constraint 18 dropped
       Constraint 20 dropped
       Constraint 21 dropped
       Constraint 22 dropped

       F( 17,    17) =   38.50
            Prob > F =    0.0000

. testparm i.cou

 ( 1)  5.cou = 0
 ( 2)  6.cou = 0
 ( 3)  7.cou = 0
 ( 4)  8.cou = 0
 ( 5)  9.cou = 0
 ( 6)  10.cou = 0
 ( 7)  11.cou = 0
 ( 8)  12.cou = 0
 ( 9)  13.cou = 0
 (10)  14.cou = 0
 (11)  15.cou = 0
 (12)  17.cou = 0
 (13)  18.cou = 0
 (14)  20.cou = 0
 (15)  21.cou = 0
 (16)  22.cou = 0
 (17)  23.cou = 0

       F( 17,    17) = 4.6e+06
            Prob > F =    0.0000
```

Fixed over pooled OLS

```
Breusch and Pagan Lagrangian multiplier test for random effects

        growthGDPpcapita[cou,t] = Xb + u[cou] + e[cou,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               growthG~a |   .0028795       .0536613
                       e |   .0016372       .0404624
                       u |   .0000357       .0059747

        Test:   Var(u) = 0
                             chibar2(01) =    10.21
                          Prob > chibar2 =   0.0007
```

Pooled OLS over random

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
   L.growthr |    .1628668     .2040162       -.0411495        .0060268
  L.growthir |    -.031274    -.0423665        .0110924               .
  L.lnDebtH1 |   -.0128018    -.0071374       -.0056644        .0043941
 InequalityF |    .2143648     .1266868        .0876779        .0929443
 InequalityL |    .2590017    -.0240338        .2830355         .075109
 InequalityK |    .2044004     .0970323        .1073681        .0540435
    unemplRT |   -.2728967     -.171492       -.1014047        .0558585
    eurodumm |   -.0029036    -.0034746         .000571        .0017499
  crisisdumm |   -.0217553    -.0172097       -.0045456        .0037881
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(9) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =  -256.22    chi2<0 ==> model fitted on these
                                        data fails to meet the asymptotic
                                        assumptions of the Hausman test;
                                        see suest for a generalized test

.
. hausman fixed random,sigmamore

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
   L.growthr |    .1628668     .2040162       -.0411495         .013275
  L.growthir |    -.031274    -.0423665        .0110924        .0100666
  L.lnDebtH1 |   -.0128018    -.0071374       -.0056644        .0046602
 InequalityF |    .2143648     .1266868        .0876779        .0995286
 InequalityL |    .2590017    -.0240338        .2830355        .0798338
 InequalityK |    .2044004     .0970323        .1073681        .0579827
    unemplRT |   -.2728967     -.171492       -.1014047          .06256
    eurodumm |   -.0029036    -.0034746         .000571          .00298
  crisisdumm |   -.0217553    -.0172097       -.0045456        .0044068
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(9) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       47.13
                Prob>chi2 =      0.0000

. hausman fixed random, sigmaless

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
   L.growthr |    .1628668     .2040162       -.0411495        .0126052
  L.growthir |    -.031274    -.0423665        .0110924        .0095587
  L.lnDebtH1 |   -.0128018    -.0071374       -.0056644         .004425
 InequalityF |    .2143648     .1266868        .0876779        .0945065
 InequalityL |    .2590017    -.0240338        .2830355        .0758054
 InequalityK |    .2044004     .0970323        .1073681        .0550569
    unemplRT |   -.2728967     -.171492       -.1014047        .0594032
    eurodumm |   -.0029036    -.0034746         .000571        .0028297
  crisisdumm |   -.0217553    -.0172097       -.0045456        .0041844
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(9) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       52.27
                Prob>chi2 =      0.0000
```

Fixed over random effects