ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
Εθνικόν και Καποδιστριακόν
Πανεπιστήμιον Αθηνών

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ

Εθνικόν και Καποδιστριακόν

Πανεπιστήμιον Αθηνών

ΤΜΗΜΑ ΟΙΚΟΝΟΝΟΜΙΚΩΝ ΕΠΙΣΤΗΜΩΝ
ΠΡΟΓΡΑΜΜΑ ΜΕΤΑΠΤΥΧΙΑΚΩΝ
ΣΠΟΥΔΩΝ ΕΦΑΡΜΟΣΜΕΝΗΣ ΟΙΚΟΝΟΜΙΚΗΣ &
ΧΡΗΜΑΤΟΟΙΚΟΝΟΜΙΚΗΣ
ΑΚΑΔΗΜΑΪΚΟ ΕΤΟΣ: 2018

ΔΙΠΛΩΜΑΤΙΚΗ ΕΡΓΑΣΙΑ
του ΑΡΓΥΡΟΥ ΔΗΜΗΤΡΙΟΥ

"FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH IN THE MENA COUNTRIES: A PANEL DATA APPROACH"

Επιβλέπουσα: Καθηγ. Ευαγγελία Παπαπέτρου

ΠΕΡΙΛΗΨΗ

Βασικό θέμα της παρούσας μελέτης είναι η εξέταση της σχέσης ανάμεσα στο ρόλο του χρηματοπιστωτικού τομέα και στην οικονομική μεγέθυνση σε μία ομάδα χωρών γνωστή ως MENA countries. Αυτή η ομάδα αποτελείται από τις περισσότερες χώρες της Βόρειας Αφρικής και της Μέσης Ανατολής, και συγκεκριμένα: Αλγερία, Μπαχρέιν, Αίγυπτο, Ισραήλ, Ιορδανία, Ιράκ, Ιράν, Κουβέιτ, Λίβανος, Λιβύη, Μαρόκο, Ομάν, Κατάρ, Σαουδική Αραβία, Συρία, Σουδάν, Τυνησία, Τουρκία και Ηνωμένα Αραβικά Εμιράτα. Ο κύριος λόγος για την επιλογή αυτής της συγκεκριμένης ομάδας είναι τα ιδιαίτερα χαρακτηριστικά των χρηματοπιστωτικών τους συστημάτων. Αρχικά, παρουσιάζεται η θεωρητική βιβλιογραφία που εξετάζει τη σχέση χρηματοοικονομικού τομέα και οικονομικής μεγέθυνσης. Μετά από μια εξέταση των διαφορετικών θεωρητικών προσεγγίσεων, συζητούνται οι πρόοδοι της εμπειρικής βιβλιογραφίας ως προς το συγκεκριμένο θέμα. Η εμπειρική παρούσα ανάλυση βασίζεται σε ένα υπόδειγμα PVAR, μέσω του οποίου εξετάζεται η ύπαρξη μιας σχέσης στις χώρες αυτές ως ομάδα. Ωστόσο, η παρουσία ή η απουσία αιτιώδους συνάφειας σε επίπεδο ομάδας δεν σημαίνει απαραίτητα ότι το ίδιο συμπέρασμα ισχύει για κάθε χώρα ξεχωριστά. Για τους λόγους αυτούς, η σχέση εξετάζεται και σε επίπεδο χώρας, μέσω μεμονωμένων δοκιμών υποδειγμάτων VAR και Granger αιτιότητας. Πριν από την εξέταση της αιτιώδους συνάφειας σε επίπεδο χώρας, χρησιμοποιείται μια άλλη μέθοδος, η μέθοδος Dumitrescu & Hurlin, η οποία διερευνά το κατά πόσον υπάρχει αιτιώδης συνάφεια σε τουλάχιστον μία μεμονωμένη χώρα στο panel. Βάσει της παραπάνω μεθοδολογίας εξάγονται συμπεράσματα σχετιζόμενα με την υπό εξέταση σχέση. Στα πλαίσια της εμπειρικής ανάλυσης χρησιμοποιείται το στατιστικό πακέτο STATA 14.

I would like to express my gratitude to my supervisor Professor Evangelia Papapetrou for her guidance and advice she has provided me during the writing of the dissertation. I would also like to thank Ass.Professor Violeta Dalla for her help and advice on a number of econometric issues. In addition, I would like to express my sincere thanks to all the MSc-program professors who taught me during the period October 2016-January 2018. I thank them for the valuable knowledge they have given me and for their general support.

Table of Contents

1. Introduction

The main goal of this study is to examine the relationship between financial-sector development and economic growth in a particular group of countries known as the MENA countries. This group comprises of most of the North African and Middle Eastern countries, namely: Algeria, Bahrain, Egypt, Israel, Jordan, Iraq, Iran, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Sudan, Tunisia, Turkey and United Arab Emirates. The main reason behind the choice of this particular group is the special characteristics of their financial systems as well as their special financial ethics and practices represented by the term "*Islamic Banking*". Also, an interesting point behind the choice of this group is the ongoing financial-liberalization initiatives.

Before investigating, empirically, the aforementioned relationship, the theoretical literature examining the connection between economic growth and financial development is presented. Special focus is placed on the contradictory views held by various leading economists. In general, the views presented fall in one of three categories: those saying that the financial system spurs real economic growth, those stressing that financial development just follows economic growth, and those suggesting that there is no such a relationship at all. After a thorough examination of the different theoretical views, the advances of the empirical literature as far as the specific subject is concerned are discussed. In this part, different types of empirical studies are examined: cross country studies, time-series studies, panel-data studies, firm and industry level studies and country-case studies. In this section the particular problems that an empirical economist might face when examining this subject are also mentioned.

Our empirical analysis is based on a PVAR model, through which the existence of a relationship in these countries as a group is examined. However, the presence or absence of causality at group level does not necessarily mean that the same finding applies to each country separately. On these grounds, the relationship is also examined at country level, through individual VARs and Granger causality tests. Before examining causality at individual country-level, another test, the Dumitrescu & Hurlin test, which investigates whether causality exists in at least one individual country, is employed. The main purpose behind this test is to help us as far as which countries and which variables representing financial development should be employed in the individual VARs.

The analysis is performed using a particular set of variables. Of these variables, two have been traditionally used in the existing studies on that subject (*Domestic credit to the private sector as a percentage of GDP* and *M2 as a percentage of GDP)*, one, although it does not show financial development per se, is considered in the literature to be strongly connected to financial development (*Total Trade as a percentage of GDP*), and the other three variables are indices created by the IMF to describe financial development. These indices have special characteristics and have not yet used by the existing literature that examines the relationship of interest.

After the choice of the variables, unit-root tests are performed in order to examine whether the differences or the levels of the data should be used in the models. Subsequently, the optimal lag for the PVAR model is chosen through a specific test. After the implementation of the PVAR model, of the Dumitrescu & Hurlin tests and of the individual-country VARs, the empirical findings are presented.

The innovative characteristics of the study are:

i. The examination of a group of countries with special characteristics
ii. The use of the PVAR approach, which is rather new in the empirical economics literature
iii. The use of the IMF indices as proxies of financial development, which have not been employed by the existent literature on financial development and economic growth.

The structure of the study is as follows.

- Basic Definitions
- Theoretical literature
- Empirical literature
- Empirical analysis, which contains: the choice of the sample, the data, the description of the methodology, the unit root tests, the choice of the optimal lag, the implementation of the PVAR, the Dimirescu-Hurlin test, and the individual country-specific VARs)
- Main findings-conclusions

2. Basic Definitions

Firstly, some definitions of the main economic notions that are at the core of our subject should be provided.

Starting with economic growth, it is defined as the capacity of an economy to produce more goods and services from one period of time to another (Jones & Volrath 2013). It can be measured in nominal or real terms, the latter of which is adjusted for inflation. Traditionally, aggregate economic growth is measured in terms of gross national product (GNP) or gross domestic product (GDP), although alternative metrics are sometimes used.

The definition of financial development is much less precise and more descriptive. Olgu, Dinçer & Hacıoğlu (2014), for example, give six answers to the question "What is financial development?"

- *Financial development is part of the private sector development strategy to stimulate economic growth and reduce poverty by overcoming "costs" incurred in the financial system. This process of reducing costs in acquiring information, enforcing contracts and executing transactions results in the emergence of financial contracts, intermediaries, and markets. Different types and combinations of information, transaction, and enforcement costs, in conjunction with different regulatory, legal and tax systems have motivated distinct forms of contracts, intermediaries and markets across countries in different times.*
- *Financial development thus involves the establishment and expansion of institutions, instruments and markets that support this investment and growth process.*
- *Financial development may be defined as the developments in the size, efficiency and stability of and access to the financial system.*
- *Financial development means some improvements in producing information on possible investments and on allocating capital, monitoring firms and exerting corporate governance, trading, diversification, and management of risk, mobilization and pooling of savings, easing the exchange of goods and services. These financial functions affect savings or investment decisions and technological innovations and hence economic growth.*
- *Financial development refers to the fulfillment of the functions of the financial system in the best manner by eliminating the market distortions.*

Indeed, many admit that the financial sector plays a very important and substantial role in the formation and development prospects of the capitalist system both at the macro and the micro level (Vaitsos 2009). As a result, money and its appropriations are among the main and most important factors of the existing economic system. They are considered to be endogenous and special variables of every economic system. In the real world, there are costs of acquiring information and making transactions. As Levine (1996) states, these costs create incentives for the emergence of the financial markets. The costs result from frictions of the economic system and the lack of perfect information. These costs influence the allocation of resources across space and time. The emergence of banks improves the acquisition of information about firms and managers and alters the allocation of credit. Thus, we can easily understand why in an Arrow-Debreu style of economy, where there are no specific frictions, the financial sector has no role to play. As Levine (1997) clearly points out, "any theory of the role of the financial sector and its development on economic growth adds friction to the Arrow-Debreu model".

3. Theoretical Literature: the growth-finance relationship

In the literature, there is a great spectrum of contradictory ideas regarding the relationship between the development of the financial system and the process of economic growth. The contradictions mainly refer to the importance attributed to the financial system, and in particular its causal relationship with economic growth and development. Some economists claim that financial development plays the role of the cause of economic growth, while others claim that there is a relationship but not causality, and several other researchers, such as Lucas (1973), claim that there is not any relationship at all.

The first noted views about the relationship between the financial sector and economic development were put in a political rather than a theoretical or scientific economic context. As Hammond (1957) in his book concerning the banking history of the early USA (1776-1866) points out, two of the founding fathers of the USA, Alexander Hamilton and John Adams, had totally different views about the role of the banking system. Alexander Hamilton, stated in 1781 that "*…banks were the best machines ever invented for economic development…*". On the other hand, John Adams stated in 1819 that "*…banks influence negatively the morality, the tranquility, and even the wealth of nations…*"

Bagehot (1873) was the first to recognize, in a scientific context, a relationship between financial development and economic growth. Bagehot, and also Hicks about a century later, argued that the financial system played a critical role in igniting industrialization in England by facilitating the mobilization of capital. Hicks even claimed that "*the industrial revolution had to wait the financial revolution…*". He further argued that the earlier promotion of the capital markets that boosted the liquidity of the UK economy in the 19th century was the central cause of the industrial revolution. Only after the liquidity provided by the capital markets was the UK economy able to utilize the technological innovation that had already been created in earlier periods (Vaitsos 2009).

Schumpeter (1911) also viewed the financial system and its development as very important elements of economic growth. Indeed, Schumpeter argued that the services provided by financial intermediaries, mobilizing savings, evaluating risk, monitoring managers and facilitating transactions, were essential for technological innovation and economic development. According to Schumpeter, well-functioning banks and financial systems spur technological innovation by identifying and funding those entrepreneurs with the best chance of successfully implementing innovative products and production processes. In that way, economic growth leads to the best allocation of resources. Contrary to Schumpeter, Joan Robinson suggested that "*...where enterprise leads finance follows...*". According to this view, it is economic development per se that creates demands for particular types of financial arrangement, and the financial system simply responds to these demands (Levine 1997).

Surprisingly, theoretical support for Robinson's argument was given by Friedman & Schwartz (1963), through their theory on the demand for cash holdings. According to them, if we consider financial intermediation as a luxury good then the positive relationship between financial development and GDP per person, derived from the quantity theory of money MV=PT, supposing that T= GDP, which means that financial intermediation is inversely related to the velocity of money, something that implies an income elasticity of money demand greater than one. This means that the relationship between these two variables is derived from real-sector growth to financial-sector growth through the demand for real cash holding, rather than the opposite as suggested by Schumpeter.

Following the seminal work of Goldsmith, McKinnon & Shaw (1973) went a step further by expressing the view that the role of the financial sector is so important for the economy that institutional interferences, such as the imposition of a highest level of interest rate or the imposition of a requirement of higher reserves, impede economic development and thus economic growth. A similar view is also expressed by Kapur (1976), Galbis (1977) and Mathienson (1980). They emphasize on the channels between financial development and growth by stressing the role of saving, which then leads to a high level of investment.

Representing a completely different school of thought, this of the new classical economics, Lucas (1973) did not believe that the finance-growth relationship is of any importance. Lucas stated that economists "*…badly over-stress…",* the role of the financial sector. In contrast, according to Lucas, there were other much more important factors influencing economic growth, such as human capital, the existing institutions and the quality of economic policy (Levine 1997). Other economists, specialized in development economics, also frequently express skepticism about the role of the financial sector, and often ignore it as a determinant of economic growth and development. Still others, like Fama (1980), stress that financial development induces growth. Fama (1980) states that, through their role in producing a pure nominal commodity or unit of account which is made to play the role of numeraire in a monetary system, the banks influence the real economy sector.

One of the most important analysts of the relationship between the financial sector and economic growth is Levine (1997, 2005). Levine has tried to show, both theoretically and empirically, the existence of a causal relationship between economic development and financial markets. Indeed, Levine has found evidence that financial markets and institutions are a critical and integral part of the development process and that the idea that the financial system is just a negligible perspective that passively corresponds to economic growth must be abandoned.

As Levine emphasizes, the financial sector exists because of frictions and lack of perfect information in the capital and money markets. The financial markets arise in order to resolve the problems resulting from these two elements, and in that way these markets can affect the allocation of resources and economic activity in general. Levine argues that each of the five main functions of the financial system, which result from specific market frictions, may affect the process of economic growth.

In particular, according to Levine (1997, 2005), King & Levine (1993) and Vaitsos (2009), the five main functions of the financial system are:

i. Hedging, diversifying & pooling risk
ii. Acquiring information &allocating resources
iii. Monitoring managers and exerting corporate control
iv. Mobilizing savings
v. Facilitating the exchange of goods & services

i. Hedging, Diversifying and Pooling Risk

This function of the financial system concerns risk amelioration. Market frictions and the derived costs cause risk. Levine (2005) divides this risk into two major categories: (a) liquidity risk, and (b) idiosyncratic risk. Liquidity risk refers to the risk resulting from the existence of conditions of uncertainty with respect to the ability and speed of converting assets into purchasing power. Liquidity is the ease and speed with which agents can convert assets into purchasing power at an agreed price (Levine 1997). Some assets are generally more liquid than others. For example, real-estate assets are much less liquid than shares or other paper investments. So informational asymmetries and transaction costs may inhibit liquidity and intensify liquidity risk. In addition to information costs, trading costs can also cause liquidity risks. These frictions create incentives for the development of financial markets and of other institutions that augment liquidity (Levine 2005). Levine (1997, 2005), Levine *et al.* (2000) and Vaitsos (2009) thoroughly analyze the link between liquidity and economic development or growth. As is well known, most of the high return projects require a long-run commitment of capital. On the other hand, no saver wants to give up his or hers control over their savings for a long period. Thus, it is the role of the financial sector to mitigate and augment the liquidity of a long-term investment so as this high return investment, which, by definition, is beneficial, will occur. As mentioned earlier, it was, according to Hicks, exactly this role of the financial sector and capital markets that enable the Industrial Revolution. It was necessary at the time of the industrial revolution for savers to hold liquid assets that they could easily sell, and the industrial markets to transform these liquid assets into long-term capital investments, especially in the machinery sector.

Levine (1991) takes a set up from Diamond & Dybvig (1983), who modeled the endogenous formation of capital, and especially equity markets, and linked it to economic growth. According to Levine (1991), savers who receive shocks can either sell their equity claims or future profits of the liquid production to others. As market participants do not verify whether or not other agents have received shocks, participants only trade impersonal stocks. Therefore, equity holders can easily sell their shares, while firms have permanent access to the capital invested by the initial shareholders. As stock-market transaction costs fall, more investment is made in the illiquid and higher-return projects. The high-return projects are likely to be associated with large positive externalities. As a result, greater stock-market liquidity induces faster steady state growth. Besides the stock market, Levine also emphasizes the role of the financial intermediaries, a representative example of which are commercial banks. Given that it is impossible to write incentive-compatible state-contingent insurance products, because it is impossible to observe shocks to individuals, banks can offer liquid deposits to savers and undertake a mixture of liquid, high return investments. Thus, the banks, by providing demand deposits and by creating an appropriate mixture of liquid and illiquid investments, offer complete insurance to savers against liquidity risk while simultaneously facilitating long run investments in high return projects. As a result, the banks replicate the equilibrium allocation of capital that exists when shocks are observable. One of the problems pointed out by Levine, is that the banking system is not incentive-compatible if agents can trade in liquid equity markets. If this was possible, all agents would use equities and so there would be no role for the banks. Sufficient impediments to trading in security markets are necessary for the banking system to emerge and play a role. Also financial liquidity involves firm access to credit during the production process, which may promote investment in longer gestation. As stated by Levine (2005), some firms are likely to receive shocks after receiving outside financing, in which case they may need additional injections of capital to complete outstanding projects. In the presence of information asymmetries, intermediaries can sell an option to a line of credit during the firm's initial financing that enables the firm to access additional credit at certain stages in the future.

Another way by which the financial system can induce growth through liquidity costs is by promoting human-capital accumulation via the provision of financial arrangements that facilitate borrowing for the accumulation of skills. While he stresses the important role of financial markets in enhancing economic growth through the reduction of liquidity risks, Levine (Levine 1997, 2005) acknowledges that theory suggests that enhanced liquidity has generally an overall ambiguous effect on saving rates and economic growth (Levine, 1997). Generally, in most models, greater liquidity either increases investment returns or lowers uncertainty. Higher returns affect saving through substitution and income effects, while lower uncertainty affects saving rates in an ambiguous way. Thus, in a model with physical-capital externalities, it is possible that saving falls with greater liquidity, so that economic growth actually decelerates through the role of financial markets (Jappelli & Pagano 1994, Levine 1997).

Besides lowering liquidity risk, there is another type of risk, which the presence of capital market reduces and can affect economic growth, the idiosyncratic risk. This refers to the risks associated with individual projects, firms, regions, countries etc. All types of financial markets, i.e. banks, mutual funds, securities market etc., provide ways of pooling and diversifying this risk. As the high-return projects are considered riskier than the low-return projects, the risk diversification induces a portfolio shift towards projects with higher expected returns. In this respect, therefore, the financial system's ability to provide risk diversification may affect long-run growth by changing resource allocation and saving rates. For reasons similar to those relating to liquidity risk, Levine (1997), acknowledges that, at least theoretically, the efficient capital allocation achieved through capital-market development may result in a reduction of economic growth when there is an externality-based or linear growth model. On the other hand, risk diversification may affect positively the rate of technological change and through technological change economic growth. That relationship will be described, as presented by King & Levine (1993), later on.

ii. Acquiring information and Allocating resources

As financial markets have a role to play in a non-perfect information context, there are costs associated with firms, managers etc. before making investments decisions. The savers probably may have neither the capacity nor the time to collect and process this information. On the other hand, they are likely to be reluctant to invest in activities for which there is little available information. This situation may result in keeping capital from flowing to its highest value-use, and impede growth. Financial intermediaries may reduce the costs of acquiring and processing information. As a result, they can improve economic allocation and enhance economic growth. Financial intermediaries also help to identify those entrepreneurs with the best chances of initiating successfully new goods and production processes, thus boosting the rate of innovation. The stock market plays a special role in the acquisition and dissemination of information. The larger the stock market, the greater the incentives for participants to acquire information about firms. It is easier for agents to disguise this private information and have a greater potential return through investment. Thus, large liquid markets can stimulate the acquisition of information and substantially improve resource allocation and long-term growth. It has to be pointed out here that there is an ongoing debate concerning the important of the liquid financial markets in distributing information. This debate is based on the role of information as a public good. As Stiglitz (1985) notes, this result, by lowering the incentives for spending private resources to acquire this information, large liquid markets may have opposite effects than those stated above.

iii. Monitoring managers and Exerting corporate control

The modern corporate entity usually faces problems concerning the corporate governance. There is the well-known conflict of interests between the different types of shareholders, between shareholders and outside creditors, between shareholders and management, or employees and management etc. As a result, the notion of corporate interest for every stakeholder in a modern corporate entity is different. This, according to the theory of corporate governance, results in costs. Firstly, there is difficulty in getting sufficient information on the actions of the decision makers, as there are many different decision makers with conflicting interests. This difficulty leads to an information-acquisition cost. The monitoring of firm managerial decisions and also the exertion of corporate control also involve risks. The presence of these risks results in poor distribution of resources and thus impedes economic growth through lower productivity.

In the presence of such conditions, financial intermediaries are considered crucial. According to Levine (1997), the intermediaries mitigate the information costs and the costs of monitoring the decision makers, ex post, i.e. after financing the investment. The previously described role of financial intermediaries as mitigators of information costs involve an ex ante mitigation of these costs. Financial creditors of all types, banks, equity or bond holders, create financial arrangements that compel the managers to run the firm in accordance with the interests of all creditors. Levine (1997) refers to certain studies (e.g. Getner 1988, Shleifer 1996) that find a positive relationship between financial arrangements for monitoring and exerting control on the one hand, and capital accumulation, optimal resource allocation and long-run growth on the other. Besides specific financial arrangements, financial intermediaries can reduce even further the information costs through their roles as "delegate monitors (Vaitsos 2009, Levine 1997, 2005). As it mobilizes the savings of many individual and lends these resources to the project owners, a financial intermediary economizes on aggregate monitoring costs as the borrower is monitored only by the intermediary and not by each of the various lenders. To get it even further, as the monitor-financial intermediary holds a well-diversified portfolio, there is no need for the individual lender to monitor the intermediary. The development of long run relationships between the intermediaries and the corporations that borrow further lowers the information costs.

In addition to the role of the banking system in exerting corporate control and reducing the relevant costs, stock markets may also promote corporate control (Levine 2005). For example, as the price of the firm's stock in a way reflects its performance, linking stock performance to manager compensation helps to align the interests of the owners to those of the managers and in this way it reduces the relevant costs. Similarly, if takeovers are easier in a well-developed stock market, there are incentives for managers not to underperform, given that, in case a takeover takes place, they probably lose their jobs.

Although there is serious disagreement, most researchers agree that the role of financial intermediaries and institutions of any kind as controllers is of paramount importance. Summarizing the arguments, financial intermediaries, by reducing information asymmetries and the corresponding costs, can ease external funding constraints and facilitate the optimal allocation of resources, and thus they can lead to faster capital accumulation and growth.

iv. Mobilizing savings

The notion of mobilizing savings involves the agglomeration of capital from different savers to investment. Without the access to multiple investors, production processes may be constrained to an inefficient scale. Also, through specific financial instruments, households are allowed to hold a diversified portfolio, which enables them to invest in efficient-scale firm's projects and to increase asset liquidity. This mobilization improves resource allocation and also increases economies of scale and investment initiatives that affect the overall growth process (Levine 1997, Vaitsos 2009). However, it is possible that total savings may be reduced rather than increased due to the combined influence of income and substitution effect. Thus, as acknowledged even by Levine (2001), the overall effect is ambiguous.

v. Facilitating the exchange of goods and services

Financial arrangements can also promote specialization and technological innovation, and therefore growth, by lowering transaction costs. The role of transaction costs in promoting specialization and growth was acknowledged firstly by Adam Smith himself (see e.g. Levine 2006, Vaitsos 2009). Adam Smith argued that financial arrangements, by lowering transaction costs, would permit greater specialization, as specialization requires more transactions. He placed this argument in terms of money over barter. According to Adam Smith, the need to diminish, to the greater possible extent, transaction and information costs makes economies to switch from barter to money. However, as Levine (1997) notes, the drop in transaction costs is not necessarily a one-time switch into money. More specialization requires more transactions, and as transactions are becoming more costly, the role of financial intermediaries and arrangements is paramount. This results in cumulative productivity gains. It is also stated that there is a feedback from productivity gains to financial market development. If there are fixed costs associated with establishing markets, then higher income per capita implies that these fixed costs are less burdensome as a share of per capita income.

Another way by which a financial system induces growth is through liquidity costs, transaction and information costs. As acknowledged by Levine (2001), the financial system can promote the accumulation of human capital. As such, Levine is in accordance with Jacoby (Jacoby 1994). Financial arrangements can facilitate borrowing for the accumulation of skills. As textbook reading suggests (e.g. Weil 2005, Barro & Sala-i-Martin 2004, Jones & Vollrath 2013), if human capital accumulation is not subjected to diminishing returns, human capital creation, and indirectly the financial arrangements that ease physical capital creation, can help to accelerate growth.

Studies using endogenous and neoclassical models, such as the AK model, show a causality relationship between financial development and economic growth which goes either one way or both ways. The AK model, as presented by Vaitsos (2009), relates total production in an economy, represented by GDP, at time *t* to the economy's total productivity (A), which is a function of investment in capital goods, of economies of scale or of scope and of other positive externalities, to capital accumulation of every type including human capital accumulation (K). The AK production function is defined as $Qt = Yt = AKt$, where t = time. Total saving in the economy is given as $St=sYt$, where s is the average propensity to save, and total investment is given as $I = \varphi St$, where φ is the part of savings used for the financial coverage of productive investments. As Vaitsos (2009) notes, with this definition of φ, it is logical to define $1\text{-}\varphi$ as the part of savings used to pay for the services of the financial sector and the possible tax payments. From the above assumptions, we get $g = \left[A\left(I/Y\right) - \delta\right] = \left[\mathrm{A}\varphi s - \delta\right]$ where δ denotes the yearly rate of capital depreciation. From this equation, it follows that financial development results in positive effects for the whole economy. The following channels facilitate that relationship:

- An effective financial sector may result in augmenting the level of φ, the percentage for real investment, and thus it is totally logical that results in a rise of g
- The development of financial sector results in greater capital accumulation (K), which itself causes a rise on the productivity of the capital (A)
- Conditional financial development may cause a rise in the average propensity of investment and thus may cause a higher level of capital accumulation and a greater level of productivity (A).

At the same time, according to Watchel (2001), there are at least four channels through which financial intermediaries can promote economic growth via an efficient allocation of resources. Firstly, financial intermediaries act as fund transferring mechanisms which channel the excess funds from surplus units to deficit units (as deficit units are defined the productive sectors). Secondly, financial intermediaries will offer more attractive and innovative instruments and incentives to encourage the mobilization of savings, which in turn may promote higher saving rates. Thirdly, financial institutions lower the costs of project evaluation and origination through economies of scale and also facilitate the monitoring of projects via corporate governance. Finally, financial intermediaries provide opportunities to reduce risk and promote liquidity due to their role as institutions which provide economies of scale, as Levine himself has also stated.

More recently, interesting, and somewhat, unorthodox views about the role of financial-sector development in economic growth have been expressed. Furthermore, the issues of financial liberalization and deepening have been examined. For example, Cechetti & Kharroubi (2013) express the view that financial-sector growth crowds out real economic growth. Using a two-sector model, in which the labour force can be employed in either the financial sector or in a sector that encompasses all other sectors of the real economy, they show that an augmentation of the financial sector absorbs labour and other resources that normally may be used by the more R&D intensive parts of the real-economy sector. They also show that this competition results in credit booms, harming real economic growth, in contrast with the view that they enhance the real economy. Cechetti & Kharroubi use endogenous growth theoretical models and try to prove their position mathematically, without performing any empirical investigation. In the same context, Stochammer (2004) builds a model to show how financialization slows down economic growth, which is explained by a shift in corporate power from the managers to the shareholders who prefer higher profit to faster growth.

Political economists and historians have also stressed the role of financial markets in real economic growth and have pointed to a connection between financial development and international political power. Cohn (2009), for example, points out that World War I in a way enforced the displacement of the financial markets from London to New York and thus led to the decline of Great Britain as the leading world power.

As far financial liberalization is concerned, there are different views among economists, which, as Vaitsos (2008) notes, in a way stem from different ideological backgrounds. Levine (1997, 2005, 1998, 2000) and many other economists have shown, in a theoretical context, that financial liberalization affects positively the macroeconomic environment and growth performance. Others point out that the over-liberalization of certain well-developed financial markets had caused financial bubbles and crises, such as that of 2007-2008, and as a result have had adverse effects on economic growth, as well as on welfare, the rate of unemployment and other key characteristics of an economy. Views in this direction can be found in Epstein (2001), who, using a theoretical framework, finds financialization to be '..associated with substantial economic costs, including increased income inequality, increased shares of GDP going to owners of financial assets " . Similar views can be found in Freeman (2004).

Most economists agree that a certain level of financial development and liberalization is essential for economic growth. Nevertheless, they object to the over-financialization, which they consider detrimental to the real economy. The detrimental role of the over-the-optimum financial development is considered to affect only the developed countries that have a complex financial system. On the other hand, unorthodox views, such as those of Lapavitsas (2009), stress that financialization adversely affects even developing countries.

The most important of these different theoretical views, concerning the relationship between financial development and economic growth, can be summarized in the following table:

Table 1 - Theoretical views about the relationship between economic growth and financial development

Bagehot (1873)	Financial System Development induces Economic Growth. Development of the financial system is a crucial factor behind industrial revolution.
Schumpeter (1911)	Financial System Development induces Economic Growth. Financial system induces growth through mobilization of savings, evaluation of risk and facilitating transactions and thus enhancing technological innovation.
Hicks (1953)	Financial System Development induces Economic Growth. Development of the financial system is a crucial factor behind industrial revolution. In agreement with Bagehot.
Robinson (1952)	Economic Growth induces Financial Development through the demand of different types of financial development.
Friedman & Schwartz (1963)	Economic Growth induces Financial Development .Based on the theory of the demand for cash holdings.
Goldsmith (1969)	Financial System Development induces Economic Growth. First empirical study using cross-country data.
Mckinnon & Shaw (1973), Kapur (1976), Galbis (1977)	Financial System induces Economic Growth. The role of financial system in economic growth is so important that institutional interferences must be avoided, due to the possibility that they may impede financial development and thus growth
Lucas (1988)	No important relationship exists.
Fama (1980)	Financial System induces Economic Growth. This happens through the banks role in producing a pure nominal commodity or unit of account which is made to play the role of numeraire in a monetary system.
Levine (1991 & 1997), King & Levine (1993)	Financial System induces economic growth. This happens through five channels: Hedging, diversifying & pooling risk, acquiring information & allocating resources, monitoring managers & exerting corporate control, mobilizing savings, facilitating the exchange of goods and services.
Cechetti & Kharoubi (2013)	Financial System Development affects negatively economic growth. Financial-sector growth crowds-out real economic growth.
Stockhammer (2004), Freeman (2004)	Financial System Development affects negatively economic growth. Financial-sector growth slows down real economic growth because of a shift from corporate managers to shareholders who are interested just in financial profit.
Cohn (2009)	Financial System induces economic growth. The displacement of financial markets from London to New York after the World War I as a leading cause of the decline of Great Britain.
Epstein (2001)	Financial System Development affects negatively economic growth. Financial sector growth is associated with substantial costs.
Lapavitsas (2009)	Financial System Development affects negatively economic growth. Financialization affects adversely even developing countries

4. Empirical Literature

After presenting the major theoretical views on the relationship between financial development and economic growth, in this section we will discuss the existing empirical literature. In general, one of the main objectives of the existing empirical papers is to investigate whether financial development precedes economic growth or economic growth proceeds financial development. Studies are not in agreement with each other on that subject, and in many cases the direction of the relationship is not undoubtedly defined.

The existing empirical literature on financial development and growth includes:

i. Cross-country growth regressions
ii. Time-series analyses
iii. Panel studies
iv. Industry- and firm-level studies
v. Detailed country studies

Most of the existing empirical studies find a direct relationship between different financial-development proxies and economic growth but there is controversy about how their findings should be interpreted. As Choong & Chan (2011) notes, the four main sources of controversy are: (i) the selection and measurement of financial development indicators, (ii) the causality direction of the relation, (iii) the empirical methodology employed, and (iv) the channels through which financial development promotes growth.

<u>(i) Selection and measurement of financial development indicators</u>

As mentioned earlier, there are several indicators that can be used as proxies for financial intermediation, depending on the characteristics of the specific financial system examined. Firstly, monetary aggregates can be used as financial-sector proxies, based on the framework developed by the study of McKinnon & Shaw (973), which reveals that a high degree of monetarization should be positively related to economic performance. This indicator is used by a variety of researchers, including McKinnon & Shaw (1973), Goldsmith (1969) and Karr et al. (2011). Monetary indicators, however, have been criticized as they measure the extent of monetization rather than the degree of financial deepening. They may also not accurately reflect the effectiveness of the financial sector in reducing informational asymmetries and transaction costs. Also, as this measure includes deposits by one financial intermediary in another, it may result in double counting (Choong & Chan 2011). Moreover, the definition of M1, M2, M3 or M4 [1] can be inherently problematic, to the extent that different central banks sometimes measure these money aggregates differently. For example, De Gregorio & Guidotti (1995) criticize the use of the ratio of narrow money to income (M1/GDP) as a proxy for financial development on the grounds that a high level of monetization is most likely to be the result of financial underdevelopment, while a low level of monetization can be the result of a high degree of sophistication in financial markets which allows individuals to economize on their money holdings. In addition, based on Fama's view on the functions of financial markets (Fama 1980), i.e. to channel the excess funds from surplus units to deficit units which in turn will generate income growth and provide liquidity services, it is inferred that the ability of financial intermediary to efficiently allocate limited funds is not necessarily reflected in the level of monetization.

[1] Different measures of money supply. Not all of them are widely used and the exact classifications depend on the country. M0 and M1, also called narrow money, normally include coins and notes in circulation and other money equivalents that are easily convertible into cash. M2 includes M1 plus short-term time deposits in banks and 24-hour money market funds. M3 includes M2 plus longer-term time deposits and money market funds with more than 24-hour maturity. The exact definitions of the three measures depend on the country. M4 includes M3 plus other deposits. The term broad money is used to describe M2, M3 or M4, depending on the local practice.

Another financial-development indicator used by a variety of empirical studies is the ratio of deposit money to bank domestic assets plus central bank domestic assets, a measure which indicates the relatively significance of particular financial institutions. The main problem with this measure is that it does not properly reflect the proportion of credit allocated to both the private and the public sector.

Yet another measure is the proportion of credit channeled to private enterprises relative to total domestic claims or the ratio of claims on the non-financial private sector to GDP. These two proxies are suggested in order to differentiate the role of government in economic activity. Indeed, these measures are also heavily criticized by Ling & Levine (1993) on the grounds that they may reflect the overall size of the public sector and the extent of public-sector borrowing, and not the level of financial services. Thus, as an alternative indicator, Calderon & Liu (2003) suggest the ratio of credit provided by financial intermediaries to GDP. This indicator has the advantage of taking into account only credit to the private sector, by isolating the credit channeled to public sector or the central bank. As Calderon and Liu (2003) point out, an increase in this indicator means more financial services and thus greater financial intermediary development.

According to Arestis & Demetriades (1997), alternative credit-based indicators are more appropriate, as, at least in the case of developing countries, they are more likely to exhibit a stable long-run relationship with output rather than deposit-based ones. These two indicators are the inverse of the broad-money velocity, M2/GDP, and the ratio of currency to narrow money (M1).

On the other hand, Levine et al.(2000) have focused on three alternative indicators of financial development. The first reflects the overall size of the financial market, the second measures whether commercial-banking institutions or the Central Bank is conducting the intermediation. In general, it is believed that using multiple indicators provides more information about financial-intermediary development than if researchers used only a single measure.

(ii) Causality direction of the relationship

As far as the direction of the causality of the relationship is concerned, the issue has been a crucial aspect of discussion among researchers. The direction of causality is in general ambiguous, and this inconclusiveness presents a major problem. As Al-Yousif (2002) points out, most of the existing studies focus on a correlation which is something quite different from causality. Moreover, Wang (1999) points out that using an augmented production-function approach could produce misleading conclusions to the extent that a measure of financial development is added as another argument in the production function. Indeed, it is usually assumed that economic growth is an endogenous variable, so that causality is running from financial development to economic growth. There is, however, a possibility of a growth-led-finance relationship. This can lead to model-misspecification. The inconclusiveness is enhanced further by the variety of the indicators used as measures of financial development, presented previously. The segmentation of sample data can also result in an ambiguity of the relationship between financial development and economic growth. The longer the sampling interval, the larger is the effect of financial development on growth.

(iii) Empirical methodology

Another problematic aspect is the empirical approach. A large number of studies use standard type of regressions, such as $Y_{i,j} = aF_{i,j} + \beta Z_{i,j} + \varepsilon_{\tau}$, with Y = GDP, F = financial development indicators, Z = standard conditioning variables. This standard type of model entails certain econometric problems. Firstly, the model is likely to produce simultaneity bias as there is a possibility of a bi-directional relationship or growth-driven finance, as mentioned before. Secondly, this specification assumes that any unobserved country-effects are included in the error term. The problem is that in such a case, the error is correlated with the explanatory variables, thus producing biased coefficient estimates.

(iv) Channels through which financial development promotes growth.

Finally, there is controversy as far as the sources of growth are concerned. Different economic variables have been proposed as channels through which financial development affects growth, such as efficiency of investment, total factor productivity (TFP[2]), capital accumulation, and technical change. The choice between these different variables is mainly done ad hoc. Moreover, institutional reforms and other social characteristics are believed by many to constitute another potential channel of impact on the relationship (see e.g. Choong & Chan 2011).

4.1. Cross country studies

The first attempts to empirically test the relationship between financial development and economic growth were cross-country studies. These studies use cross-sectional data methodology to econometrically test the relationship between several indicators of economic growth and proxies of financial development across countries. The data consist of values for each country which are mainly an average of the values of the variables for a specific period. For example in King's & Levine (1993) the value of each indicator of financial development attributed to each country is the average of the values of that *ith* indicator in each year for the specific time period of 1960-1989. In this way, these studies incorporate a time aspect, a logical point as the variables of interest are macroeconomic. However, after averaged for each country the data are entered in the model as of the cross-sectional type. This is a major difference compared to the panel data approach, which has both cross-sectional and time-series dimensions

With respect to cross-country studies, the first, and most pioneering attempt, was that of Goldsmith (1969). Goldsmith examined whether finance exerts a causal influence on growth and whether a mixture of markets and intermediaries operating in the economy influences economic growth. His analysis was motivated as follows (see Levine 2005)*"…one of the most important problems in the field of finance, if not the most important own is the effect of financial structure and development have on economic growth".* Goldsmith used data from 35 countries during1860-1963 on the value of financial intermediary's access divided by GNP. He also assumed that the size of the financial sector is positively correlated to the quality of the financial services provided, something logical for the period when the article was written. Goldsmith found that as countries develop, financial-intermediary size relative to the size of the economy rises. He also documented graphically that there is a positive correlation between financial development and economic growth. While Goldsmith attempts to draw causal interpretations from graphic documentation, he does not really confirm whether financial development causes the economic growth or vice versa. The main problems of Goldsmith's study, as identified by Levine (2005) and Ray (2010), are:

- Small sample, only 35 countries
- No systematic control for other factors influencing economic growth
- It does not explain whether financial development is associated with productivity growth or capital accumulation as is suggested by the theory
- The indicator of financial development used, which measures the size of the financial intermediaries sector, may not accurately reflect the functioning of the financial system
- The close association between financial-system size and growth does not necessarily imply the specific direction of causality
- The study does not shed light on whether financial markets, non-bank based intermediaries, or a mixture of market and intermediaries matter for economic growth

---

[2] Total Factor of Productivity: Total Factor Productivity (TFP) is the proportion of output not explained by the amount of inputs used in production. As such, its level is determined by how efficiently and intensely the inputs are utilized in production. TFP growth is usually measured by the Solow residual. Let g_Y denote the growth rate of aggregate output, g_K the growth rate of aggregate capital, g_L the growth rate of aggregate labor and a the capital share. The Solow residual is then defined as $g_Y - \alpha * g_K - (1 - \alpha) * g_L$. The Solow residual accurately measures TFP growth if (i) the production function is neoclassical, (ii) there is perfect competition in factor markets, and (iii) the growth rates of the inputs are measured accurately (see.e.g. Weil 2005)

More than twenty years after Goldsmith's seminal paper, in the early nineties, King and Levine (1993) extended Goldsmiths' work. Using data from 77 countries during 1960-1989, they examined whether the level of financial development predicts long run growth. Three indicators of economic growth were used: real per capita GDP growth, growth in the capital stock per person, and total factor productivity. To measure financial development, they constructed the following measures:

- DEPTH: measures the size of the financial intermediaries, and is equal to the ratio of liquid liabilities of the financial system relative to GDP.
- BANK: measures the degree to which the central bank and the commercial banks are allocating credit, and is equal to bank credit divided by bank credit plus central-bank domestic credit
- PRIVY: measures credit to private enterprises divided by GDP.

With respect to BANK, two weaknesses of the measure are noted by Levine himself (Levine 2005). Banks are not the only financial intermediaries providing financial functions, and also they may lend to the government or public enterprises. With regards to PRIVY, the underlying assumption is that financial systems that allocate more credit to the private sector are more engaged in researching firms, exerting corporate control, providing risk management services, mobilizing savings and facilitating transactions than financial systems that simply funnel credit to the broadly-defined public sector.

King & Levine (1993), based on the proxies created, estimate the regression $G(j)=\alpha + \beta F(i) + \gamma X + \varepsilon$, where $F(j)$ represents the value of the *ith* indicator of financial development, averaged over the period 1960-1989, $G(j)$ represents the value of the *jth* growth indicator averaged over period 1960-1989, and X represents a matrix of conditioning information to control for other factors influencing economic growth. The main findings of King & Levine are as follows. Firstly, there exists a strong positive relationship between each of the financial-development indicators and the three growth indicators. Second, the magnitudes of the coefficients are economically large. Thirdly, a rise of DEPTH from the mean of the slowest growing quartile (0.2) to the mean of the fastest growing quartile (0.6) of countries would have increased per capita growth rate by almost 1% each year. Indeed, a rise in DEPT alone is found to eliminate 20% of the growth difference between the slowest growing and fastest growing quantile of countries. These findings have been confirmed through additional econometric tests and robustness checks. Levine & King (1993) also try to examine whether the value of financial depth in 1960 predicts the rate of economic growth, capital accumulation and productivity growth over the next 30 years. They find that financial depth in 1960 is a good predictor of subsequent rates of economic growth, of capital accumulation and of total-productivity growth. The limitations of the study, as accounted for by Ray (2010), are mainly two. First, while the study shows that finance predicts growth, still it does not formally deal with issues of causality. Second, the study focuses only on one segment of the financial system, the banks, and does not take into account the non-banking financial markets which are predominant in some advanced economies, mainly Anglo-Saxon economies.

Levine & Zervos (1998) add to the framework the stock market. They construct several stock-market development indexes to assess the relationship between stock market development and the three above-mentioned measures of economic growth. They also control for other potential growth determinants, including the development of the banking sector. Using data from 42 countries during 1976-1993, they found that initial levels of stock-market liquidity and banking development are positively and significantly correlated with future rates of economic growth, capital accumulation and productivity growth. Moreover, they observe no trend between bank-based and market-based financial systems. In fact, both systems enter the growth regressions significantly, which means that they have different roles. They also find that the link between stock markets, banks and growth runs robustly through productivity growth rather than through physical capital accumulation, and that stock-market size is not robustly correlated with growth, capital accumulation or TFP. The latter means that a simple listing on stock exchange does not necessarily foster resource allocation. Certain weaknesses of the Levine-Zervos approach are identified by other papers. Firstly, while Levine-Zervos show that stock-market liquidity and bank development predict economic growth, they do not formally examine the important issue of causality. Secondly, as Levine (2005) points out, there are certain problems in measuring liquidity, e.g. they do not measure the direct costs of conducting equity transactions. Thirdly, the paper does not take into account different local financial conditions within a specific country. Guido, Sapienza & Zigales (2002), for example, have shown that in the case of Italy there exists significant variation in local financial conditions. Fourthly, the link between trade and growth may not necessarily present a link between trade and liquidity, as a third factor may independently influence both. Finally, by only focusing on measures of the functioning of stock markets and banks, the paper excludes other components of financial sector, such as the bond markets or the finance provided by nonfinancial firms.

As the issue of causality is not settled, and financial development is not regarded fully as a fundamental cause of real economic growth but can simply play the role of a leading indicator of economic growth, one needs instrumental variables that explain cross-country differences in financial development. To this end, Levine (1998) and Levine, Loyaza & Beck (2000) use as instruments measures of legal origin. These measures were created by La Porta et al. (1998) and consider whether a county's commercial laws derive from British, French, German or Scandinavian law tradition. Levine, Loyaza & Beck (2000) use data from 71 countries during 1960-1995. Their main finding is that there is a strong link between financial development and growth, which is not due to simultaneity bias. In particular, a very strong connection between the exogenous components of financial development and long-run growth is observed.

4.2. Time series studies

An extensive literature examines the finance-growth relationship using a time series approach. The data do not consist of both a time and a cross-sectional dimension as the panel data do. These studies just examine different time-series data sets for each country separately. Different analysts use a variety of empirical methodologies. The most frequently used empirical methodologies are causality tests and VAR procedures. However, there are differences among the corresponding studies with respect to the definition of financial development.

Demetriades & Hussein (1996) use the ratio of money to GDP, and find that causality between finance and growth goes both ways, especially in developing countries. They apply in their analysis the Granger Notion Theorem to test the causality relationship. Neusser & Kugler (1998) use a measure of the value-added provided by the financial system and find that in most countries financial-sector boosts real economy, not only through the service it provides but also per se. In other cases, a growth-driven hypothesis and feedback causality exists. As far as the econometric method applied, they use both Joghansen maximum likelihood and panel cointegration tests. Arestis, Demetriades & Luintel (2001) use measures for both stock markets and bank development. Based on quarterly data, they find a positive relationship between financial development and growth. They also find that the effect of banking-sector development is much larger than that of the stock market. Their study is criticized by Levine (2005, 2006) because of the limited data-size and the fact that it uses quarterly stock-market data which contain high-frequency factors.

Xu (2000), based on a VAR model for 41 countries, without using a panel-data methodology, reject the hypothesis that finance simply follows growth. The analysis concludes that finance affects long-term growth positively. Rousseau & Sylla (1998, 2005), using VARs and including stock markets, examine the historical role of finance in US economic growth. In a similar empirical context, Braekaert, Harvey & Ludbland (2001) examine the effect on growth of opening equity markets. Their work constitutes a statistical innovation, as it uses over-lapping data in order to avoid the loss of information inherent in non-overlapping data. In that scope, they use data-averages from 1990-1995 and data-averages from 1991 to 1996.

In a recent study, using a time-series VAR model, Hondroyiannis, Papapetrou & Lolos (2005) examine the relationship between banking-system and stock-market development, on the one hand, and economic performance, on the other, in the case of

Greece over the period 1986–1999. The paper suggests that there exists bi-directional causality between finance and growth in the long run.

4.5. Panel data studies

In recent years, the majority of studies use a panel-data approach. There are certain benefits of moving from time-series and cross-country data to panel data (Levine 2006). Firstly, panel data enable the user to exploit both the time-series and the cross-sectional variation of the data. Secondly, by moving to a panel approach, biases associated with cross-country regressions are avoided. In cross-country regressions, the unobserved country-specific effect is part of the error term so that correlation between the explanatory variables and the variable to be explained results in biased coefficient estimates. Thirdly, unlike pure cross-sectional estimators, which do not control for the endogeneity of all the explanatory variables, panel-data permits the use of instrumental variables for all regressors and thereby provide more precise estimates of the finance-growth relationship. In most studies, researchers use legal origin instruments to extract the exogenous component of financial development.

Of the first papers using dynamic-panel methodology, are those of Beck, Levine & Loyaza (2000) and Levine, Loyaza & Beck (2000). Both papers apply GMM dynamic-panel and cross-sectional instrumental-variable estimators to address potential biases, such as simultaneity, omitted variables and unobserved country specific effect. The main difference between the two papers is their main goal. Levine, Loyaza & Beck (2000) estimate the relationships between financial-intermediaries development and growth, while Beck, Levine & Loyaza (2000) focus on the sources of growth. More specifically, Beck, Levine & Loyaza (2000) examine a relationship between financial development on the one hand, and productivity growth, physical capital accumulation, and savings on the other. Both papers find a positive effect of financial development on growth, with their regressions passing the specification tests. It is thus concluded that the large positive relationship between growth and private credit is not driven by simultaneity bias, does not omit country effects, or uses lagged dependent variables in cross country regressions.

Riojia & Valev (2004) examine other factors influencing economic growth and its relationship with financial development. They find that in the rich countries finance boosts growth by speeding productivity growth, while in low-income countries boosts growth by accelerating capital accumulation. Their findings also suggest that the relationship is non-linear. Indeed, they find that there is a small acceleration of growth from a marginal increase in the level of financial development if initially there is a very low level of financial development. As the level of financial development rises, so does the effect of a marginal increase in financial development. Another interesting study is that of Benhabib & Spiegel (2000). Using a panel estimator, they examine the relationship between different types of financial-intermediary-development indicators and measures related to growth (i.e. economic growth, investment, total-factor productivity). They find that indicators of financial development are positively correlated with both TFP and the accumulation of capital (physical and human). On the other hand, Loyaza & Ranciere (2002), using panel-data methodology, show that there is a difference in the relationship between financial development and economic growth in the short and long run. They showed that short-run large increases in bank lending can actually lead to financial and banking crises. They therefore conclude that while a positive relationship between financial development and growth exists in the long run, this may not an issue in the short run.

Tsionas & Christopoulos (2004), criticizing the time-series methodology on the grounds that it yields unreliable results due to the short-time spans of data sets, use panel unit-root tests and panel-cointegration analysis to examine the growth-finance relationship in ten developing countries. Their main finding is that there is no evidence of a bi-directional causality and long-run causality runs from financial development to growth. Indeed, they find a unique integrating vector between indicators of growth and financial development. It is also concluded, after careful investigation of the data properties, by applying panel-unit root tests, panel cointegration analysis and other tests, that there exists a single equilibrium relation between financial deepening, economic growth and some macroeconomic variables.

Other studies use dynamic panel estimation and focus on stock-market and banking-sector development, and not only on financial intermediation. Two such studies are Rousseau & Watchel (2000) and Beck & Levine (2004). The first uses annual data and a difference-estimator, while the second uses five-year averaged data to focus on long-run growth factors. In both studies, it is shown that the exogenous component of both bank- and stock-market development helps to predict economic growth. Another interesting finding is that stock-market capitalization is not relegated positively or negatively to growth. The implication is the ability of agents to exchange ownership from productive technologies that is relevant, and not listing per se.

In a more recent study, Yao (2011) tests empirically the relationship between financial- intermediation development and the TFP growth using regional panel data from the different provinces in China. The ratio of loans to private enterprises relative to total loans is used as a measure of financial development. As far as the model is concerned, Yao uses the endogenous-growth AK model. The main conclusion is that financial intermediation has a positive effect on TFP growth in China, but in order to reach a higher level of financial development it is important that allocative efficiency of financial resources is improved. However, it must be noted that the financial system in China is state-owned and therefore highly regulated due to the communist political system.

Akbas (2015) examines the relationship between financial development and growth in a set of emerging country-markets. The study uses a variety of proxies as measures of financial development. These are classified as: monetary aggregate variables, domestic & private credit variables or banking variables and stock- and bond-market variables. However, due to the difficulty of obtaining accurate data for M1, M2 and M3, these monetary aggregates are not used in the final specification. Instead, five indicators are used as explanatory variables: domestic credit provided by the banking sector to GDP, domestic credit to the private sector as percentage of GDP, gross domestic savings to GDP, total exports to GDP, and interest rates. The empirical methodologies employed by Akbas (2015) are the same to those in Kar, Nazlioglu & Agir (2011), i.e. the GMM estimator, the approach developed by Hurlin (2008) and the approach of Konya (2008). Identifying problems in the GMM and Hurlin approaches, Akbas (2015) proceeds with the Konya framework, which is based on a SUR(3) rather than on classic OLS. In regard to that approach, Wald tests are used with country specific bootstrap critical values in order to detect causal relationships. After conducting tests for cross section dependence and heterogeneity, the paper tests every explanatory variable with regards to causality between itself and the level of GDP. The main findings are: unidirectional causality from GDP to domestic credit to the private sector for India and from domestic credit to the private sector to GDP for Argentina, Chile, Russia, South Africa, Russia and Thailand, and no causality at all for the economies of Brazil, China, Colombia, Indonesia, Malaysia, Mexico and Turkey. Between domestic credit provided by the banking sector and GDP, they find: (i) unidirectional causality between GDP and domestic banking-sector credit in the case of Argentina, Colombia, Mexico and South Africa, (ii) bidirectional causality in the case of Turkey, and (iii) no causal relationship in the case of Brazil, Chile, China, Indonesia, Malaysia, Russia and Thailand. As far as total exports are concerned, causality goes from total export to income for Argentina, China, India and Turkey, while no causality is found for other countries. In general, the findings support a "neutrality" hypothesis. The insufficient connection prevails more at the high-income level of the examined countries, e.g. Argentina. Only in the case of Turkey bidirectional causality is found. The author suggests that certain characteristics of these countries (e.g. the late integration and liberalization process, the fact that in Russia and China the financial markets started to develop only after 2000, the political instability, and the role of the state in production) are the main reasons behind this finding.

SUR or seemingly unrelated regression equations (SURE) is a generalization that consists of several regression equations, each having its own dependent variable and potentially different sets of exogenous explanatory variables.

Kar, Nazlioglu & Agir (2011) uses the same type of methodology with different variables to examine the relationship between financial development and growth in the case of MENA countries, fifteen Middle-East countries, which in last two decades have experienced a significant liberalization of their financial sector. To assess the direction of causality between financial development and growth in these countries, they use the Granger-causality test procedure developed by Konya (2006). This methodology is considered novel in the literature on financial development and growth as it controls for cross-sectional dependence among countries, something ignored in other studies. The paper uses a bivariate model: *economic growth = F(Financial development),* and a wide range of measures for financial development, which is another novelty. These measures include: the ratio of quasi money to income, the ratio of M2 to income, the ratio of private-sector credit to income, the ratio of deposit-money bank liabilities to income and the ratio of domestic credit to income. These are monetary aggregates as well as variables representing credit, commonly used by such studies. The data are firstly controlled for cross-sectional dependence. In the context of the paper, cross-sectional dependence can arise due to a high degree of globalization, as a shock affecting one country may also affect another country. Heterogeneity is also estimated in the parameters for each country. The authors point out that the GMM methodology and that proposed by Hurlin (2008) have inherent problems, so they proceed with the method of Konya (2006). The main finding of the paper is that there is no strong evidence to support the hypothesis that financial development is an important determinant of growth. The direction of causality is shown to be country-sensitive, i.e. there is no uniformity in the relationship between the variables for each MENA country.

4.4. Industry level analyses

Other researchers have employed industry- and/or firm-level data across a broad spectrum of countries in order to better understand the finance-growth relationship. In fact, these studies focus on the influence of financial development on specific industries or on a group of industries. Some studies also examine indirectly the influence of financial development on economic growth through its effects on specific industries The first most influential study was that of Rajan & Zingales (1998). Rajan & Zingales argue that better developed financial markets and intermediaries help overcome market frictions. These frictions are those which create a wedge between external and internal financing. They state therefore that industries which are heavy users of external finance should benefit more from greater financial development. Based on that, they establish one natural test. They examine whether certain industries that are naturally heavy users of external finance grow faster in economies with better developed financial systems. If they do so, this supports the financed induced growth hypothesis. Their approach proceeds in two steps. Firstly, they use data from the US, where they assume a relatively frictionless market, and examine which industries are more dependent on external financing. At a second stage, they examine whether industries that are technologically more dependent on external finance (i.e. industries that are defined in the first step) grow comparatively faster in more financially-developed countries. To that end, they use data from 36 industries across 40 countries over the period 1980-1990, with the US excluded as it was previously used in step 1 to identify external dependence. The specification used is the following:

$$Growth_{i,k} = \sum_j a_j Country_j + \sum_l \beta_l Industry_l + \gamma Share_{i,k} + \delta(external_k * FDI_i) + \varepsilon_{i,k}$$

Where $Growth_{i,k}$ measures the average annual growth rate of value-added or the growth in the number of establishments in country i and industry k. $Country_j$, $Industry_l$ are dummies. $Share_{i,k}$ is the share of industry *i* in country *j*. $external_k$ is the fraction of capital expenditures not financed with internal funds, and FDD a measure of financial development. They also interact FDI and external finance, and estimate the coefficient δ. This is logical since if the coefficient is positive and statistical significance, then the effect of financial development will be positive and financial development will induce a bigger impact on growth if the industry relies more on external finance. They isolate therefore the effect that the interaction of external dependence and financial development has on industry growth from dependence on external finance and industry means and characteristics. Financial development is measured through total capitalization, which is the sum of stock-market capitalization and domestic credit as share of GDP and through accounting standards. Their main finding is that δ is positive and statistical significant at 1%, which results in the conclusion mentioned above. So if an industry is a heavy user of external finance, financial development will disproportionally boost the growth of that industry.

4.5. Firm level analyses

Firm-level studies focus on the behavior of individual firms with regard to financial development. As firms' growth is directly linked to the notion of real economic growth, these studies indirectly show the effect of financial development on the real economy. One such study is that of Demiurgic-Knut & Maximovich (1998). This study examines whether financial development influences the degree to which firms are constraint from investing in profitable growth opportunities. The paper focuses on long-term debt and external equity as a method of financing and uses firm level data from 26 countries during 1980-1991. The main finding is that bank development as well as stock-market liquidity affect positively firm's growth. This finding is also supported by a paper by Beck (2001). On the other hand, Love (2003) examines whether financial development eases firms' financing constraints. She uses firm-level date from 40 countries and concludes that in general financial development eases the financing constraints of firms. Her results also reveal that the sensitivity of investment to internal funds (at a firm level) is greater in countries where the financial system is poorly developed. This means that greater financial development reduces the strength of the link between internal funds and investment. The study also notes that higher levels of financial development are particularly effective on easing the constraints for smaller firms.

4.6. Country case studies

These studies are based on case-studies for specific countries. Often they do not use elaborate statistical/econometric methodologies, and in some cases their analysis is of a rather simplistic descriptive nature. Instead, they carefully examine the evolution of political, legal policy, industrial and financial systems in each country (Levine 2005), and document critical interactions among financial intermediaries, financial markets, government policies and the financing of industrialization. The authors are aware of the limitations at an analytical level, but they provide a lot of valuable information on the role of finance in growth. Two of the most studies of this type are Cameron, Crisp, Patrick & Tilly (1967) and McKinnon (1973). Cameron, Crisp, Patrick & Tilly (1967) study the historical relationship between banking development and early stages of industrialization in England, Scotland, France, Germany, Russia and Japan for different time spans during the 19th century. McKinnon (1973), on the other hand, examines the relationship between the financial system and economic development in Argentina, Brazil, Chile, Germany, Korea, and Indonesia. He points out that the evidence emerging from his country-case studies suggests that better functioning financial systems lead to faster economic growth.

Another study is that of Jayaratne & Straham (1996). This study examines the change in growth rates after the reform of the early 1970s, when 35 states relaxed impediments on intra-state branching of banks relatively to other countries. By comparing with the US, the paper eliminates problems associated with country-specific factors. Their main finding is that branch reform accelerates real per capita growth rates by improving the quality of bank loans and the efficiency of capital allocation. The paper also finds little evidence that branch reform induces more lending. A study based on the same framework is that of Bertrand, Scholar & Thesmar (2007, 2004) and concerns France. This study examines the impact of the deregulation of 1985 that eliminated the government intervention in bank-lending decisions and fostered greater competition in credit markets. Their main finding is that after the deregulation, banks bailed out poorly performing firms and induced an increase in allocative efficiency among firms, thus lowering concentration ratios and boosting both entry and exit rates for firms. Although this is not directly tied to growth, the suggestion of the paper is that better-functioning banks affect not only the bank-firm relations but also the structure and dynamics of product markets and thus economic growth.

Haber (1991, 1997) compares the industrial capital-market development of Brazil, Mexico and USA between 1830 and 1930. Using firm-level data, Haber concludes that capital-market development affects industrial composition and market economic performance. He observes that in Brazil, after the overthrow of the monarchy in 1889, the restrictions on financial markets were reduced, although not lifted. This is found to have resulted in a fall in industrial concentration, as it gave firms easier access to external finance. In the case of Mexico, the study shows that that the decline in the process of financial liberalization during the dictatorship of Diaz (1877-1911) resulted in a much weaker decline in concentration and increase in economic growth. The main conclusions of Haber are that: (i) international differences in financial development significantly impact the rest of industrial expansion, and (ii) underdeveloped financial systems that resist access to institutional sources of capital impede industrial expansion and therefore growth.

5. Empirical Analysis

In this section the main issue of our dissertation*, "whether a relationship between economic growth and financial-sector development exists"* will be examined. A certain sample of counties will be used and an econometrical analysis will be implemented, as an analytical method, in order to examine the issue mentioned.

5.1. The choice of the sample

The focus is on the relationship between financial development, measured by a number of different indicators, and economic growth, measured by the annual rate of change of real GDP, in the case of MENA countries. The main question that will be examined is: "whether financial-sector development contributes to real economic growth". The MENA country-group consists of the Middle Eastern & North African countries, which, alphabetically, are: Algeria, Bahrain, Jordan, Egypt, Iran, Israel, Iraq, Jordan, Kuwait, Libya, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, Sudan, Syria, Tunisia and Turkey. In most of these countries, Islam is the predominant religion and this affects all aspects of social life and economic relations, including the organization of the financial system. With respect to the influence of the Islamic religion on the financial system, from this set of countries Israel and Turkey must be excluded, as the former is a country in which Islam is not the predominant religion, while in Turkey, although the majority of the population is Muslim, the political and economic system is organized in a highly westernized way. Echoing the specific cultural tradition and religion of these countries, the financial and banking system is organized in a different way in terms of both its ethics and practices to that of the West. A representative term of all these special practices is the term "Islamic Banking". In particular, as Imam & Kpodar (2010) state, four factors are unique to Islamic banking and differentiate its practices to these of the western banking system:

- Prohibition of interest (Riba),
- Prohibition of maysir (games of chance) and of gharar (chance). Islamic banking bans speculation, which increases one's wealth by chance rather than productive effort. While entrepreneurship itself could be interpreted as a form of gambling, maysir refers to unnecessary uncertainties that are not part of everyday life, such as going to a casino. Unavoidable risk is permitted.

- Prohibition of haram (illegal) activities. The code of conduct for Islamic banks allows them to finance only halal (legal) activities. They are not supposed to lend to companies or individuals involved in activities deemed to have a negative impact on society (for example, gambling) or are illegal under Islamic law (for example, financing construction of a plant to make alcoholic beverages).
- Payments of part of the banks' profits to benefit society (zakat). Muslims believe that justice and equality in opportunity (not outcome) are crucial for a society to function. One mechanism to achieve this goal is to redistribute income and provide a minimum standard of living for the poor. This form of giving is called zakat. It is generally agreed that the amount of zakat would be 2.5 percent of the assets held. In countries where zakat is not collected by the state, Islamic banks establish a zakat fund for collecting money to be donated to religious institutions.

Several studies have questioned whether this particular way of organizing the financial system affects positively economic growth. Some studies, including Noland (2003) and Imam & Kpodar (2010), suggest that Islamic economic ethics and practices, which include the practices of the Islamic banking, affect positively the economic growth. Indeed, Imam & Kpodar (2010) state that: *"…In fact, not only does Islam not negatively impact growth, but Islamic banking could complement conventional banks and thereby help diversify systemic risk. In conventional banks, when a bank gives out a loan, the borrower bears all risks, except in the case of bankruptcy. In Islamic banking, both bank and entrepreneur share the rewards and failure. In many developing countries risk sharing might allow entrepreneurs with little savings to undertake projects they could not contemplate in an environment where all the risk lies on them. In conventional banking, the creditworthiness of the borrower is the main determinant of the lending decision, and banks are interested in the interest and principal on the loan. In Islamic banking, because profits and losses are shared, banks will receive a return only if a project is successful. Therefore, Islamic banks are more prone to finance sound projects, even if the entrepreneur has no credit history*"

In addition to the practice of the Islamic banking, another interesting characteristic of these countries is that only recently they have liberalized their financial systems. Indeed, MENA countries, with the possible exception of Israel, have experienced over the last two decades a wave of financial liberalization (Ben Naceur, 2008). The main goal behind that policy was that, by lifting government restrictions on the banking system, such as the high reserve requirement, the directed credit programs and interest-rate system would have positive effects on economic growth, as claimed by Mckinnon & Shaw (1973).

These two characteristics of MENA-group of countries make them appealing for investigating the special relationship between financial development and economic growth. Examining the growth-financial development relationship in these countries will provide us with the possibility to comment on the ability of the Islamic banking and finance to contribute to economic growth as was stressed by Kpodar & Imam (2010). Furthermore, as the process of financial liberalization in these countries is still ongoing, we can examine its impact on economic growth and derive useful policy suggestions.

Our study is not the first to examine this relationship in the MENA countries. Several studies have focused on the impact of finance on growth in these countries, including Achy (2005), Boulila & Trabelsi (2004), mainly based on time-series analysis. An interesting study is also that of Kar et al. (2010) (mentioned in the literature-review section), which employs panel data. Some indicative examples of studies examining the relationship between financial system development and growth are presented in the following table along with their main findings.

Table 2 - Indicative studies of the relationship between financial development and economic growth in the case of MENA countries

Author(s)	Methodology	Country	Period	Findings (direction of causality)
Gursoy & Al-Aali (2000)	Granger causality	Bahrain, Saudi Arabia, Kuwait	1973-1988	FD-EG (Kuwait), EG-FD (Bahrain & Saudi Arabia)
Al-Tamimi et al. (2002)	Granger causality-impulse responses	Algeria, Bahrain, Egypt, Jordan, Kuwait, Morocco, Saudi Arabia, Syria	Different for each of the countries-1970 -1995 (Algeria), 1975-1998 (Bahrain), 1952-1999 (Egypt), 1970-1998 (Jordan), 1973-1998 (Kuwait), 1958-1998 (Morocco), 1964-1998 (Saudi Arabia), 1963-1998 (Syria)	No causality
Achy (2004)	Standard cointegration analysis with control variables	5 MENA countries	1970-1997	No causality
Boulila-Trabelsi (2004)	Standard cointegration analysis Granger causality	16 MENA countries	1960-2002	EG-FD (weak causality)
Otzturk et al. (2011)	Holt-Eakin, Newney and Rosen panel causality	9 MENA countries	1992-2009	FD-EG
Kar et al. (2011)	Bootstrap panel Granger causality	15 MENA countries	1980-2007	No causality

*EG-FD: causality is directed from economic growth to financial development

*FD-EG: causality is directed from financial development to economic growth

In contrast to Kar et al. (2010), who employ the Konya's (2006) framework, the innovation in our study will be to examine the growth-financial development relationship using an integrated PVAR framework, treating each variable as endogenous. Specifically, we will base our empirical analysis on the econometric framework developed by Abriggo & Love (2015) and recently used by Bellinger (2015).

It has to be noted that the MENA countries Syria, Libya and Iraq have been excluded by the sample because of data unavailability for long periods, due to severe political turmoil (civil war, and the Iraq war of 2003-2011).

5.2. Methodology

We will address the major question of our study "Is there a relationship between economic growth and financial-sector development?'', with the use of panel data. The statistical package used is STATA 14.

The panel-data methodology encompasses the characteristics of both a time-series approach and a cross-sectional approach. Panel data are a hybrid of time-series and cross-sectional data as they express both different values of the same variable for different subjects and different values of each variable over time. Thus panel data consists of observations of the same units, such as people, companies, regions and countries, which are collected for different time periods (Dimeli, 2013). There are several different types of models using panel data. Some of them use a greater number of periods and comparatively less units, while others put more emphasis on the number of units. The former presents several problems, often plaguing time-series data, such as non-stationarity, spurious correlations between the explanatory variables and the dependent variables, and problems concerning the cointegration between the time series. On the other hand, according to Dimeli (2013), there are several positive aspects of using panel data, compared with time series and cross-sectional data. Apart from the obvious fact that they encompass two dimensions, that of time and that of intra-variable object difference, an advantage of using panel data is that by definition they consist of a large number of observations in total and per period. This means that the known problems of small samples, such as multicollinearity, often do not exist in the case of panel-data-based models. Other important advantages are also stressed by Dimeli (2013). The use of panel data enables the economists to specify the econometric models in a more complicated and so more realistic way. They also enable the assessment of cross-sectional effects. This is an important element, as in most macroeconomic models, such as the one we will use here, the units are different countries. Thus it is of great interest to exploit the potential difference in the relationships across countries and decode the main reasons behind these differences. This characteristic of panel data is an expression of the heterogeneity which is dominant in these types of data. As such, some of the endogeneity problems, which are common in macroeconomic models, due to the nature of the macro-economy itself ("Lucas critique" (Lucas 1976)), are absent in the panel data approach.

As far as the disadvantages of panel data are concerned, they are, according to Dimeli (2013), of a rather technical nature and mainly concern the absence of observations in certain objects for a certain period or the lack of independence between certain cross-sectional observations. Also, the fact that there are two dimensions causes problems with the asymptotic properties of the variables. These problems can, however, be solved to a certain extent by the employing models with specific properties.

As in our study all countries are Middle-Eastern countries, and also its context relates to a globalized economic environment that leads to major interdependencies among the different nations, a multi-lateral perspective is crucial. Indeed, there is strong endogeneity and interdependencies in any model that describes the relationship between output growth and financial-sector development. This is obvious from the theoretical arguments presented in the first part of our dissertation, as today's growth may affect financial development of tomorrow, and the same point can be made for the opposite direction. In all cases, strict exogeneity is violated. As in a simple VAR, all variables are treated as endogenous and interrelated, as without the acknowledgement of that perspective it is possible that distortions will be induced. There are two ways of addressing this issue, an econometrical and an analytical one. The analytical-mathematical method to this approach is by using Dynamic Stochastic General Equilibrium Models (DSGE). The econometric approach is to develop a panel-VAR model. These models avoid explicit micro-structure that is present in the analytical macroeconomic models and also pose minimal restrictions on the model. Through shock identification, they allow impulse-response analyses or policy counterfactuals to be exercised. However, there are criticisms to these models, which also apply in the case of standard VAR models (see e.g. Cooley & Leroy, 1985, Faust & Leeper 1997, Canova & Pina, 2005). On the other hand, the analytical way, i.e. the use of DSGE models, imposes several restrictions, which may conflict with the reality expressed by the data.

The PVAR approach was employed by Holtz-Eakin et al. (1988). Panel-VAR models have the same structure as simple VAR models, in that all variables are assumed to be endogenous and interdependent. Thus, as in a standard VAR model, each variable is affected by the lags of itself and by every other variable and its lags. But while in the standard VAR each equation contains p lags of each of the depending variables, including its own, in a PVAR model we have the addition of the cross-sectional dimension.

A PVAR model is of the form:

$$Y_{it} = \sum_{i=1}^{p} A_l Y_{it-l} + g_i + dt + e_{it}$$

where

$$E\left[e_{it}\right]=0, E\left[e_{it}e'_{it-k}\right]=0, E\left[e_{it}e'_{it}\right]=\Omega$$

g_i = *fixed effects*

d_t = *time dummies*

P = number of lags

Y = a vector of N dependent variables

In a PVAR model, the units are generally correlated across the *i*, a feature called dynamic interdependency. Also, it is possible for the slope and the variance of the shocks to be unit specific (Canova & Cicarelli 2013). This feature is common in macroeconomic models like the one employed here. Indeed, the main characteristics of a PVAR model are: dynamic interdependencies, static interdependencies, sectional heterogeneities.

To summarize, according to Canova & Cicarelli (2013) "*In a way, a panel VAR is similar to a large scale VAR where dynamic and static interdependencies are allowed for. It differs as cross sectional heterogeneity impose a structure on the covariance matrix of the error terms...*''. P-VAR models are very useful in the field of applied macroeconomics. Such usefulness is presented in Canova and Cicarelli (2013):

I. Panel VAR's are suited to analyze the transmission of idiosyncratic shocks across units and time

II. Panel VARs have been used to construct average effects across heterogeneous groups of units while also characterizing unit specific differences from the average

III. Panel VARs have been used to analyze the importance of interdependencies and to check whether feedbacks are generalized or involve certain pairs of units

IV. Panel VAR's have been used to examine the extent of heterogeneity to endogenously group units or characterized their differences.

It must be pointed out that for the PVAR models to be consistent with the theory; the lags for each unit, which, in the macroeconomic models, is usually a country, should be the same, so the assumption that each country is a small closed economy must be dropped out. That at least one asset is traded in financial markets or that the intermediary factors are exchanged in open markets, must also be assumed.

A way to estimate a PVAR model is through the GMM framework. An equation-by-equation GMM may yield consistent estimates of the panel VAR model, but estimating the model as a system of equations results in efficiency gains (Holtz-Eakin, Newney & Rosen 1998). That is exactly the approach we will follow in our analysis.

The examination of all countries as a group, not only presents specific technical problems, but also does not show the particular relationship between finance and growth for each country separately. However, before we examine the presence of causality for each individual country through a VAR model, we check if causality exists for any of the countries at all. To examine this we use the Dumirescu & Hurlin Test (2012). It must be pointed out that before we proceed to test for causality through the methods mentioned, we examine the presence of unit roots in order to choose between the levels or the differences of the variables and decide on the optimum lag.

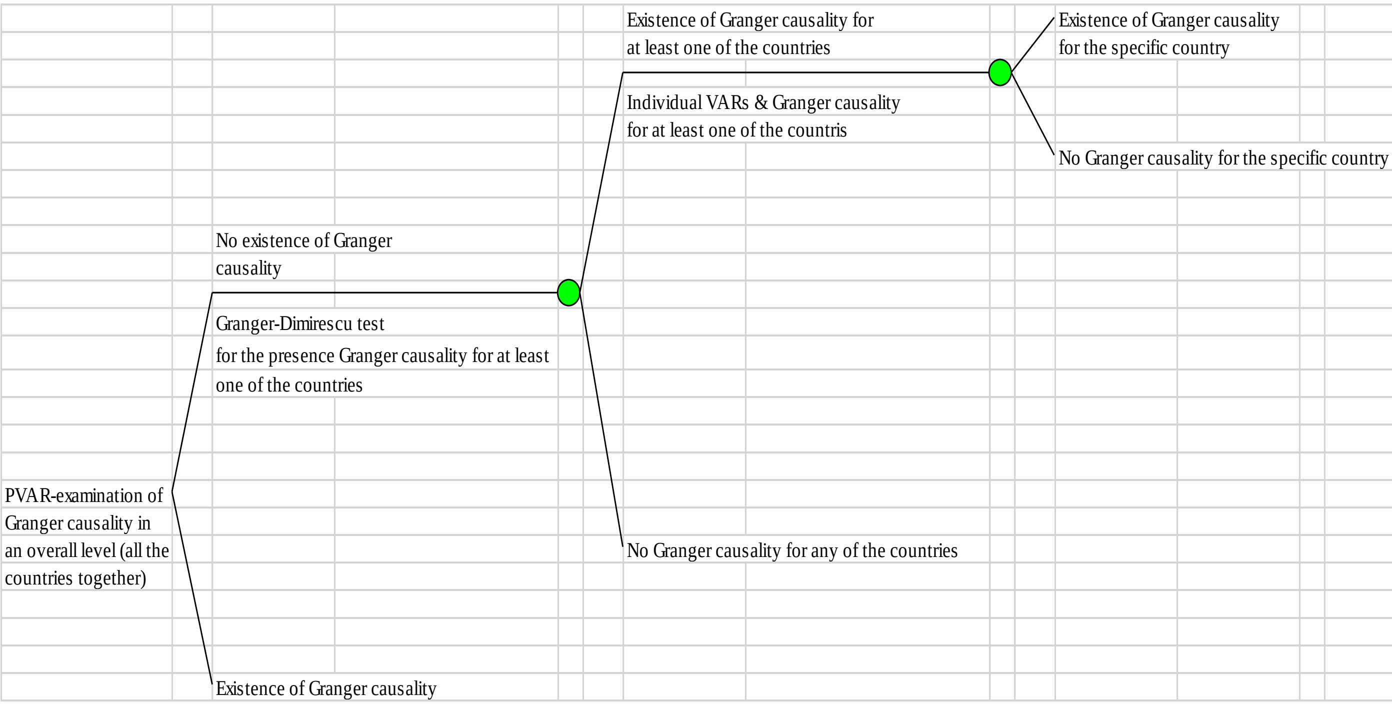
To summarize, the steps followed are presented in the following table:

Table 3 - Steps of the methodology followed

1.Selection of the proxies representing the variables
2.Collection of the Data
3.Descriptive statistics
4.Examination of the presence of unit roots-Unit root tests
5.Model selection-Optimum lag specification
6.PVAR model estimation
7. Dimirescu & Hurlin test for the presence of Granger causality
8.Individual VAR's & Granger causality tests
9.Results-conclusions

If causality is not inferred for all the countries in the PVAR model as a group these MENA countries present no causality on average between finance and growth. However, this does not mean lack of a causal relationship for every country. Indeed, the possibility of Granger causality between finance and growth for any country is examined (Dimirescu & Hurlin test). If it is found that in at least one country Granger causality exists, the individual countries will be examined using VARs and Granger causality. This three-step approach is shown in the next figure.

Figure 1-Steps-Process



5.3. Model specification & choice of variables

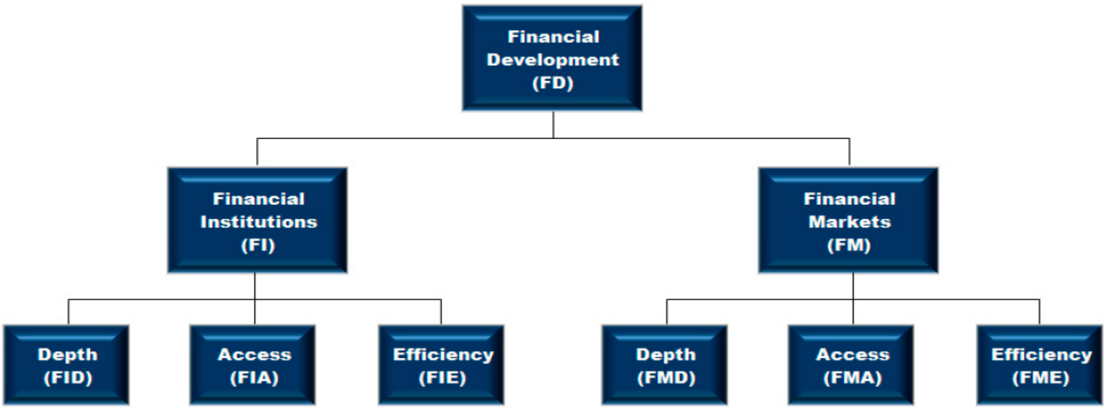
Following the aforementioned approach, the relationship of interest can be presented as:

$$\begin{cases} \textit{Economic Growth} = f\,(\textit{financial development}) \\ \textit{Financial Development} = f\,(\textit{economic growth}) \end{cases}$$

Financial development is measured by several proxies. Indeed, in the literature, particular monetary aggregates, such as M1, M2 or quasi money to GDP, have been employed, as well as other proxies associated with credit to the private sector, or the overall credit to GDP, and stock capitalization. Other measures of a more qualitative nature have also been used in the literature, including the number of banking institutions per person.

Besides measures of financial development related to the banking sector, there are proxies associated with the stock market itself. It must be pointed out that these proxies essentially measure a specific aspect of financial development and overall do not take into account the complex multidimensional nature of financial development (Svirydzenka, 2016). It is well known that the financial sector, having largely evolved over time and in fact more rapidly during the last 20 years, now consists of a large number of different type of financial institutions, such as investment banks, insurance companies, mutual funds, pension funds, venture capital firms, and many other types of non-bank financial institutions, and not only banks. The financial system's role of diversifying credit has also become much more complicated and involves many agents and intermediaries. Furthermore, a recent important feature of the financial systems has become their free access and efficiency. Large financial systems are of limited use if they are not accessible to a sufficiently large portion of the population and firms. Even if financial systems are sizeable and have a broad reach, their contribution to economic development would be limited if they were wasteful and inefficient. All these elements may not be easily captured by the traditional proxies of financial development aforementioned. As a solution, the IMF has recently developed a number of indices reflecting how developed are financial institutions and financial markets in terms of their depth, access, and efficiency, which also culminate in an overall index of financial development. These measures have been firstly introduced in an IMF-Staff Discussion Note "Rethinking Financial Deepening: Stability and Growth in Emerging Markets" (Sahay et al., 2015). In Figure 2 below, the sub-indexes of the overall IMF index are presented. As the figure shows, financial development is defined as a combination of depth (size and liquidity of markets), access (ability of individuals and companies to access financial services), and efficiency (ability of institutions to provide financial services at low cost and with sustainable revenues, and the level of activity of capital markets). In particular, six indexes have firstly been created (FID, FIA, FIE for markets and institutions), to measure the accessibility, the level of depth and the efficiency of financial markets. These six indexes have then been aggregated to create one measure for financial institutions and one measure for financial markets. These composite new indices have been further aggregated to create a "financial development index". Each sub-index (FID, FIA, FII) comprises of several indicators covering different aspects of financial markets for a sufficiently long time period. All of these are presented in the figure below (Figure 2), which also describes the specific data sources from which the indicators have been taken.

Figure 2-Financial Development Index



Source: Svirydzenka (2015)

As it is evident from the figure, many of the proxies employed in the existing literature to measure financial development have been used to compose these indices. Therefore, the use of this IMF index has the positive aspect that many of the different measures of financial development are captured cumulatively by only one index. Moreover, a number of potential financial useful financial indicators often cannot be used because of the limitation in finding data, especially for a long period of time. In the IMF case, data for each indicator and therefore index spans from 1980 onwards. It is therefore clear that this index captures all the dimensions of the financial systems that have evolved over time, including stock markets and financial institutions, and, as such, it constitutes an efficient and innovative way to measure financial development. Indeed, through the financial access sub index, it could be claimed that this index also captures the notion of financial innovation. However, the fact that these indexes include all the different aspects of the financial system which are present in the highly developed financial system of North America and Western Europe, may pose a problem in their usage in a context where the relationship between financial development and economic growth in MENA countries is examined.

In our analysis we will use the traditionally used by the literature proxies to represent financial development and the newly created indexes as well. In particular, following e.g. Kar et.al. (2011), we will use a monetary proxy and a proxy measuring provided credit. Given our panel-VAR framework, it is not econometrically viable to include in the model more than one proxy of each type (see e.g. Kar et al. 2015). As a credit proxy, we use *domestic credit to the private sector as a percentage of GDP*. On the other hand, it is often suggested by the literature (Hassan, Sanchez & Suk-Yuk 2011) that the best indicator of financial development is a proxy showing the level of credit provided is *domestic credit provided by the banking sector.* Indeed, as Levine (1997) notes, the higher the value of that proxy the higher the degree of dependence upon the banking sector for financing. In the countries which we focus on, the financial system is not as much developed as it is in western advanced economies and financial institutions which are not banks often play a minor role in financing. Also, as many of these countries are in process of development, banks are usually not subject to mandate loans to priority sectors or are obliged to hold government securities (Hassan, Sanchez & Suk-Yuk 2011) so the bulk of the finance goes to the private sector.

As far as monetary proxies are concerned, it is strongly suggested by the literature that M3 as a percentage of GDP is the best indicator of financial development. Indeed, it could be argued that M3 is the best measure of the financial-depth aspect of financial development as it is related more to the ability to provide transaction services than to the ability to channel funds from savers to borrowers (Khan & Sendaji 2000). However, attempting to use M3 as a proportion of GDP, we came upon problems: different countries define M3 differently; comparable data only start in 2000; for some of the countries in our sample there are no

M3 series at all. Accordingly, we use instead *M2 as percentage of GDP*. Although M2 has several problems (e.g. it is not as a broad definition of money as M3), it has been used as a proxy for financial development by a number of researchers (see e.g. Kar, et. al., 2015).

The IMF's aggregate financial development indexes are employed to represent and measure financial development. This is an innovative approach: the index was developed quite recently and no previous studies known to us have used them to examine the relationship between economic growth and financial development as far as the particular group of MENA countries is concerned. We will use the Financial Development Index (the overall index) and the two sub-indexes Financial Development Markets (FMI) and Financial Development Institutions (FII). An important fact is that through the usage of the indexes we capture the stock market as well.

Apart from the proxies already mentioned, we use another variable: *total trade as a percentage to GDP*. This variable per se does not describe financial development. However, a strong link between financial development and openness-total trade is general recognized in the literature (see Beck 2002 & Beck 2003). As such, this variable can be used as an indirect proxy of financial development (some researchers stress the trade-openness encompasses a notion of financial innovation, see e.g. Kar et al. 2011). Total trade is measured as a sum of total exports and imports expressed as a percentage of tGDP.

The variables that will be used as proxies of financial development, as well as indicative studies which employ these variables, are presented in the following table.

Table 4 - Financial Development Indicators

Domestic Credit to the private sector as a % of GDP	Arestis, P., & Demetriades, P. (1997), Calderón, C., & Liu, L. (2003), De Gregorio, J., & Guidotti, P. E. (1995), Dritsakis, N., & Adamopoulos, A. (2004), Kar, M., Nazlıoğlu, Ş., & Ağır, H. (2011), Hassan, Sanchez & Suk-Yuk (2011), Levine & Zervos (1998), Kenourgios & Samitas (2007)
M2 as % of GDP	Akbas, Y. E. (2015), Al-Yousif, Y. K. (2002) , Calderón, C., & Liu, L. (2003), Dritsakis, N., & Adamopoulos, A. (2004), Springler, E. (2005), Hondroyiannis, G., Lolos, S., & Papapetrou, E. (2005), Kar, M., Nazlıoğlu, Ş., & Ağır, H. (2011)
Gross domestic savings as % of GDP	Akbas, Y. E. (2015), Christopoulos, D. K., & Tsionas, E. G. (2004), Lahcen, A. C. H. Y. (2004), Hassan, Sanchez & Suk-Yuk (2011)
Financial Development Index (FDI)	-
Financial Development Index-Institutions (FI)	-
Financial Development Index-Markets (FM)	-
Total trade as a % of GDP	Akbas, Y. E. (2015), Kar, M., Nazlıoğlu, Ş., & Ağır, H. (2011)

5.4. Data

The data comprise of observations for 14 MENA countries covering a time period of 1980-2014. These countries are: Algeria, Egypt, Bahrain, Jordan, Iran, Lebanon, Kuwait, Qatar, Israel, Oman, Saudi Arabia, United Arab Emirates, Morroco, Tunisia & Turkey. Data sources are presented in Table 5.

Table 5 - Data Sources

Real GDP & GDP growth (annual percentage change)	World Development Indicators, WDI database, World Bank World Economic Outlook, WEO database, IMF
M2 as a percentage of GDP	International Financial Statistics, IMF
Domestic Credit to the private sector as a percentage of GDP	World Development Indicators, WDI database, World Bank
Gross Domestic Savings as a percentage of GDP	World Economic Outlook, WEO database, IMF
Trade as a percentage of GDP	World Development Indicators, WDI database, World Bank
Financial Development Index (FDI)	"Rethinking Financial Deepening: Stability and Growth in Emerging Markets" (Sahay et al., 2015)
Financial Development Index-Institutions (FII)	"Rethinking Financial Deepening: Stability and Growth in Emerging Markets" (Sahay et al., 2015)
Financial Development Index-Markets (FMI)	"Rethinking Financial Deepening: Stability and Growth in Emerging Markets" (Sahay et al., 2015)

As the data are panel series, there is no point in presenting descriptive statistics, given that the values of the variables differ greatly among the different countries. However, after careful observation of the data several points can be made.

Firstly, the level of financial development, as proxied by the various indicators, seems to be rising over time for most of the countries in the sample. We must also point out that for some countries, the most characteristic being Sudan, the series follow a very different pattern from that of the other countries, something logical given that for example Sudan is a country with sub-Saharan economic characteristics and problems and therefore very different from the other more-developed middle eastern countries that are part of our sample, and the same differences apply to other countries too. Not only does the pattern of financial development and economic growth differ among the countries but also the levels as well. Furthermore, the volatility of the growth rate in some these countries (and the high growth levels in general), may not be unrelated to oil prices, while for others it is totally interrelated with the oil prices. Indeed, Berument et al. (2007) have found that oil-price increases have had a statistically significant positive effect on the output of Algeria, Iran, Iraq, Kuwait, Libya, Oman, Qatar, Syria, and United Arab Emirates. It has also been found that oil supply shocks are associated with lower output growth in most of these countries. Political instability in that region is a further important factor and, even if we exclude from our sample Syria, Iraq and Libya, it is very likely that political factors have affected real-GDP levels and therefore output growth. Certain political conditions, such as the invasion of Sadam Hussein in Kuwait, the Islamic revolution in Iran and the Arab Revolution, could have had specific effects on GDP. In general, growth rates vary a lot and their pattern is very different from that of the OECD or the EU countries. Furthermore, there are some missing observations in some of the countries (Oman, Qatar, Lebanon, and Kuwait) as far as real GDP growth is concerned. In the PVAR, this is of no practical importance as we can use unbalance-panel methods. However, when we test for the presence of Granger causality for at least one country with the Dimirescu & Hurlin test, we have to discard countries that lack data for a specific period. Individual Granger causality can be tested by discarding the observations missing in both variables of the VARs. It must also be pointed out that data unavailability for the IMF indexes exist in the case of Sudan.

5.5. Unit Root Tests

The presence or absence of unit roots helps to identify some features of the underlying data-generating process of a series. If a series has no unit roots, it is characterized as stationary, and therefore exhibits "mean reversion" i.e. it fluctuates around a constant long run mean. Absence of unit roots also implies that the corresponding series have a finite variance which does not depend on time (this point is crucial for economic forecasting) and that the effects of shocks dissipate over time.

In contrast, if a series shows unit roots, it is characterized as a non-stationary process that has no tendency to return to a long-run deterministic path. The variance of the series is also time-dependent, and goes to infinity as time approaches infinity, which results in serious problems for forecasting. Moreover, non-stationary series suffer permanent effects from random shocks. As usually is stressed by the literature, series with unit roots follow a random walk.

Stationarity-testing of a series is very important before proceeding to the estimation of a PVAR model, as it enables us to identify which variables to include in our model. Stationarity can be checked through a unit root test, and in general means that:

$$E(Yt) \text{ is independent of the time } t$$

$$Var\ (Yt) = \sigma^2 \text{ is independent of the time } t$$

$$Cov(Yt, Yt+g) = Cov\ (Yt+m, Yt+m+g) = \gamma$$

There are, however, differences between unit-root testing in time series data and panel data. The main difference in panel data is that we have to consider both the asymptotic behavior of the time series dimension T and the cross-sectional dimension N. The way that the N and T are converging is crucial if one wishes to determine the asymptotic behaviour of the estimators and the corresponding tests. It is possible in panel data that the parameters γi present a level of heterogeneity between the panels. Also in the case of panel data, there is a possibility of correlation among the panels. On the other hand, it has been shown that panel unit root tests are more powerful (less likely to commit a Type II error) than unit root tests applied to individual series because the information in the time series dimension is enhanced by that contained in the cross-section data (Baltaggi 2001). In addition, in contrast to individual unit root tests, which have complicated limiting distributions, panel unit root tests lead to statistics with a normal distribution in the limit (see e.g. Baltaggi 2001)

Existing unit-roots tests are summarized in Table 6. The table presents the type of the test, the hypotheses, the autocorrelation-correction method and the possible deterministic component

Table 6-Unit Root Tests

Test	Null	Alternative	Possible Deterministic Component	Autocorrelation Correction Method
Levin, Lin and Chu	Unit root	No Unit Root	None, F, T	Lags
Tzavalis-Harris	Unit root	No Unit Root	None, F, T	Lags
Breitung	Unit root	No Unit Root	None, F, T	Lags
IPS	Unit Root	Some cross-sections without UR	F, T	Lags

Fisher-ADF	Unit Root	Some cross-sections without UR	None, F, T	Lags
Fisher-PP	Unit Root	Some cross-sections without UR	None, F, T	Kernel
Hadri	No Unit Root	Unit Root	F, T	Kernel

Source: http://www.eviews.com

There are several differences between the tests listed in the table above. Firstly, the Levin-Ling-Chu and Harris-Tzavalis tests make the simplifying assumptions that all panels share the same autoregressive parameter, while the other tests suppose the autoregressive parameter to be panel specific. Secondly, the various tests make different assumptions about the rates at which the number of panels and the number of variables change. Thirdly, the size of the sample, as well as whether the panels are balanced or unbalanced, determines the specific type of test appropriate. For panels to be strongly balanced, each has to have the same number of observations covering the same time span. Furthermore, it must be pointed out that all tests require that there are no gaps in any panel's series.

Based on the theoretical analysis of Baltagi (2000), the appropriate tests for the presence of unit roots will be performed. The data are characterized by a relatively higher time coefficient than the number of panels, and it is not irrational to assume that all panels share the same autoregressive parameter (*ρi =ρ*). These characteristics qualify our variables to be tested with the Levin-Lin-Chu criterion. However, as this test is characterized as restrictive and has specific problems, i.e. one might infer stationarity for the whole panel even if this holds for only a handful of individuals, our panel can also be tested by the Im-Peasran-Shim tests. This is, in fact, suggested by Baltagi (2001) "*..it is advisable to analyze the outcome of both Levin-Lin-Chu & Im-Pessaran-Shin test.".* As it is often noted that the Fisher type test out-performs the Im-Pesaran-Shin test, it is useful to check stationarity with that criterion too.

<u>(i) Levin-Lin-Chou</u>

The two important restrictive hypotheses for this test to be applied are that all panels share the same autoregressive parameter and also that they are balanced. The hypotheses suggested are:

H0 - each time series contain a unit root

H1 - each time series is stationary

The procedure for this tests presented by Baltagi (2001), starts from an augmented Dickey-Fuller test for each cross section of the equation

$$\Delta y_{it} = \rho_\iota y_{i,t-1} + \sum_{L=1}^{pi} \theta_{it} \Delta y_{it-L} + a_{mi} d_{mt} + \varepsilon_{\iota\tau}$$

Next, two auxiliary regressions are run: Δy_{it} on Δy_{it-L} and d_{mt} to obtain the residuals $\hat{e}_{it}$ and y_{it-1} on Δy_{it-L} and d_{mt} to obtain $\hat{v}_{i,t-1}$. Then the residuals become standardized. Finally, a pooled OLS regression is run: $\tilde{\hat{e}}_{it} = \rho \tilde{v}_{\iota,t-1} + \tilde{\varepsilon}_{it}$.

The lags in that test can be specified as these which maximize or minimize a specific criterion, as for example the Akaike criterion. This test is preferable when we have panels of moderate size, with are about 10-250 panels and 5-250 observations per panel. Our panel falls in that category, as we have 14 panels and 33 observations per panel. If the number of observations is very small the test is undersized and has low power. Also it is suggested by Levin et al (2002) that if the number of the observations is very large, individual root time-series can be applied. The main drawbacks of the test are its restrictive null hypothesis, the fact that all panels should share the same autoregressive parameter and that the test relies on the assumption of cross-sectional independence.

(ii) Im-Pesaran-Shin test

This test does not require all panels to share a common autoregressive parameter and thus is less restrictive than the LLC. Another important feature of this test pointed out by Maddala & Wu (1999) is that the Dickey-Fuller regression, which is the starting point for this test, is fitted to each panel separately and the resulting t statistics are averaged whereas in the LLC the data are previously pooled. Im, Pesaran & Shin (1997) allow for a heterogeneous coefficient of yit−1 and proposed an alternative testing procedure, based on the augmented DF tests when uit is serially correlated with different serial correlation properties across cross-sectional units. The hypotheses suggested are:

H0 - each time series contain a unit root

H1 - each time series is stationary

(iii) Fisher-type test

This test proposed first by Fisher combines p-values from independent tests to obtain an overall test statist. In the context of panel data, a unit root test on each panel's series separately is performed and then the p-values are combined to obtain an overall test of whether the panel series contains a unit root. The formula of the test is: $P = -2\sum_{i=1}^{N} \ln p_i$ which combines the *p-value* from unit root tests for each cross-section *i* to test for unit root in panel data. *P* is distributed as *x^2* with *2N* degrees of freedom as $Ti \rightarrow \infty$ for all *N*. When *pi* closes to *0* (*null hypothesis is rejected*), *ln pi* closes to $-\infty$ so that large value P will be found and then the null hypothesis of existing panel unit root will be rejected. In contrast, when *pi* closes to 1 (*null hypothesis is not rejected*), ln *pi* closes to 0 so that small value P will be found and then Choi (1999) pointed out the advantages of the Fisher test: (1) the cross-sectional dimension, *N*, can be either finite or infinite, (2) each group can have different types of non-stochastic and stochastic components, (3) the time series dimension, T can be different for each i (imbalance panel data), and (4) the alternative hypothesis would allow some groups to have unit roots while others may not. A main disadvantage involved is that the p-value has to be derived by Monte Carlo simulations (Nell & Zimmermann 2011).

We examine each variable separately. If a variable contains unit roots and is not stationary, one can check its first differences for stationarity. It must be pointed out that if a variable is stationary in its level, by definition first differences will be stationary too. This is important as if one of the variables is stationary only in its first or even second differences and not in its levels, all the other variables must be stationary at the same level. As we will use three tests for each panel, our conclusion will be based in the outcome of the majority of the tests. The aim is to use data that are stationary in each step of our analysis (PVAR, Dimirescu & Hurlin, Individual VARs). As the tests examine the overall presence of unit roots, in case for a specific variable the levels are shown to be stationary this does not necessarily mean that for every different country the levels are stationary. The output of STATA with regard to the three tests can be found in the appendix section. We base our results of the test in the p-value criterion.

Table 7 - p-values

P>0.10	Strongly not statistically significant
P=0.05-0.1	Weakly not statistically significant
P<0.05	Weakly statistically significant
P<0.01	Strongly statistically significant

The following table summarizes the findings of all the three tests for each one of the variables.

Table 8 - Unit root tests

Variable	Test	Result
Real GDP	Levin-Lin-Chu	Strongly not reject the H0-Levels are not stationary-unit roots are present (p-value 0.29)
Real GDP	Im-Pesaran-Shim	Strongly not reject the H0-Levels are not stationary-unit roots are present (p-value 1)
Real GDP	Fisher-type	Strongly not reject the H0-Levels are not stationary-unit roots are present (p-value 0.99)
GDP growth	Levin-Lin-Chu	Strongly reject the H0- First differences are stationary-unit roots are not present (p-value 0.00)
GDP growth	Im-Pesaran-Shim	Strongly reject the H0-First differences are stationary-unit roots are not present (p-value 0.00)
GDP growth	Fisher-type	Strongly reject the H0-First differences are stationary-unit roots are not present (p-value 0.00)
Domestic credit to the private sector as a percentage of GDP	Levin-Lin-Chu	Strongly not reject the H0-Levels are not stationary-unit roots are present (p-value 0.95)
Domestic credit to the private sector as a percentage of GDP	Im-Pesaran-Shim	Strongly not reject the H0-Levels are not stationary-unit roots are present (p-value 0.98)
Domestic credit to the private sector as a percentage of GDP	Fisher-type	Strongly not reject the H0-Levels are not stationary-unit roots are present (p-value 0.82)
First differences domestic credit to the private sector as a percentage of GDP (first differences)	Levin-Lin-Chu	Strongly reject the H0-First differences are stationary-unit roots are not present (p-value 0.00)
First differences domestic credit to the private sector as a percentage of GDP (first differences)	Im-Pesaran-Shim	Strongly reject the H0-First differences are stationary-unit roots are not present (p-value 0.00)
First differences domestic credit to the private sector as a percentage of GDP (first differences)	Fisher-type	Strongly reject the H0-First differences are stationary-unit roots are not present (p-value 0.00)
M2 as a percentage of GDP	Levin-Lin-Chu	Strongly not reject the H0-Levels are not stationary-unit roots are present (p-value 0.31)
M2 as a percentage of GDP	Im-Pesaran-Shim	Strongly not reject the H0-Levels are not stationary-unit roots are present (p-value 0.15)
M2 as a percentage of GDP	Fisher-type	Weakly reject the H0-First differences are stationary-unit roots are not present (p-value 0.2)
First differences M2 as a percentage of GDP	Levin-Lin-Chu	Strongly reject the H0-First differences are stationary-unit roots are not present (p-value 0.00)
First differences M2 as a percentage of GDP	Im-Pesaran-Shim	Strongly reject the H0-First differences are stationary-unit roots are not present (p-value 0.00)
First differences M2 as a percentage of GDP	Fisher-type	Strongly reject the H0-First differences are stationary-unit roots are not present (p-value 0.00)
FMI	Levin-Lin-Chu	Strongly reject the H0-Levels are stationary-unit roots are not present (p-value 0.01)
FMI	Im-Pesaran-Shim	Strongly not reject the H0-Levels are not stationary-unit roots are present (p-value 0.38)
FMI	Fisher-type	Strongly not reject the H0-Levels are not stationary-unit roots are present (p-value 0.38).
First differences FMI	Fisher-type	Strongly not reject the H0-First differences are stationary-unit roots are not present (p-value 0.00)
First differences FMI	Im-Pesaran-Shim	Strongly not reject the H0-First differences are stationary-unit roots are not present (p-value 0.00)
First differences FMI	Levin-Lin-Chu	Strongly not reject the H0-First differences are stationary-unit roots are not present (p-value 0.00)
FII	Levin-Lin-Chu	Strongly not reject the H0-Levels are not stationary-unit roots are present (p-value 0.93)
FII	Im-Pesaran-Shim	Strongly not reject the H0-Levels are not stationary-unit roots are present (p-value 0.92)
FII	Fisher-type	Strongly not reject the H0- Levels are not stationary-unit roots are present (p-value 0.33)
First differences FII	Levin-Lin-Chu	Strongly reject the H0-First differences are stationary-unit roots are not present (p-value 0.00)

First differences FII	Im-Pesaran-Shim	Strongly reject the H0-First differences are stationary-unit roots are not present (p-value 0.00)
First differences FII	Levin-Lin-Chu	Strongly reject the H0-First differences are stationary-unit roots are not present (p-value 0.00)
FDI	Levin-Lin-Chu	Strongly not reject the H0-Levels are not stationary-unit roots are present (p-value 0.92)
FDI	IM-Pesaran-Shim	Strongly not reject the H0-Levels are not stationary-unit roots are present (p-value 0.38)
FDI	Fisher-type	Strongly not reject the H0-Levels are not stationary-unit roots are present (p-value 0.87)
First differences FDI	Fisher-type	Strongly not reject the H0-The first differences are stationary-unit roots are not present (p-value 0.00)
First differences FDI	Levin-Lin-Chu	Strongly not reject the H0-The first differences are stationary-unit roots are not present (p-value 0.00)
First differences FDI	Im-Pesaran-Shim	Strongly not reject the H0-The first differences are stationary-unit roots are not present (p-value 0.00)
Trade as a percentage of GDP	Im-Pesaran-Shim	Strongly not reject the H0-The levels are not are-unit roots are present (p-value 0.63)
Trade as a percentage of GDP	Levin-Lin-Chu	Strongly not reject the H0-The levels are not stationary-unit roots are present (p-value 0.23)
Trade as a percentage of GDP	Im-Pesaran-Shim	Strongly not reject the H0-The levels are not stationary-unit roots are not present (p-value 0.45)
First differences Trade as a percentage of GDP	Fisher-type	Strongly reject the H0-The first differences are stationary-unit roots are not present (p-value 0.00)
First differences Trade as a percentage of GDP	Im-Pesaran-Shim	Strongly reject the H0-The first differences are stationary-unit roots are not present (p-value 0.00)
First differences Trade as a percentage of GDP	Levin-Lin-Chu	Strongly reject the H0-The first differences are stationary-unit roots are not present (p-value 0.00)

Firstly, as usual, *real GDP*, in its levels, is not stationary, something confirmed by all three tests. However, its first difference is stationary, which is imperative as it means that output-growth rates are stationary. As a result, we can assume that the compound variable growth rate is stationary. As far as the variable *domestic credit as percent of GDP* is concerned, from the results of all three tests it can be inferred that it is not stationary in its levels and thus it cannot be included in the PVAR model or the other models used (Ho would have been rejected even if we had included a time trend). This is inferred from the p-value measure, which is higher than 0.10 in all three cases. As levels of domestic credit are non-stationary, first differences should be examined. The p-value is close to zero in all three tests, so the Ho hypothesis should be rejected. Therefore, we infer that this variable is stationary in its first difference. The next variable examined is *M2 as percentage of GDP*. From the table it follows that the tests do not agree with each other (i.e. they do not agree whether the Ho should or should not be rejected and thus whether the variable is stationary). However, as at least one test implies non-stationary in levels, we must examine stationary in first differences. In all three tests, the corresponding p-value is close to zero so without any doubt the first difference of this variable can be assumed stationary (Ho is strongly rejected). Having examined the stationarity of the traditionally used proxies describing financial development, we now proceed to test for stationarity in the *IMF's financial development indices* (i.e. financial development-institutions and financial development-markets). All three indices seem to be stationary in their first differences and not in their levels. As far as *Trade as a percentage of GDP* is concerned, stationarity also exists only in first differences.

5. 6. Model Selection, Optimum-lag specification

Before proceeding to the Panel VAR analysis, the optimal lag for each PVAR model must be examined. The method used is that of Andrews and Lu (2001), who proposed model and moment selection criteria (MMSC) for GMM frameworks. Their proposed MMSC are analogous to the Akaike information criteria (AIC), the Bayesian Information criteria (BIC) and the Hannah-Quinn (HQIC) criteria. This method selects the pair of Q and p that minimizes the MBIC, MAIC, MIC criteria. Therefore, the optimal model is that with the minimum value of the MBIC, MAIC, MIC criteria. In cases where the criteria do not agree with one another, a n-order PVAR will be chosen for which the majority of the criteria have the minimum values. As the method is based on Hansen's J-statistic (see Hansen 1982), the restriction-requirement is that the number of endogenous variables must be greater than the number of moment conditions.

In all our cases, the three statistics have minimum value at lag 1 suggesting a PVAR(1) model, something that also agrees with the optimum lag derived from the unit-root tests that is supposed to maximize the Akaike criterion. In the following table the values of the MAIC, MBIC and MIC criteria are presented for lag 1, 2, 3 (we assume a maximum possible lag of 3 as is suggested by common practice). The corresponding STATA outputs are included in the appendix section.

Table 9-PVAR Model selection-optimum lag specification

Model 1: Variables: Diff. M2 as a percentage of GDP, economic growth			
lag	MAIC	MBIC	MQIC
1	-15.626	-64.163	-34.807
2	-14.626	-46.971	-27.398
3	-7.045	-29.225	-13.439
Model 2: Variables: Diff. Domestic credit to private sector as a percentage of GDP, economic growth			
lag	MAIC	MBIC	MQIC
1	-11.084	-59.624	-30.265
2	-14.611	-43.630	-24.058
3	-7.045	-21.748	-11.962
Model 3: Variables: Diff. FDI, economic growth			
lag	MAIC	MBIC	MQIC
1	-13.439	-61.604	-32.496
2	-8.569	-40.679	-21.274
3	-17.825	-23.860	-14.157
Model 4: Variables: Diff. FII, economic growth			
lag	MAIC	MBIC	MQIC
1	-10.589	-58.754	-29.646
2	-5.520	-37.630	-18.225
3	-5.148	-21.203	-11.501
Model 4: Variables: Diff. FMI, economic growth			
lag	MAIC	MBIC	MQIC
1	-8.964	-57.129	-28.021
2	-7.864	-37.630	-20.569
3	-7.156	-21.203	-13.508
Model 5: Variables: Total Trade as a precentage of GDP, economic growth			
lag	MAIC	MBIC	MQIC
1	-33.835	-60.229	-53.835
2	-14	-43.541	-25.954
3	-7.174	-21.853	-13.055

5.7. PVAR model estimation, Granger causality, and impulse response functions

Using the PVAR methodology, the relationship between finance and growth in the case of MENA countries as a group will be examined. Formally, the specific PVAR model that will be used is:

$$Y_{it} = \sum_{i=1}^{p} A_l Y_{it-l} + g_{it} + e_{it}$$

where, Y_{it} is a vector of endogenous variables, consisting of GDP growth, M2 as a percentage of GDP, domestic credit as a percentage of GDP and the IMF indices and g_{it} is a vector of exogenous variables, if they such variables have been used.

In our PVAR, the equation has been transformed by first differencing due to the presence of unit roots found in the previous section, and so there is no need for Forward Orthogonal Deviation. At the same time, although causality can be inferred from the estimated coefficients and their statistical significance, a formal Granger-causality test can still be performed after the estimation of the PVAR model to assert whether financial development, represented by the specific proxies, Granger-causes economic growth or the opposite, at the usual confidence levels. Furthermore, it is imperative to check the stability condition of the estimated PVAR. Finally, in the case in which we find that one of the proxies of financial development Granger-causes growth or the opposite, it is of interest to examine exactly how exogenous changes in either variable due to certain shocks affect the other variable. The notion of exogenous shocks to economic growth is easy to be understood. However, the most common and predominant shocks to growth in the specific sample of countries we examine are likely to come from oil-price volatility and political instability and as such it is doubtful if these type of shocks affect financial development. Financial development shocks are mainly shocks attributed to financial crises, such as that of 2008-2009, although exogenous changes in monetary and credit policy due to a variety of reasons can also regarded as financial development shocks. In general, the role of financial shocks has been thoroughly examined in the literature. It has been found to be separate from other shock types and to exert a significant influence on key macroeconomic variables such as GDP and (particularly) investment (see Fornari & Stracca 2013). In the context of our PVAR model, such shocks can be identified through impulse-response functions (IRF). IRFs describe the reaction of one variable to exogenous innovations or shocks in the other, ceteris paribus. Along with the estimation of impulse response functions, we estimate the forecast error variance decomposition (FEVD), which is derived from the orthogonalized impulse response coefficient matrices and displays the proportion of movements in the each time different dependent variable that are due to their own shocks versus shocks to the other variables. In both cases, about 500 Monte-Carlo iterations are employed and are used to compute confidence intervals.

The estimation results from all the PVAR models are presented in the following table. Specifically, for each model, the variables are defined, and estimated coefficients are presented along with the corresponding standard error and the p-values (STATA outputs are included in the appendix section). Before proceeding, it is important to mention that in all the PVAR models the stability condition is satisfied (see appendix).

Table10- PVAR Estimation

Model	**Dep.var.**	**r.h.s. var.**	**coeff.**	**Stand.Err.**	**p-value**
1.PVAR(1), Growth-first differences domestic credit as a percentage of income	Economic growth	Economic growth (lag.1)	0.018	0.080	0.026
1.PVAR(1), Growth-first differences domestic credit as a percentage of income	Economic growth	diff.dom.credit as a % of GDP (lag.1)	0.002(-)	0.022	0.911
1.PVAR(1), Growth-first differences domestic credit as a percentage of income	diff.dom.credit as a % of GDP	Economic growth (lag.1)	0.231	0.164	0.159
1.PVAR(1), Growth-first differences domestic credit as a percentage of income	diff.dom.credit as a % of GDP	diff.dom.credit as a % of GDP (lag.1)	0.206	0.070	0.004
2.PVAR(1), Growth-first differences M2 as a percentage of GDP	Economic growth	Economic growth (lag.1)	0.165	0.072	0.023
2.PVAR(1), Growth-first differences M2 as a percentage of GDP	Economic growth	diff.M2 as a % of GDP (lag.1)	0.002(-)	0.003	0.458
2.PVAR(1), Growth-first differences M2 as a percentage of GDP	diff.M2 as a % of GDP	Economic growth (lag.1)	2.833(-)	8.917	0.751
2.PVAR(1), Growth-first differences M2 as a percentage of GDP	diff.M2 as a % of GDP	diff.M2 as a % of GDP (lag.1)	0.070	0.071	0.031

3.PVAR(1), Growth-first differences FDI	Economic growth	Economic growth (lag.1)	0.178	0.070	0.011
3.PVAR(1), Growth-first differences FDI	Economic growth	diff. FDI (lag. 1)	0.042	0.065	0.517
3.PVAR(1), Growth-first differences FDI	diff. FDI	diff. FDI (lag. 1)	0.093	0.075	0.215
3.PVAR(1), Growth-first differences FDI	diff. FDI	Economic growth (lag.1)	0.036	0.038	0.342
4.PVAR(1), Growth-first differences FII	Economic growth	Economic growth (lag.1)	0.230	0.065	0.000
4.PVAR(1), Growth-first differences FII	Economic growth	diff. FII (lag. 1)	0.017	0.067	0.800
4.PVAR(1), Growth-first differences FII	diff. FII	diff. FII (lag. 1)	0.106(-)	0.072	0.143
4.PVAR(1), Growth-first differences FII	diff. FII	Economic growth (lag.1)	0.016(-)	0.035	0.650
5.PVAR(1), Growth-first differences FMI	Economic growth	Economic growth (lag.1)	0.314	0.098	0.001
5.PVAR(1), Growth-first differences FMI	Economic growth	diff. FMI (lag. 1)	0.017(-)	0.045	0.705
5.PVAR(1), Growth-first differences FMI	diff. FMI	diff. FMI (lag. 1)	0.004	0.007	0.954
5.PVAR(1), Growth-first differences FMI	diff. FMI	Economic growth (lag.1)	0.028	0.290	0.771
6.PVAR(1), Growth-first differences Total Trade as a percentage of GDP	Economic growth	Economic growth (lag.1)	0.230	0.083	0.006
6.PVAR(1), Growth-first differences Total Trade as a percentage of GDP	Economic growth	diff. Total trade as % of GDP (lag. 1)	0.046	0.019	0.014
6.PVAR(1), Growth-first differences Total Trade as a percentage of GDP	diff. Total trade as % of GDP (lag. 1)	diff. Total trade as % of GDP (lag. 1)	0.016	0.086	0.851
6.PVAR(1), Growth-first differences Total Trade as a percentage of GDP	diff. Total trade as % of GDP (lag. 1)	Economic growth (lag.1)	0.123(-)	0.153	0.420

From these results, specific points can be made. To start with, as expected, the previous levels of economic growth (one-year lagged values) have a statistically significant effect on current economic growth. The same applies to the indicators of financial development M2 as a percentage of GDP and Domestic Credit to the private sector as percentage of GDP. However, as far as the three IMF's indexes are concerned, their current values do not seem to be affected by their previous values and the same applies to the trade variable. The fact that current trade does not depend on its previous values can be attributed to the fact that for most of the countries for which a high level of openness is reported, the trade performed has to do mainly with oil exports which does not show a trend and are influenced heavily by external factors and political decisions.

From the table above ii follows that there is no statistically significant relationship between the financial development indicator Domestic Credit to GDP and economic growth when we examine all countries together as a group, and this seems to go both ways. To be more specific, as the p-value is 0.911 we cannot assume that lagged domestic credit to the private sector affects economic growth. The same applies to the relationship from lagged economic growth to domestic credit with a p value at 0.159.As far as the other PVAR models are concerned, in Models 2, 3, 4, and 5 all the p-values are more than 0.10, and we cannot infer that there is a relationship between economic growth and financial development as represented by the corresponding proxies. The absence of statistically significant causality means that increases in financial development (in particular, in domestic credit to the private sector or in M2 as a percentage of GDP) fail to contribute on average to economic growth.

Model 6, which uses total trade as percent of GDP, a variable not indicating exactly financial development but clearly associated with financial development (Akbas 2015), leads to different results compared to the other models. A positive relationship between trade and growth is recorded, something that is in general in accordance with the macroeconomic literature. The corresponding Granger-causality test also indicates that Trade affects growth. However, the coefficient seems to be of a rather small magnitude, something that might seem surprising. Nevertheless, it must be again stressed that this variable does not show financial development per se but is recorded as strongly related to financial development.

As no relationship between economic growth and financial development is identified in Models 1,2,3,4 and 5, there is no reason to present here the corresponding Granger-causality tests (STATA outputs are presented in the appendix section). However, in the case of Trade, where Granger-causality is identified, the Granger causality tests are presented below.

Table 11-Total Trade as a percentage of GDP Granger-causality test

```
panel VAR-Granger causality Wald test
  Ho: Excluded variable does not Granger-cause Equation variable
  Ha: Excluded variable Granger-causes Equation variable
```

Equation \ Excluded	chi2	df	Prob > chi2
WDIgrowth1			
TrGDPChange	5.997	1	0.014
ALL	5.997	1	0.014
TrGDPChange			
WDIgrowth1	0.651	1	0.420
ALL	0.651	1	0.420

Furthermore, it can be shown through impulse response functions, based on 200 Monte Carlo draws, that a one-unit change in the variable showing Total Trade as a percentage of GDP is responsible for about 2% change in economic growth. This response of growth to changes in Trade is not big, but it exists (for variables which show no statistical significance the corresponding magnitude is zero). The fact that a change in Trade is responsible for a change of only a 2% in economic growth may be attributed to the fact that some of the countries in our sample, such as Sudan, Oman and Iran, have a very low level of openness, mainly due to political reasons. and the PVAR Granger-test examines the MENA countries as a group. The Monte Carlo simulations are presented in tthe following table:

Table 12-Impulse response function (Forecast-error variance decomposition)

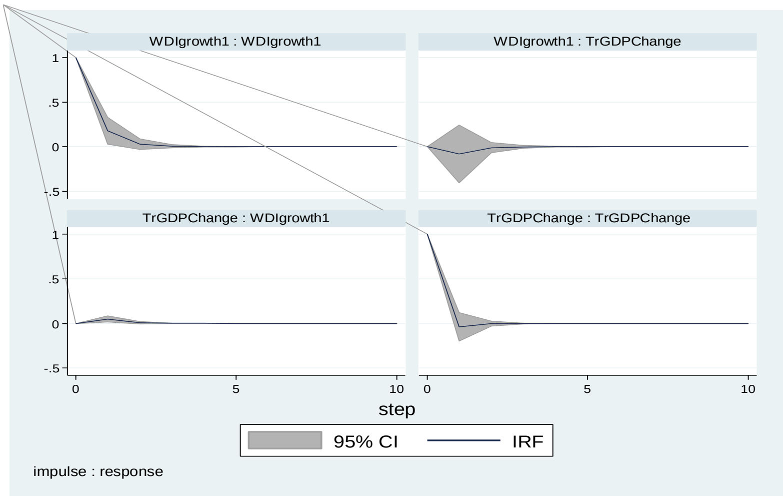
```
. pvarfevd, mc(200)
```

Forecast-error variance decomposition

Response variable and Forecast horizon	Impulse variable TrGDPChange	WDIgrowth1
TrGDPChange		
0	0	0
1	1	0
2	.9992388	.0007612
3	.9992242	.0007758
4	.9992238	.0007762
5	.9992238	.0007762
6	.9992238	.0007762
7	.9992238	.0007762
8	.9992238	.0007762
9	.9992238	.0007762
10	.9992238	.0007762
WDIgrowth1		
0	0	0
1	.0025291	.9974709
2	.0245056	.9754944
3	.0249059	.975094
4	.0249162	.9750838
5	.0249164	.9750836
6	.0249164	.9750836
7	.0249164	.9750836
8	.0249164	.9750836
9	.0249164	.9750836
10	.0249164	.9750836

FEVD standard errors and confidence intervals are not saved. Use option **save**.

Figure 4 Impulse responses graph



To summarize, in general we cannot assume causality between the variables in most of the models when we employ a PVAR approach where all countries are pooled and examined together. The absence of such a relationship in a model that pools the data of all countries is not in contrast with the literature. For example, Kar, Nazlioglu & Agir (2011), who examined the relationship between financial development and economic growth for the countries of the MENA region through country-specific Granger causality tests, were not able to conclude on a relationship for all the countries, as is assumed in a PVAR model. The lack of causality shown may be attributed either to absence of causality at all or to a high level of non-uniformity between the countries that comprise the group. Al-Awad & Harb (2005) have also found very weak evidence of a causal relationship in the short run, and it must be pointed out that a PVAR model shows causality mainly in the short run.

The lack of relationship and causality, which contrasts the theory, can be attributed to several factors. Firstly, as a PVAR model is of form

$$Y_{it} = \sum_{i=1}^{p} A_l Y_{it-l} + g_{it} + e_{it}$$

the *git* should be the relatively the same for all countries, as it identifies all the other parameters which affect growth. In our case, we have countries with very different growth characteristics. It is indicative that our set of countries includes a relatively impoverished country with a very low human development index and GDP per person, Sudan, but also Israel or even Qatar with very high GDP per capital. In general, the growth paces of the countries included in our sample vary considerably and this contributes heavily to the inability of the PVAR to recognize a relationship between economic growth and financial development when we pool the data of all these different countries together. It must also be pointed out that the accuracy of the data for several of the countries considered is questionable, as the national-data providers, which give to IMF and World Bank the data, are noted for the lack of their credit worthiness. Finally, it must be pointed out that usually a PVAR model requires a rather larger value of N and T than that of our sample.

5.8. Testing Granger causality with Dumirescu & Hurlin Test

The absence of causality when using the MENA countries as a group in a PVAR model does not necessarily mean that there is no causality between economic growth and financial development for any of the countries in our sample. It is possible that causality exists for some of the countries. To examine this issue, we use the Dumirescu & Hurlin Test (2012). This test examines formally the presence of non-causality for all “individuals”, and so the format of the null and the alternative hypothesis is presented in a certain way. By extension, the test examines whether for at least an “individual” (in our case a country) causality exist between economic growth and financial development.

Dumirescu & Hurlin (2012) provide an extension of the seminal article of Granger (1969). The underlying regression is

$$y_t = a + \sum_{k=1}^{k} \gamma_k y_{t-k} + \sum_{k=1}^{k} \beta_k x_{t-k} + \varepsilon_t$$

with t=1…., T

The null hypothesis is defined as $H_0 = \beta_{\iota 1} = ...\beta_{\iota K} = 0$, which corresponds to absence of causality for all individuals in the panel. The alternative hypothesis is $H_1 = \beta_{\iota 1} \neq 0, or...., or \beta_{\iota K} \neq 0$, $\forall i = 1,... N$. This corresponds to Granger causality between the variables of interest for at least one individual of the panel data set. The average Wald statistic is computed as $\bar{W} = (1/N)\sum_{i=1}^{N} W_i$, and is shown to be asymptotically well behaved. Based on that, the Wald statistics the standardized statistics are computed and are compared to the critical values. If the critical values are greater than the computed Z, then the H_0 should be rejected. The rejection or not of the null hypothesis can also be examined by looking at the p-values.

Applying the methodology of Dumirescu & Hurlin (2009), the specific results are summarized and presented in the following table (STATA outputs are included in the Appendix section). It is important to mention that the Granger non-causality is estimated for optimum lag 1, as directed from the model specification in the previous section and also the unit-root tests.

Table 13-Dumirescu & Hurlin (2012) Granger non-causality tests

H0: X variable does not Granger-cause Y
H1: X variable Granger cause Y for at least one country

X	Y	p-value	Result
change, domestic credit to the private sector as percentage of GDP	Economic growth	0.000	Rejection of the null hypothesis
change, M2 as percentage of GDP	Economic growth	0.000	Rejection of the null hypothesis
diff. FDI (Financial development index)	Economic growth	0.076	No rejection of the null hypothesis
diff.FMI (Financial development markets index)	Economic growth	0.084	No rejection of the null hypothesis
diff.FII (Financial development Institutions index)	Economic growth	0.313	No rejection of the null hypothesis
change, Trade as percentage of GDP	Economic growth	0.001	Rejection of the null hypothesis
Economic growth	change, domestic credit to the private sector as percentage of GDP	0.035	Rejection of the null hypothesis
Economic growth	change, M2 as percentage of GDP	0.000	Rejection of the null hypothesis
Economic growth	diff. FDI (Financial development index)	0.920	No rejection of the null hypothesis
Economic growth	diff.FMI (Financial development markets index)	0.920	No rejection of the null hypothesis
Economic growth	diff.FII (Financial development Institutions index)	0.031	Rejection of the null hypothesis
Economic growth	change, Trade as percentage of GDP	0.197	No rejection of the null hypothesis

From Table 13 the following points can be inferred. Firstly, no causality is reported between economic growth and financial development when the latter is measured by the Financial Development Indicators created by the IMF, except for the FII variable, showing the development of financial institutions, where there is evidence of causality from economic growth to financial development. Secondly, when Domestic credit as a percentage of GDP is used as an indicator of financial development, Granger-causality for at least one country in our sample running from financial development to economic growth is recognized. The causality recognized goes both ways, from financial development to economic growth and from economic growth to financial development. Thirdly, in the case of the aggregate monetary proxy M2, Granger causality from financial development to economic growth for at least one country is recognized. Granger causality from economic growth to the lagged M2 as a percentage of GDP can also be inferred for at least one of the countries. Finally, it must be pointed out that Granger-causality is recognized for at least one country between trade and financial development, something that is also evident from our PVAR model. No causality is recognized from lagged economic growth to change of total trade as a percentage of GDP.

The fact that Table 13 implies that in at least one country Granger causality between financial development and economic growth exists is totally in accordance with other previous studies. It must be pointed out however that in Table 13, when we apply the Dimirescu & Hurlin (2012) test, Kuwait, Qatar, Lebanon and Jordan are excluded from the sample, as there are some missing observations for GDP growth and the test in STATA requires a balanced panel. Nevertheless, as the test examines the existence of Granger causality for at least one country, the omission of these countries does not affect the outcome. Furthermore, these countries have been checked separately and no causality is found to exist for them in cases where the Dimitrescu-Hurlin test does not indicate causality for the other countries of our set.

On the other hand, the fact that, unlike other proxies commonly used in the literature, no Granger causality is in general inferred when financial development is represented by the IMF's indices may be due to the perplexity of these measures. As we have mentioned, the IMF indices are comprised of a large number of sub-indicators, and their values are obtained through a weighted averaging of all these sub-indicators. Some of these sub-indicators are not representative of financial development in a strict sense but are rather more general indicators which tend to be related to financial development, as for example the "return on equity" indicator. Some of these indicators have relatively small values (e.g. mutual fund assets to GDP or return on equity) for the countries of our sample, as they tend to play a major role in the financial system only in sufficiently financially developed countries.

5.9. Individual VARs and Granger causality

We have shown that generally for at least one of the individual countries in our sample Granger causality between financial development as proxied by some specific variables and economic growth does exist and this can go both ways. In particular, presence of causality is identified from domestic credit to the private sector as a percentage of GDP to economic growth, from M2 as a percentage of GDP to economic growth, and from economic growth to M2 as a percentage of GDP. To examine in which of the countries in our sample a causal relationship causality does exist, Granger causality is examined separately for each country, based on individual VARs. Granger causality tests based on individual VARs are also employed, although for a smaller time period, in the case of the countries excluded from the Dimirescu-Hurlin test due to lack of data (Qatar, Lebanon and Jordan). In general, a problem to our methodology as far as the implementation of individual VARs and the corresponding Granger causality tests are concerned is the relatively small number of observations. As has been previously shown, the optimal lag is 1 and so our VAR is a VAR(1) model.

The results from the country-level Granger causality tests between the proxies of financial development and economic growth are shown in Tables 14-16, one for each variable. The corresponding STATA outputs are included in the appendix section.

Table 14 -Granger causality (individual countries) between M2 and growth

H0-X does not Granger cause Y				
Country	Y	X	p-values	result
Algeria	economic growth	diff.M2 as a % of GDP (lag. 1)	0.069	Weakly Rejecting the H0-X weakly Granger cause Y
Algeria	diff.M2 as a % of GDP	economic growth (lag. 1)	0.355	Not rejecting the H0-X does not Granger cause Y
Bahrain	economic growth	diff.M2 as a % of GDP (lag. 1)	0.783	Not rejecting the H0-X does not Granger cause Y
Bahrain	diff.M2 as a % of GDP	economic growth (lag. 1)	0.605	Not rejecting the H0-X does not Granger cause Y
Egypt	economic growth	diff.M2 as a % of GDP (lag. 1)	0.651	Not rejecting the H0-X does not Granger cause Y
Egypt	diff.M2 as a % of GDP	economic growth (lag. 1)	0.9	Not rejecting the H0-X does not Granger cause Y
Iran	economic growth	diff.M2 as a % of GDP (lag. 1)	0.121	Not rejecting the H0-X does not Granger cause Y
Iran	diff.M2 as a % of GDP	economic growth (lag. 1)	0.009	Rejecting the H0-X does Granger cause Y
Israel	economic growth	diff.M2 as a % of GDP (lag. 1)	0.318	Not rejecting the H0-X does not Granger cause Y

Israel	diff.M2 as a % of GDP	economic growth (lag. 1)	0.45	Not rejecting the H0-X does not Granger cause Y
Jordan	economic growth	diff.M2 as a % of GDP (lag. 1)	0.814	Not rejecting the H0-X does not Granger cause Y
Jordan	diff.M2 as a % of GDP	economic growth (lag. 1)	0.769	Not rejecting the H0-X does not Granger cause Y
Kuwait	economic growth	diff.M2 as a % of GDP (lag. 1)	0.290	Not rejecting the H0-X does not Granger cause Y
Kuwait	diff.M2 as a % of GDP	economic growth (lag. 1)	0.609	Not rejecting the H0-X does not Granger cause Y
Lebanon	economic growth	diff.M2 as a % of GDP (lag. 1)	0.004	Rejecting the H0-X does Granger cause Y
Lebanon	diff.M2 as a % of GDP	economic growth (lag. 1)	0.000	Rejecting the H0-X does Granger cause Y
Morocco	economic growth	diff.M2 as a % of GDP (lag. 1)	0.947	Not rejecting the H0-X does not Granger cause Y
Morocco	diff.M2 as a % of GDP	economic growth (lag. 1)	0.000	Rejecting the H0-X does Granger cause Y
Oman	economic growth	diff.M2 as a % of GDP (lag. 1)	0.039	Rejecting the H0-X does Granger cause Y
Oman	diff.M2 as a % of GDP	economic growth (lag. 1)	0.092	Weakly not rejecting the H0-X weakly does not Granger cause Y
Qatar	economic growth	diff.M2 as a % of GDP (lag. 1)	0.692	Not rejecting the H0-X does not Granger cause Y
Qatar	diff.M2 as a % of GDP	economic growth (lag. 1)	0.965	Not rejecting the H0-X does not Granger cause Y
Tunisia	economic growth	diff.M2 as a % of GDP (lag. 1)	0.568	Not rejecting the H0-X does not Granger cause Y
Tunisia	diff.M2 as a % of GDP	economic growth (lag. 1)	0.948	Not rejecting the H0-X does not Granger cause Y
Turkey	economic growth	diff.M2 as a % of GDP (lag. 1)	0.019	Rejecting the H0-X does Granger cause Y
Turkey	diff.M2 as a % of GDP	economic growth (lag. 1)	0.804	Not rejecting the H0-X does not Granger cause Y
Saudi Arabia	economic growth	diff.M2 as a % of GDP (lag. 1)	0.012	Rejecting the H0-X does Granger cause Y
Saudi Arabia	diff.M2 as a % of GDP	economic growth (lag. 1)	0.274	Not rejecting the H0-X does not Granger cause Y
Sudan	economic growth	diff.M2 as a % of GDP (lag. 1)	0.36	Not rejecting the H0-X does not Granger cause Y
Sudan	diff.M2 as a % of GDP	economic growth (lag. 1)	0.768	Not rejecting the H0-X does not Granger cause Y
UAE	economic growth	diff.M2 as a % of GDP (lag. 1)	0.532	Not rejecting the H0-X does not Granger cause Y
UAE	diff.M2 as a % of GDP	economic growth (lag. 1)	0.966	Not rejecting the H0-X does not Granger cause Y

Table 15 -Granger causality (individual countries) between domestic credit to the private sector and growth

H0-X does not Granger cause Y				
Country	X	Y	p-values	result
Algeria	economic growth	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	0.007	Rejecting the H0-X does Granger cause Y
Algeria	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	economic growth (lag. 1)	0.075	Weakly not rejecting the H0-X weakly Granger causes Y
Bahrain	economic growth	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	0.078	Weakly not rejecting the H0-X weakly Granger causes Y
Bahrain	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	economic growth (lag. 1)	0.882	Not rejecting the H0-X does not Granger cause Y
Egypt	economic growth	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	0.651	Not rejecting the H0-X does not Granger cause Y
Egypt	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	economic growth (lag. 1)	0.90	Not rejecting the H0-X does not Granger cause Y
Iran	economic growth	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	0.121	Not rejecting the H0-X does not Granger cause Y

Iran	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	economic growth (lag. 1)	0.005	Rejecting the H0-X does Granger cause Y
Israel	economic growth	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	0.451	Not rejecting the H0-X does not Granger cause Y
Israel	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	economic growth (lag. 1)	0.128	Not rejecting the H0-X does not Granger cause Y
Jordan	economic growth	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	0.308	Not rejecting the H0-X does not Granger cause Y
Jordan	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	economic growth (lag. 1)	0.997	Not rejecting the H0-X does not Granger cause Y
Kuwait	economic growth	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	0.376	Not rejecting the H0-X does not Granger cause Y
Kuwait	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	economic growth (lag. 1)	0.679	Not rejecting the H0-X does not Granger cause Y
Lebanon	economic growth	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	0.001	Rejecting the H0-X does Granger cause Y
Lebanon	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	economic growth (lag. 1)	0.007	Rejecting the H0-X does Granger cause Y
Morocco	economic growth	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	0.295	Not rejecting the H0-X does not Granger cause Y
Morocco	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	economic growth (lag. 1)	0.005	Rejecting the H0-X does Granger cause Y
Oman	economic growth	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	0.589	Not rejecting the H0-X does not Granger cause Y
Oman	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	economic growth (lag. 1)	0.094	Not rejecting the H0-X does not Granger cause Y
Qatar	economic growth	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	0.012	Rejecting the H0-X does not Granger cause Y
Qatar	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	economic growth (lag. 1)	0.56	Not rejecting the H0-X does not Granger cause Y
Tunisia	economic growth	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	0.026	Rejecting the H0-X does Granger cause Y
Tunisia	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	economic growth (lag. 1)	0.768	Not rejecting the H0-X does not Granger cause Y (weakly)
Turkey	economic growth	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	0.058	Rejecting the H0-X does Granger cause Y (weakly)
Turkey	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	economic growth (lag. 1)	0.178	Not rejecting the H0-X does not Granger cause Y
Saudi Arabia	economic growth	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	0.000	Rejecting the H0-X does Granger cause Y (weakly)
Saudi Arabia	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	economic growth (lag. 1)	0.855	Not rejecting the H0-X does not Granger cause Y
Sudan	economic growth	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	0.36	Not rejecting the H0-X does not Granger cause Y
Sudan	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	economic growth (lag. 1)	0.568	Not rejecting the H0-X does not Granger cause Y
UAE	economic growth	diff.Domestic credit to the private sector as a % of GDP	0.376	Not rejecting the H0-X does not Granger cause Y

		(lag. 1)		
UAE	diff.Domestic credit to the private sector as a % of GDP (lag. 1)	economic growth (lag. 1)	0.679	Not rejecting the H0-X does not Granger cause Y

Table 16-Granger causality (individual countries) between FII and growth

H0-X does not Granger cause Y				
Country	Y	X	p-values	result
Algeria	economic growth	diff.FII(lag. 1)	0.095	Not rejecting the H0-X does not Granger cause Y
Algeria	diff.FII	economic growth (lag. 1)	0.735	Not rejecting the H0-X does not Granger cause Y
Bahrain	economic growth	diff.FII(lag. 1)	0.391	Not rejecting the H0-X does not Granger cause Y
Bahrain	diff.FII	economic growth (lag. 1)	0.816	Not rejecting the H0-X does not Granger cause Y
Egypt	economic growth	diff.FII(lag. 1)	0.088	Not rejecting the H0-X does not Granger cause Y
Egypt	diff.FII	economic growth (lag. 1)	0.045	Rejecting the H0-X does Granger cause Y
Iran	economic growth	diff.FII(lag. 1)	0.815	Not rejecting the H0-X does not Granger cause Y
Iran	diff.FII	economic growth (lag. 1)	0.048	Rejecting the H0-X does Granger cause Y
Israel	economic growth	diff.FII(lag. 1)	0.833	Not rejecting the H0-X does not Granger cause Y
Israel	diff.FII	economic growth (lag. 1)	0.771	Not rejecting the H0-X does not Granger cause Y
Jordan	economic growth	diff.FII(lag. 1)	0.145	Not rejecting the H0-X does not Granger cause Y
Jordan	diff.FII	economic growth (lag. 1)	0.378	Not rejecting the H0-X does not Granger cause Y
Kuwait	economic growth	diff.FII(lag. 1)	0.391	Not rejecting the H0-X does not Granger cause Y
Kuwait	diff.FII	economic growth (lag. 1)	0.816	Not rejecting the H0-X does not Granger cause Y
Lebanon	economic growth	diff.FII(lag. 1)	0.344	Not rejecting the H0-X does Granger cause Y
Lebanon	diff.FII	economic growth (lag. 1)	0.000	Rejecting the H0-X does Granger cause Y
Morocco	economic growth	diff.FII(lag. 1)	0.856	Not rejecting the H0-X does not Granger cause Y
Morocco	diff.FII	economic growth (lag. 1)	0.034	Rejecting the H0-X does Granger cause Y
Oman	economic growth	diff.FII(lag. 1)	0.912	Rejecting the H0-X does Granger cause Y
Oman	diff.FII	economic growth (lag. 1)	0.539	Not rejecting the H0-X does not Granger cause Y
Qatar	economic growth	diff.FII(lag. 1)	0.615	Not rejecting the H0-X does not Granger cause Y
Qatar	diff.FII	economic growth (lag. 1)	0.032	Rejecting the H0-X does Granger cause Y
Tunisia	economic growth	diff.FII(lag. 1)	0.684	Not rejecting the H0-X does not Granger cause Y
Tunisia	diff.FII	economic growth (lag. 1)	0.021	Rejecting the H0-X does Granger cause Y
Turkey	economic growth	diff.FII(lag. 1)	0.656	Not rejecting the H0-X does not Granger cause Y
Turkey	diff.FII	economic growth (lag. 1)	0.567	Not rejecting the H0-X does not Granger cause Y
Saudi Arabia	economic growth	diff.FII(lag. 1)	0.233	Rejecting the H0-X does Granger cause Y
Saudi Arabia	diff.FII	economic growth (lag. 1)	0.374	Not rejecting the H0-X does not Granger cause Y
UAE	economic growth	diff.FII(lag. 1)	0.381	Not rejecting the H0-X does not Granger cause Y
UAE	diff.FII	economic growth (lag. 1)	0.204	Not rejecting the H0-X does not Granger cause Y

From the above tables, when M2 is employed as financial-development proxy, causality from financial development to economic growth seems to exist in the case of Lebanon, Oman, Saudi Arabia and Turkey. In the case of Lebanon, Saudi Arabia, Tunisia, Turkey and Sudan, Domestic credit to the private sector also seems to Granger cause economic growth.

As far as causality from growth to financial-sector development is concerned, such causality is observed in the case of Iran, Lebanon, Qatar and Morocco when we use M2 as a proxy of financial development. When domestic credit to the private sector is employed, causality from growth to financial development can be inferred in the case of Algeria, Oman and Lebanon. Examining the IMF's FII index, causality is shown to exist from growth to FII in the case of Egypt Lebanon, Iraq, Morocco and Tunisia. An interesting point is that for most of the countries in which Granger causality is reported when we use the one proxy of financial development the same relationship can be inferred when we use the other variable. This shows a level of consistency between the variables. Table 17 summarizes the findings mentioned above.

Table 17-Granger causality Financial Development & GDP growth (Summary)

Causality form financial development to economic growth			
countries	M2 as % of GDP	Dom.cred. As % of GDp	FII
Algeria	–	→	–
Bahrain	–	–	–
Egypt	–	–	–
Iran	–	–	–
Israel	–	–	–
Jordan	–	–	–
Kuwait	–	–	–
Lebanon	→	→	–
Morocco	–	–	–
Oman	→	–	–
Qatar	–	→	–
Saudi Arabia	→	→	–
Sudan	–		*
Tunisia	–	→	–
Turkey	→	→	–
Causality form economic growth to financial development			
UAE	–	–	–
Algeria	–	–/←	–
Bahrain	–	–	–
Egypt	–		←
Iran	←	–	←
Israel	–	–	–
Jordan	–	–	–
Kuwait	–	–	–
Lebanon	←	←	←
Morocco	←	←	←
Oman	–	–/←	–
Qatar	–	–	–
Saudi Arabia	–	–	–
Sudan	–	–	*
Tunisia	–	–	←
Turkey	–	–	–
UAE	–	–	–

*Lack of data for FII for Sudan

6. Conclusions

Based on a PVAR framework no evidence has been found suggesting that financial development plays a significant role in promoting economic growth in the MENA countries as a group, at least over the period 1981-2017. The practice of Islamic banking does not seem to enhance the effect of the MENA countries' financial system on economic growth. One reason for the lack of evidence for such a relationship could be that, even though in recent years the financial systems of MENA countries have been subject to drastic reforms, there has been strong control over the financial system for too long. Besides the strict control over the financial system for a long time, the absence of financial liberalization can also be considered an important factor behind our findings.

Indeed, our results support neither the supply-leading hypothesis nor the demand-based hypothesis for the MENA countries as a group. Moreover, for those countries that financial development does play a role, no uniformity has been found as far as the direction of the causality is concerned. In this respect, we can agree neither with the theorists who suggest that finance is an important driving factor of growth (e.g. Levine), nor with those who claim that financial development just follows growth, as Robinson, among others, has suggested. We cannot follow the view of Lucas either, since causality that may go even both ways has been found for some countries.

The most important finding is the lack of uniformity among the countries in our sample. This could be attributed mainly to the fact that levels of financial development may vary across these countries and also to differences in terms of the rates of economic growth. In such a context, using a PVAR model could be one of the reasons that we did not find a causality overall. Indeed, the absence of causality when these countries are considered as a group, and the fact that in some of them a causal relationship does exist while in others does not exist, may question the action of considering the MENA countries typologically as a group.

Of the variables used as proxies for financial development, only *Trade* appears to have an overall positive causal effect on economic growth. And, even in that case, the magnitude of the effect, as reflected in the corresponding coefficients, is small. This again can be attributed to lack of uniformity in the panel, as some of the economies in our sample are known to be in general quite "open" (e.g. Israel), while others are oil-producers and exporters. It could be argued, however, that the *Trade* variable is not associated exclusively with financial development. In fact, given that the other financial indicators used appear to have no significant effect on economic growth in most of the countries, this positive relationship between *Trade* and GDP growth may reflect effects on growth from other sources.

With regard to the IMF's Financial Development Indicators and their sub-indices, the lack of any causality may be due to the perplexity of these measures. Moreover, these indicators seem to be important mostly in the case of western countries, with a well-developed financial systems and stock markets. Yet, until now, these indices have not been extensively used in the literature on economic growth and financial development. At the same time, the fact that we find no causality between the particular indicator strongly associated with the stock markets (FMI) and economic growth supports the view, stated elsewhere in the study, that the stock market does not play an important role in these countries. Indeed, it supports our decision not to employ variables related to the stock market as measures of financial development in the specific country-sample we use.

Of interest is the fact that in the individual VAR models, there are similarities between the behaviour of the different variables showing financial development for several countries.

To summarize, a general short-run relationship between financial development and economic growth for the MENA countries as a group is not found. The PVAR model used to examine this relationship suggests no causality between these two variables. This is based on two different findings. Firstly, that for most of the countries no such causality exists. Secondly, the individual VARs suggest that in some of them causality does exist, but there is no uniformity as far as its direction is concerned.

Moreover, no specific pattern is observed for countries with common characteristics. For example, the sub-group of oil-producing countries does not seem to present any uniformity in the relationship between finance and growth.

The study does not explain the reasons behind the differences in the financial development in these countries. However, tt could be extended in the future to examine these matters, mainly by taking into account effects from exogenous macroeconomic variables, such as human capital, regulatory framework and fiscal policy. This can be achieved by employing an approach not based on a bivariate PVAR model but rather on a growth equation.

References

Abrigo, M. R., & Love, I. (2015). Estimation of panel vector auto regression in Stata: A package of programs. *manuscript, Febr 2015 available on http://paneldataconference2015. ceu. hu/Program/Michael-Abrigo. pdf.*

Achy, L. (2005). Financial liberalization, savings, investment, and growth in MENA countries. In *Money and Finance in the Middle East: Missed Opportunities or Future Prospects?* (pp. 67-94). Emerald Group Publishing Limited.

Akbas, Y. E. (2015). Financial development and economic growth in emerging market: bootstrap panel causality analysis. *Theoretical & Applied Economics*, *22*(3).

Al-Awad, M., & Harb, N. (2005). Financial development and economic growth in the Middle East. *Applied Financial Economics*, *15*(15), 1041-1051.

Alecke, B., Mitze, T., & Untiedt, G. (2010). Internal migration, regional labour market dynamics and implications for German East-West disparities: results from a Panel VAR. *Jahrbuch für Regionalwissenschaft*, *30*(2), 159-189.

Al-Tamimi, H. A. H., Al-Awad, M., & Charif, H. A. (2002). Finance and growth: evidence from some Arab countries. *Journal of Transnational Management Development*, *7*(2), 3-18.

Al-Yousif, Y. K. (2002). Financial development and economic growth: another look at the evidence from developing countries. *Review of Financial Economics*, *11*(2), 131-150.

Andersen, T. B., & Tarp, F. (2003). Financial liberalization, financial development and economic growth in LDCs. *Journal of international development*, *15*(2), 189

Andrews, D. W., & Lu, B. (2001). Consistent model and moment selection procedures for GMM estimation with application to dynamic panel data models. *Journal of Econometrics*, *101*(1), 123-164.

Arestis, P., & Demetriades, P. (1997). Financial development and economic growth: assessing the evidence. *The Economic Journal*, *107*(442), 783-799.

Arestis, P., Demetriades, P. O., & Luintel, K. B. (2001). Financial development and economic growth: the role of stock markets. *Journal of money, credit and banking*, 16-41.

Assa, J. (2012). Financialization and its consequences: The OECD experience. *Finance Research*, *1*(1), 35-39.

Bagehot W. (1872), *Lombart Street*, Wiles Investment Classics, John Willey & Sons, New York-London

Bara, A., Mugano, G., & Le Roux, P. (2016). Financial innovation and economic growth in the SADC. *African Journal of Science, Technology, Innovation and Development*, *8*(5-6), 483-495.

Barro R. & Sala-i-Martin X. (2003), *Economic Growth 2nd Edition*, Cambridge, Mass.; The MIT Press

Baltagi B. (2008), *Econometric Analysis of Panrl Data*; New York; Wiley and Sons

Baum, C., (2006), *An Introduction to Modern Econometrics Using Stata, Stata Press*

Beck, T., & Levine, R. (2004). Stock markets, banks, and growth: Panel evidence. *Journal of Banking & Finance*, *28*(3), 423-442.

Beck, T., Levine, R., & Loayza, N. (2000). Finance and the Sources of Growth. *Journal of financial economics*, *58*(1), 261-300.

Beck, T. (2002). Financial development and international trade: Is there a link?. *Journal of international Economics*, *57*(1), 107-131.

Beck, T. (2003). Financial dependence and international trade. *Review of International Economics*, *11*(2), 296-

316.
Bekaert, G., Harvey, C. R., & Lundblad, C. (2005). Does financial liberalization spur growth? *Journal of Financial economics*, *77*(1), 3-55.
Bellinger, D., (2015). A p-var model built on the Ricardian approach to deficits in central and eastern Europe. *Ecoforum Journal*, *4*
Ben Naceur, S., & Goaied, M. (2008). The determinants of commercial bank interest margin and profitability: evidence from Tunisia, Working Paper IMF
Benhabib, J., & Spiegel, M. M. (2000). The role of financial development in growth and investment. *Journal of economic growth*, *5*(4), 341-360.
Bertrand, M., Schoar, A., & Thesmar, D. (2007). Banking deregulation and industry structure: Evidence from the French banking reforms of 1985. The Journal of Finance, 62(2), 597-628.
Benhabib, J., & Spiegel, M. M. (2000). The role of financial development in growth and investment. *Journal of economic growth*, *5*(4), 341-360.
Boulila, G., & Trabelsi, M. (2004). The causality issue in the finance and growth nexus: empirical evidence from Middle East and North African countries. Review of Middle East Economics and Finance, 2(2), 123-138.
Calderón, C., & Liu, L. (2003). The direction of causality between financial development and economic growth. Journal of development economics, 72(1), 321-334.
Cameron, R., Crisp, O., Patrick, H., Tilly, R. (1967), Banking In The Early Stages of Industrialization A Study In Comparative Economic History, London: Oxford University Press
Canova, F., & Ciccarelli, M. (2013). Panel Vector Autoregressive Models: A Survey, In VAR Models in Macroeconomics–New Developments and Applications: Essays in Honour of Christopher A. Sims (pp. 205-246). Emerald Group Publishing Limited
Canova, F., & Pina, J. P. (1999). Monetary Policy Misspecification in VAR Models (No. 2333). CEPR Discussion Papers.
Cecchetti, S., & Kharroubi, E. (2015). Why does financial sector growth crowd out real economic growth? (No. 10642). CEPR Discussion Papers.
Cetorelli, Nicola, and Michele Gambera. "Banking market structure, financial dependence and growth: International evidence from industry data." The Journal of Finance 56.2 (2001): 617-648.
Chakraborty, S., & Ray, T. (2006). Bank-based versus market-based financial systems: A growth-theoretic analysis. Journal of Monetary Economics, 53(2), 329-350.
Christopoulos, D. K., & Tsionas, E. G. (2004). Financial development and economic growth: evidence from panel unit root and cointegration tests. *Journal of development Economics*, *73*(1), 55-74.
Choi Z., (2007), Academic presentation for the module “Experimental Econometrics”, BSc in Economics, Department of Economics, UCL
Choong, C. K., & Chan, S. G. (2011). Financial development and Economic growth: A review. African Journal of Business Management, 5(6), 2017-2027.
Christopoulos, D. K., & Tsionas, E. G. (2004). Financial development and economic growth: evidence from panel unit root and cointegration tests. Journal of development Economics, 73(1), 55-74.
Cohn T. (2009), International Political Economy, Gutenberg (in Greek)
Cooley, T. F., & LeRoy, S. F. (1985). Atheoretical macroeconometrics: a critique. Journal of Monetary Economics, 16(3), 283-308.

De Gregorio, J., & Guidotti, P. E. (1995). Financial development and economic growth. World development, 23(3), 433-448.

Demetriades, P. O., & Hussein, K. A. (1996). Does financial development cause economic growth? Time-series evidence from 16 countries. Journal of development Economics, 51(2), 387-411.

Diamond, D. W., & Dybvig, P. H. (1983). Bank runs, deposit insurance, and liquidity. Journal of political economy, 91(3), 401-419.

Dimeli, S. (2013), Modern Methods of Time Series Analysis,3rd edition, Athens University of Economics and Business, Athens (in Greek)

Dritsakis, N., & Adamopoulos, A. (2004). Financial development and economic growth in Greece: An empirical investigation with Granger causality analysis. International Economic Journal, 18(4), 547-559.

Dumitrescu, E. I., & Hurlin, C. (2012). Testing for Granger non-causality in heterogeneous panels. Economic Modelling, 29(4), 1450-1460.

Epstein, G. (2001). Financialization, rentier interests, and central bank policy. manuscript, Department of Economics, University of Massachusetts, Amherst, MA, December.

Epstein, G. (2001). Financialization, rentier interests, and central bank policy. Manuscript, Department of Economics, University of Massachusetts, Amherst, MA, December.

Fama, E. F. (1980). Banking in the Theory of Finance. Journal of monetary economics, 6(1), 39-57.

Farhani, S., & Ozturk, I. (2015). Causal relationship between CO 2 emissions, real GDP, energy consumption, financial development, trade openness, and urbanization in Tunisia. *Environmental Science and Pollution Research*, *22*(20), 15663-15676.

Faust, J., & Leeper, E. M. (1997). When do long-run identifying restrictions give reliable results? Journal of Business & Economic Statistics, 15(3), 345-353.

Fornari, F., & Stracca, L. (2013). What does a financial shock do? First international evidence, ECB Working Paper

Friedman, M., & Schwartz, A. (1963). A monetary history of the United States, Princeton University Press

García-Páez, B. (2012). Theoretical Discussion of the Financial Liberalization: The Political Economy of a Policy's Paradox. International Journal of Economics and Finance, 4(7), 33.

Fornari, F., & Stracca, L. (2013). What does a financial shock do? First international evidence, ECB Working Paper

Gartner M. (2013), *Macroeconomics*, Pearson (2017).

Galbis, V. (1980). Financial intermediation and economic growth in less developed countries: A theoretical approach. In *Money and Monetary Policy in Less Developed Countries* (pp. 71-84).

Goldsmith, R. W. (1969). *Financial structure and development* (No. HG174 G57).

Granger, C. W. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: Journal of the Econometric Society*, 424-438.

Guiso, L., Sapienza, P., & Zingales, L. (2009). Does local financial development matter? In *The Banks and the Italian Economy* (pp. 31-66). Physica-Verlag HD

Gürsoy, C. T., & Al-Aali, H. (2000). Causal relationships between financial and economic development in Gulf countries.

Haber, S. H. (Ed.). (1997), *Essays on the Economic Histories of Brazil and Mexico, 1800-1914*. Stanford University Press.

Hall, B. H., & Mairesse, J. (2001). Testing for Unit Roots in Panel Data: An Exploration Using Real and

Simulated Data, processed. *University of California Berkeley*.

Hammond B., (1957), *Banks and Politics in America from the Revolution to the Civil War*, Princeton University Press

Hansen, L. P. (1982). Large sample properties of generalized method of moments estimators. *Econometrica: Journal of the Econometric Society*, 1029-1054.

Hassan, M. K., Sanchez, B., & Yu, J. S. (2011). Financial development and economic growth: New evidence from panel data. *The Quarterly Review of economics and finance*, *51*(1), 88-104.

Holtz, E. D., Newey, W., & Rosen, H. (1988). Estimating Vector Autoregression with Panel Data. *Econometrica*, *56*(6), 1371-1395.

Hondroyiannis, G., Lolos, S., & Papapetrou, E. (2005). Financial markets and economic growth in Greece, 1986–1999. *Journal of International Financial Markets, Institutions and Money*, *15*(2), 173-188.

Hondroyiannis G., Papapetrou E., Macroeconomic influences on the stock market." *Journal of Economics and Finance* 25, no. 1 (2001): 33-49.

Hurlin C., (2010), Linear Panel Models and Heterogeneity, Academic Presentation for MSc in Economics, University of Geneva

Hurlin, C. (2004). Testing Granger causality in heterogeneous panel data models with fixed coefficients. *Document de recherche LEO, 5*.

Imam, P. A., & Kpodar, K. (2015). *Is Islamic Banking Good for Growth?* (No. 15-81). International Monetary Fund.

Jappelli, T., & Pagano, M. (1994). Saving, growth, and liquidity constraints. *The Quarterly Journal of Economics*, *109*(1), 83-109.

Jayaratne, J., & Strahan, P. E. (1996). The finance-growth nexus: Evidence from bank branch deregulation. *The Quarterly Journal of Economics*, *111*(3), 639-670.

Jones, C., & Vollrath, D. (2013)., *Introduction to Economic Growth*, WW Norton & Co.

Kapur, B. K. (1976). Alternative stabilization policies for less-developed economies. *Journal of Political Economy*, *84*(4, Part 1), 777-795.

Kar, M., Nazlıoğlu, Ş., & Ağır, H. (2011). Financial development and economic growth nexus in the MENA countries: Bootstrap panel granger causality analysis. *Economic modelling*, *28*(1), 685-693.

Kenourgios, D., & Samitas, A. (2007). Financial development and economic growth in a transition economy: evidence for Poland. Journal of Financial Decision Making, 3(1), 35-48.

King, R. G., & Levine, R. (1993). Finance and growth: Schumpeter might be right. *The quarterly journal of economics*, *108*(3), 717-737.

King, R. G., & Levine, R. (1993). Financial intermediation and economic development. *Capital markets and financial intermediation*, 156-189.

Kónya, L. (2006). Exports and growth: Granger causality analysis on OECD countries with a panel data approach. *Economic Modelling*, *2*

Kunst, R., Nell, C., & Zimmermann, S. (2017). Summary Based on Chapter 12 of Baltagi: Panel Unit Root Tests. PhDCourse: Panel data, University of Vienna.

Lahcen, A. C. H. Y. (2004). Financial liberalization, saving, investment and growth in MENA countries (No. 0411004).

Lapavitsas, C. (2009). Financialization embroils developing countries. *Papeles de Europa*, *19*, 108.

Levine, R. (1997). Financial development and economic growth: views and agenda. *Journal of economic literature*, *35*(2), 688-726.

Levine, R. (1998). The legal environment, banks, and long-run economic growth. *Journal of money, credit and banking*, 596-613.

Levine, R. (2005). Finance and growth: theory and evidence. *Handbook of economic growth*, *1*, 865-934.

Levine, R., & Zervos, S. (1998). Stock markets, banks, and economic growth. *American economic review*, 537-558.

Levine, R., Loayza, N., & Beck, T. (2000). Financial intermediation and growth: Causality and causes. *Journal of monetary Economics*, *46*(1), 31-77.

Loayza, N. V., & Ranciere, R. (2006). Financial development, financial fragility, and growth. *Journal of Money, Credit and Banking*, 1051-1076.

Lopez, L., & Weber, S. (2017). Testing for Granger causality in panel data. *Stata Journal*, *17*(4), 972-984.

Love, I. (2003). Financial development and financing constraints: International evidence from the structural investment model. *The Review of Financial Studies*, *16*(3), 765-791.

Love I., Panel VAR: Methods and application, Presentation

Lucas, R. E. (1976, January). Econometric policy evaluation: A critique. In *Carnegie-Rochester conference series on public policy* (Vol. 1, pp. 19-46). North-Holland.

Maddala, G. S., & Wu, S. (1999). A comparative study of unit root tests with panel data and a new simple test. Oxford Bulletin of Economics and statistics, 61(S1), 631-652.

Mathieson, D. J. (1980). Financial reform and stabilization policy in a developing economy. *Journal of development economics*, *7*(3), 359-395.

McKinnon, R., & Shaw, E. (1973). Financial deepening in economic development. Washington, Brookings Institution.

Mitze, T. (2012). A Panel VAR Approach for Internal Migration Modelling and Regional Labor Market Dynamics in Germany. In *Empirical Modelling in Regional Science* (pp. 19-52). Springer, Berlin, Heidelberg.

Naceur, S. B., Ghazouani, S., & Omran, M. (2008). Does stock market liberalization spur financial and economic development in the MENA region? *Journal of Comparative Economics*, *36*(4), 673-693.

Nell, C., & Zimmermann, S. (2011). Panel Unit Root Tests Term Paper at the Department of Economics at University of Vienna, PhD Course: Panel Data.

Neusser, K., & Kugler, M. (1998). Manufacturing growth and financial development: evidence from OECD countries. *The Review of Economics and Statistics*, *80*(4), 638-646.

Noland, M. (2003). Religion, culture, and economic performance, Institute of International Economics Working Paper

Olgu, Ö. (Ed.). (2014). *Handbook of research on strategic developments and regulatory practice in global finance*. IGI Global.

Pill, H., & Pradhan, M. (1995). *Financial indicators and financial change in Africa and Asia* (No. 95-123). International Monetary Fund.

Pill, H., & Pradhan, M. (1997). Financial liberalization in Africa and Asia. *Finance and Development*, *34*(2), 7.

Porta, R. L., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1998). Law and finance. *Journal of political economy*, *106*(6), 1113-1155.

Rajan, R. G., & Zingales, L. (1998). Financial Dependence and Growth. *The American Economic Review*, *88*(3), 559-586.

Ray, T. (2010). Financial Development and Economic Growth: A Review of Literature. (academic presentation)

Robinson, J. (1979). *The generalisation of the general theory and other essays*. Springer.
Rioja, F., & Valev, N. (2004). Finance and the sources of growth at various stages of economic development. *Economic Inquiry*, *42*(1), 127-140.
Rousseau, P. L., & Sylla, R. (2003). Financial systems, economic growth, and globalization. In *Globalization in historical perspective* (pp. 373-416). University of Chicago Press.
Rousseau, P. L., & Wachtel, P. (2000). Equity markets and growth: cross-country evidence on timing and outcomes, 1980–1995. *Journal of Banking & Finance*, *24*(12), 1933-1957.
Sahay, M. R., Cihak, M., N'Diaye, M. P. M., Barajas, M. A., Pena, M. D. B. A., Bi, R., & Nguyen, L. (2016). *Rethinking Financial Deepening: Stability and Growth in Emerging Markets*. International Monetary Fund.
Springler, E. (2005). Financial Liberalization, Stock Markets and Growth in Economies with Underdeveloped Financial Markets. *European Political Economy Review*, *3*(Winter), 53-86.
Stern, N. (1989). The economics of development: a survey. *The Economic Journal*, *99*(397), 597-685.
Stiglitz, J. E. (1985). Credit markets and the control of capital. *Journal of Money, credit and Banking*, *17*(2), 133-152.
Stockhammer, E. (2004). Financialisation and the slowdown of accumulation. *Cambridge Journal of Economics*, *28*(5), 719-741
Svirydzenka, K. (2016). *Introducing a new broad-based index of financial development*. International Monetary Fund.
Vaitsos K., (2009), *Principles of Development Economics*, Kritiki (in Greek)
Wachtel, P. (2001). Growth and Finance: What do we know and how do we know it?. *International Finance*, *4*(3), 335-362.
Wang, E. C. (1999). A production function approach for analyzing the finance-growth nexus: the evidence from Taiwan. *Journal of Asian Economics*, *10*(2), 319-328.
Weil, D., (2009), *Economic Growth, 2nd Edition,* Pearson Addison Weasley
Wurgler, J. (2000). Financial markets and the allocation of capital. *Journal of financial economics*, *58*(1), 187-214.
Xu, Z. (2000). Financial development, investment, and economic growth. *Economic Inquiry*, *38*(2), 331-344.
Yao, Y. (2011). Financial Intermediation Development and Total Factor Productivity Growth: Evidence from Chinese Mainland Provincial Panel Data. *Modern Economy*, *2*(05), 868.
Zijie, Zhou Maorong1 Zhang. "On the Hidden Links between Trade and Financial Openness: An Empirical Test Based on a PVAR Model [J]." *Finance & Economics 3 (*2010): 005.
www.Imfdata-financialstatistics.com
www.investopedia.com
www.worldbank.com
www.tradingeconomics.com

Appendix

1. Unit root tests & corresponding graphs

a.Tables

Table 1-Levin-Lin-Chu Test for stationarity of real GDP

```
Levin-Lin-Chu unit-root test for GDPconstprices
-----------------------------------------------
Ho: Panels contain unit roots              Number of panels  =     10
Ha: Panels are stationary                  Number of periods =     35

AR parameter: Common                       Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Included

ADF regressions: 0.40 lags average (chosen by AIC)
LR variance:     Bartlett kernel, 10.00 lags average (chosen by LLC)
------------------------------------------------------------------------------
                    Statistic      p-value
------------------------------------------------------------------------------
 Unadjusted t        -3.5348
 Adjusted t*         -0.5475        0.2920
------------------------------------------------------------------------------
```

Table 2-Im-Pesaran-Shim Test for stationarity of   real GDP

```
Im-Pesaran-Shin unit-root test for GDPconstprices
-------------------------------------------------
Ho: All panels contain unit roots          Number of panels  =     10
Ha: Some panels are stationary             Number of periods =     35

AR parameter: Panel-specific               Asymptotics: T,N -> Infinity
Panel means:  Included                                      sequentially
Time trend:   Included

ADF regressions: 0.40 lags average (chosen by AIC)
------------------------------------------------------------------------------
                    Statistic      p-value
------------------------------------------------------------------------------
 W-t-bar              4.0074        1.0000
------------------------------------------------------------------------------
```

Table 3-Fisher Type Test for stationarity of real GDP

```
Fisher-type unit-root test for GDPconstprices
Based on augmented Dickey-Fuller tests
---------------------------------------------
Ho: All panels contain unit roots          Number of panels  =     10
Ha: At least one panel is stationary       Number of periods =     35

AR parameter: Panel-specific               Asymptotics: T -> Infinity
Panel means:  Included
Time trend:   Included
Drift term:   Not included                 ADF regressions: 0 lags
------------------------------------------------------------------------------
                                  Statistic      p-value
------------------------------------------------------------------------------
 Inverse chi-squared(20)   P         5.1781       0.9996
 Inverse normal            Z         4.1814       1.0000
 Inverse logit t(54)       L*        4.4713       1.0000
 Modified inv. chi-squared Pm       -2.3436       0.9904
------------------------------------------------------------------------------
 P statistic requires number of panels to be finite.
 Other statistics are suitable for finite or infinite number of panels.
------------------------------------------------------------------------------
```

Table 4-Levin-Lin-Chu Test for stationarity of real GDP Growth

```
Levin-Lin-Chu unit-root test for D.GDPconstprices
-------------------------------------------------
Ho: Panels contain unit roots              Number of panels  =     10
Ha: Panels are stationary                  Number of periods =     34

AR parameter: Common                       Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Included

ADF regressions: 0.60 lags average (chosen by AIC)
LR variance:     Bartlett kernel, 10.00 lags average (chosen by LLC)
------------------------------------------------------------------------------
                    Statistic      p-value
------------------------------------------------------------------------------
 Unadjusted t       -14.5166
 Adjusted t*         -8.7898        0.0000
------------------------------------------------------------------------------
```

Table 5-Im-Pesaran-Shim Test for stationarity of the differences of real GDP Growth

```
Im-Pesaran-Shin unit-root test for D.GDPconstprices
---------------------------------------------------
Ho: All panels contain unit roots           Number of panels  =     10
Ha: Some panels are stationary              Number of periods =     34

AR parameter: Panel-specific                Asymptotics: T,N -> Infinity
Panel means:  Included                                        sequentially
Time trend:   Included

ADF regressions: 0.60 lags average (chosen by AIC)
------------------------------------------------------------------------------
                    Statistic      p-value
------------------------------------------------------------------------------
 W-t-bar             -8.1796        0.0000
------------------------------------------------------------------------------
```

Table 6-Fisher Type Test for stationarity of the differences of real GDP Growth

```
Fisher-type unit-root test for D.GDPconstprices
Based on augmented Dickey-Fuller tests
-----------------------------------------------
Ho: All panels contain unit roots           Number of panels  =     10
Ha: At least one panel is stationary        Number of periods =     34

AR parameter: Panel-specific                Asymptotics: T -> Infinity
Panel means:  Included
Time trend:   Included
Drift term:   Not included                  ADF regressions: 0 lags
------------------------------------------------------------------------------
                                  Statistic      p-value
------------------------------------------------------------------------------
 Inverse chi-squared(20)   P       194.7990       0.0000
 Inverse normal            Z       -10.8490       0.0000
 Inverse logit t(54)       L*      -17.0984       0.0000
 Modified inv. chi-squared Pm       27.6382       0.0000
------------------------------------------------------------------------------
 P statistic requires number of panels to be finite.
 Other statistics are suitable for finite or infinite number of panels.
------------------------------------------------------------------------------
```

Table 7- Levin-Lin-Chu Test for stationarity of Domestic credit to private sector as % of GDP

```
Levin-Lin-Chu unit-root test for DOMESTICCREDITtoprivatesector
--------------------------------------------------------------
Ho: Panels contain unit roots               Number of panels  =     16
Ha: Panels are stationary                   Number of periods =     35

AR parameter: Common                        Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 0.56 lags average (chosen by AIC)
LR variance:     Bartlett kernel, 10.00 lags average (chosen by LLC)
------------------------------------------------------------------------------
                    Statistic      p-value
------------------------------------------------------------------------------
 Unadjusted t        -2.4007
 Adjusted t*          1.7130        0.9566
------------------------------------------------------------------------------
```

Table 8-Im-Pesara-Shim Test for stationary of Domestic credit to private sector as % of GDP

```
Im-Pesaran-Shin unit-root test for DOMESTICCREDITtoprivatesector
----------------------------------------------------------------
Ho: All panels contain unit roots           Number of panels  =     16
Ha: Some panels are stationary              Number of periods =     35

AR parameter: Panel-specific                Asymptotics: T,N -> Infinity
Panel means:  Included                                        sequentially
Time trend:   Not included

ADF regressions: 0.56 lags average (chosen by AIC)
------------------------------------------------------------------------------
                    Statistic      p-value
------------------------------------------------------------------------------
 W-t-bar              2.0651        0.9805
------------------------------------------------------------------------------
```

Table 9-Fisher type Test for stationary of Domestic credit to private sector as % of GDP

```
Fisher-type unit-root test for DOMESTICCREDITtoprivatesector
Based on augmented Dickey-Fuller tests
------------------------------------------------------------
Ho: All panels contain unit roots           Number of panels  =     16
Ha: At least one panel is stationary        Number of periods =     35

AR parameter: Panel-specific                Asymptotics: T -> Infinity
Panel means:  Included
Time trend:   Not included
Drift term:   Not included                  ADF regressions: 0 lags
------------------------------------------------------------------------------
                                  Statistic      p-value
------------------------------------------------------------------------------
 Inverse chi-squared(32)   P        24.5994       0.8219
 Inverse normal            Z         1.0178       0.8456
 Inverse logit t(79)       L*        1.0543       0.8525
 Modified inv. chi-squared Pm       -0.9251       0.8225
------------------------------------------------------------------------------
 P statistic requires number of panels to be finite.
 Other statistics are suitable for finite or infinite number of panels.
------------------------------------------------------------------------------
```

Table 10-Levin-Lin-Chu Test for stationarity of the first differences of Domestic credit to private sector as % of GDP

ADF regressions: 0.75 lags average (chosen by AIC)
LR variance: Bartlett kernel, 10.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-16.1285	
Adjusted t*	-10.8742	0.0000

Table 11- Im-Pesaran-Shim Test for stationarity of the first differences of Domestic credit to private sector as % of GDP

Im-Pesaran-Shin unit-root test for D.DOMESTICCREDITtoprivatesector

Ho: All panels contain unit roots — Number of panels = 16
Ha: Some panels are stationary — Number of periods = 34

AR parameter: Panel-specific — Asymptotics: T,N -> Infinity sequentially
Panel means: Included
Time trend: Not included

ADF regressions: 0.75 lags average (chosen by AIC)

	Statistic	p-value
W-t-bar	-12.0995	0.0000

Table 12- Fisher type Test for stationarity of the first differences of Domestic credit to private sector as % of GDP

Fisher-type unit-root test for D.DOMESTICCREDITtoprivatesector
Based on augmented Dickey-Fuller tests

Ho: All panels contain unit roots — Number of panels = 16
Ha: At least one panel is stationary — Number of periods = 34

AR parameter: Panel-specific — Asymptotics: T -> Infinity
Panel means: Included
Time trend: Not included
Drift term: Not included — ADF regressions: 0 lags

		Statistic	p-value
Inverse chi-squared(32)	P	332.1396	0.0000
Inverse normal	Z	-15.5608	0.0000
Inverse logit t(84)	L*	-23.0258	0.0000
Modified inv. chi-squared	Pm	37.5174	0.0000

P statistic requires number of panels to be finite.
Other statistics are suitable for finite or infinite number of panels.

Table 13-Levin-Lin-Chu Test for stationary of M2 as a % to GDP

Levin-Lin-Chu unit-root test for m2GDP

Ho: Panels contain unit roots — Number of panels = 16
Ha: Panels are stationary — Number of periods = 35

AR parameter: Common — Asymptotics: N/T -> 0
Panel means: Included
Time trend: Not included

ADF regressions: 0.50 lags average (chosen by AIC)
LR variance: Bartlett kernel, 10.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-4.0395	
Adjusted t*	-0.4891	0.3124

Table 14-Im-Pesaran-Shim Test for stationary of M2 as a % to GDP

Im-Pesaran-Shin unit-root test for m2GDP

Ho: All panels contain unit roots — Number of panels = 16
Ha: Some panels are stationary — Number of periods = 35

AR parameter: Panel-specific — Asymptotics: T,N -> Infinity sequentially
Panel means: Included
Time trend: Not included

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-1.0304	0.1514

Table 15-Levin-Lin-Chu Test for stationarity of the first differences of M2 as a % to GDP

Levin-Lin-Chu unit-root test for D.m2GDP

Ho: Panels contain unit roots — Number of panels = 16
Ha: Panels are stationary — Number of periods = 34

AR parameter: Common — Asymptotics: N/T -> 0
Panel means: Included
Time trend: Included

ADF regressions: 0.38 lags average (chosen by AIC)
LR variance: Bartlett kernel, 10.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-22.8419	
Adjusted t*	-16.3134	0.0000

Table 16- Im-Pesaran-Shim for stationary of the first differences of M2 as a % to GDP

```
Im-Pesaran-Shin unit-root test for D.m2GDP

Ho: All panels contain unit roots           Number of panels  =     16
Ha: Some panels are stationary              Number of periods =     34

AR parameter: Panel-specific                Asymptotics: T,N -> Infinity
Panel means:  Included                                         sequentially
Time trend:   Included

ADF regressions: 0.38 lags average (chosen by AIC)
```

	Statistic	p-value
W-t-bar	-16.5342	0.0000

Table 17- Fisher type test for stationary of the first differences of M2 as a % to GDP

```
Fisher-type unit-root test for m2GDP
Based on augmented Dickey-Fuller tests

Ho: All panels contain unit roots           Number of panels  =     16
Ha: At least one panel is stationary        Number of periods =     35

AR parameter: Panel-specific                Asymptotics: T -> Infinity
Panel means:  Included
Time trend:   Not included
Drift term:   Not included                  ADF regressions: 1 lag
```

		Statistic	p-value
Inverse chi-squared(32)	P	52.6843	0.0121
Inverse normal	Z	-1.2723	0.1016
Inverse logit t(84)	L*	-1.2568	0.1061
Modified inv. chi-squared	Pm	2.5855	0.0049

P statistic requires number of panels to be finite.
Other statistics are suitable for finite or infinite number of panels.

Table 18-Levin-Lin-Chu Test for stationarity of FMI

```
Levin-Lin-Chu unit-root test for FMI

Ho: Panels contain unit roots               Number of panels  =     15
Ha: Panels are stationary                   Number of periods =     35

AR parameter: Common                        Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Included

ADF regressions: 1.00 lags average (chosen by AIC)
LR variance:     Bartlett kernel, 10.00 lags average (chosen by LLC)
```

	Statistic	p-value
Unadjusted t	-9.7853	
Adjusted t*	-2.2080	0.0136

Table 19-Im-Pesaran-Shin Test for stationarity of FMI

```
Im-Pesaran-Shin unit-root test for FII

Ho: All panels contain unit roots           Number of panels  =     13
Ha: Some panels are stationary              Number of periods =     34

AR parameter: Panel-specific                Asymptotics: T,N -> Infinity
Panel means:  Included                                         sequentially
Time trend:   Not included

ADF regressions: No lags included
```

			Fixed-N exact critical values		
	Statistic	p-value	1%	5%	10%
t-bar	-1.1937		-2.040	-1.900	-1.810
t-tilde-bar	-1.1252				
Z-t-tilde-bar	1.4696	0.9292			

Table 20-Fisher-Type Test for stationarity of FMI

```
Fisher-type unit-root test for FMI
Based on augmented Dickey-Fuller tests

Ho: All panels contain unit roots           Number of panels  =     15
Ha: At least one panel is stationary        Number of periods =     35

AR parameter: Panel-specific                Asymptotics: T -> Infinity
Panel means:  Included
Time trend:   Included
Drift term:   Not included                  ADF regressions: 0 lags
```

		Statistic	p-value
Inverse chi-squared(30)	P	31.2487	0.4033
Inverse normal	Z	-0.1995	0.4209
Inverse logit t(79)	L*	-0.2754	0.3919
Modified inv. chi-squared	Pm	0.1612	0.4360

P statistic requires number of panels to be finite.
Other statistics are suitable for finite or infinite number of panels.

Table 21-Levin-Lin-Chu Test for stationarity of FII

Levin-Lin-Chu unit-root test for FII

Ho: Panels contain unit roots — Number of panels = 15
Ha: Panels are stationary — Number of periods = 35

AR parameter: Common — Asymptotics: N/T -> 0
Panel means: Included
Time trend: Included

ADF regressions: 0.47 lags average (chosen by AIC)
LR variance: Bartlett kernel, 10.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-8.7380	
Adjusted t*	-3.4803	0.0003

Table 22-Im-Pesaran-Shim Test for stationarity of FII

Im-Pesaran-Shin unit-root test for FII

Ho: All panels contain unit roots — Number of panels = 13
Ha: Some panels are stationary — Number of periods = 34

AR parameter: Panel-specific — Asymptotics: T,N -> Infinity sequentially
Panel means: Included
Time trend: Not included

ADF regressions: No lags included

	Statistic	p-value	Fixed-N exact critical values 1%	5%	10%
t-bar	-1.1937		-2.040	-1.900	-1.810
t-tilde-bar	-1.1252				
Z-t-tilde-bar	1.4696	0.9292			

Table 23-Fisher-Type Test for stationarity of FII

Fisher-type unit-root test for FII
Based on augmented Dickey-Fuller tests

Ho: All panels contain unit roots — Number of panels = 15
Ha: At least one panel is stationary — Number of periods = 35

AR parameter: Panel-specific — Asymptotics: T -> Infinity
Panel means: Included
Time trend: Included
Drift term: Not included — ADF regressions: 0 lags

		Statistic	p-value
Inverse chi-squared(30)	P	48.6716	0.0170
Inverse normal	Z	-1.2144	0.1123
Inverse logit t(79)	L*	-1.5093	0.0676
Modified inv. chi-squared	Pm	2.4105	0.0080

P statistic requires number of panels to be finite.
Other statistics are suitable for finite or infinite number of panels.

Table 24-Levin-Lin-Chu Test for stationarity of FDI

Levin-Lin-Chu unit-root test for FDI

Ho: Panels contain unit roots — Number of panels = 16
Ha: Panels are stationary — Number of periods = 34

AR parameter: Common — Asymptotics: N/T -> 0
Panel means: Included
Time trend: Not included

ADF regressions: 2 lags
LR variance: Bartlett kernel, 10.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-4.0715	
Adjusted t*	-0.3557	0.3610

Table 25-Im-Pesaran-Shim Test for stationarity of FDI

Im-Pesaran-Shin unit-root test for FDI

Ho: All panels contain unit roots — Number of panels = 13
Ha: Some panels are stationary — Number of periods = 34

AR parameter: Panel-specific — Asymptotics: T,N -> Infinity sequentially
Panel means: Included
Time trend: Not included

ADF regressions: No lags included

	Statistic	p-value	Fixed-N exact critical values 1%	5%	10%
t-bar	-1.2042		-2.040	-1.900	-1.810
t-tilde-bar	-1.1611				
Z-t-tilde-bar	1.3066	0.9043			

Table 26-Fisher Type Test for stationarity of FDI

Fisher-type unit-root test for FDI
Based on augmented Dickey-Fuller tests

Ho: All panels contain unit roots — Number of panels = 16
Ha: At least one panel is stationary — Number of periods = 34

AR parameter: Panel-specific — Asymptotics: T -> Infinity
Panel means: Included
Time trend: Not included
Drift term: Not included — ADF regressions: 0 lags

		Statistic	p-value
Inverse chi-squared(32)	P	22.5537	0.8919
Inverse normal	Z	1.2229	0.8893
Inverse logit t(84)	L*	1.2111	0.8854
Modified inv. chi-squared	Pm	-1.1808	0.8812

P statistic requires number of panels to be finite.
Other statistics are suitable for finite or infinite number of panels.

Table 27- Levin-Lin-Chu Test for stationarity of the First differences of FDI

Levin-Lin-Chu unit-root test for DifFDI

Ho: Panels contain unit roots — Number of panels = 16
Ha: Panels are stationary — Number of periods = 33

AR parameter: Common — Asymptotics: N/T -> 0
Panel means: Included
Time trend: Not included

ADF regressions: 1 lag
LR variance: Bartlett kernel, 10.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-16.7887	
Adjusted t*	-9.8394	0.0000

Table 28- Im-Pesaran-Sim Test for stationarity of the first differences of FDI

. xtunitroot ips DifFDI

Im-Pesaran-Shin unit-root test for DifFDI

Ho: All panels contain unit roots — Number of panels = 16
Ha: Some panels are stationary — Number of periods = 33

AR parameter: Panel-specific — Asymptotics: T,N -> Infinity sequentially
Panel means: Included
Time trend: Not included

ADF regressions: No lags included

	Statistic	p-value	Fixed-N exact critical values 1%	5%	10%
t-bar	-5.7753		-1.980	-1.850	-1.780
t-tilde-bar	-3.9862				
Z-t-tilde-bar	-12.8230	0.0000			

Table 29- Levin-Lin-Chu Test for stationarity of the First differences of FII

Im-Pesaran-Shin unit-root test for D.FII

Ho: All panels contain unit roots — Number of panels = 13
Ha: Some panels are stationary — Number of periods = 33

AR parameter: Panel-specific — Asymptotics: T,N -> Infinity sequentially
Panel means: Included
Time trend: Not included

ADF regressions: No lags included

	Statistic	p-value	Fixed-N exact critical values 1%	5%	10%
t-bar	-5.7798		-2.040	-1.900	-1.810
t-tilde-bar	-3.9741				
Z-t-tilde-bar	-11.5033	0.0000			

Table 30- Levin-Lin-Chu Test for stationarity of the first differences of Total Trade as a % of GDP

Levin-Lin-Chu unit-root test for TrGDPChange

Ho: Panels contain unit roots — Number of panels = 10
Ha: Panels are stationary — Number of periods = 34

AR parameter: Common — Asymptotics: N/T -> 0
Panel means: Included
Time trend: Not included

ADF regressions: 1 lag
LR variance: Bartlett kernel, 10.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-13.8790	
Adjusted t*	-8.7371	0.0000

Table 31- Im-Pesaran-Sim Test for stationarity of the First differences of the first differces ofTotal Trade as a % of GDP

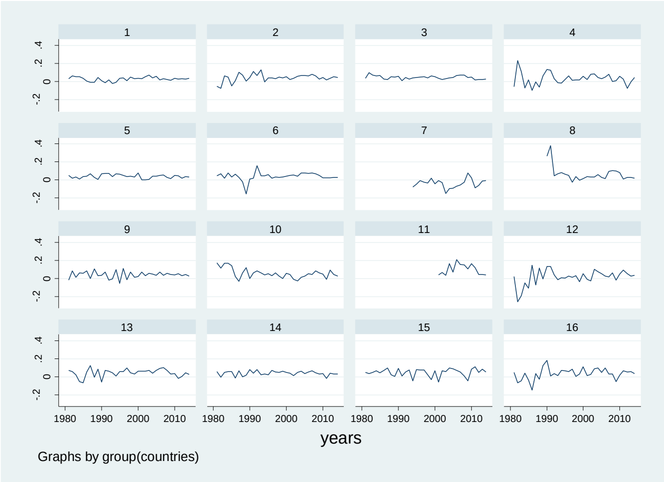
```
. xtunitroot ips TrGDPChange, lags(1)

Im-Pesaran-Shin unit-root test for TrGDPChange

Ho: All panels contain unit roots            Number of panels  =     10
Ha: Some panels are stationary               Number of periods =     34

AR parameter: Panel-specific                 Asymptotics: T,N -> Infinity
Panel means:  Included                                        sequentially
Time trend:   Not included

ADF regressions: 1 lags

                    Statistic      p-value

 W-t-bar             -9.8471        0.0000
```

Table 32- Fisher type Test for stationarity of the first differences of Total Trade as a % of GDP

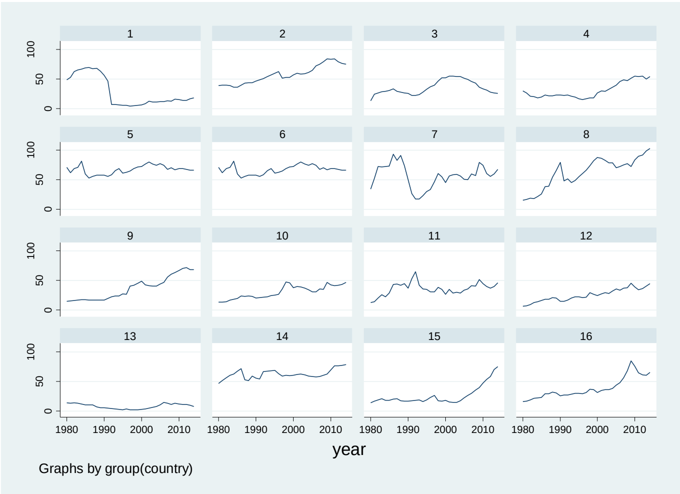
```
Fisher-type unit-root test for TrGDPChange
Based on augmented Dickey-Fuller tests

Ho: All panels contain unit roots              Number of panels  =     10
Ha: At least one panel is stationary           Number of periods =     34

AR parameter: Panel-specific                   Asymptotics: T -> Infinity
Panel means:  Included
Time trend:   Not included
Drift term:   Not included                     ADF regressions: 1 lag

                                  Statistic      p-value

 Inverse chi-squared(20)    P      164.6915       0.0000
 Inverse normal             Z      -10.5480       0.0000
 Inverse logit t(54)        L*     -14.4775       0.0000
 Modified inv. chi-squared Pm       22.8777       0.0000

 P statistic requires number of panels to be finite.
 Other statistics are suitable for finite or infinite number of panels.
```

b.Graphs

Graph 1-Economic growth

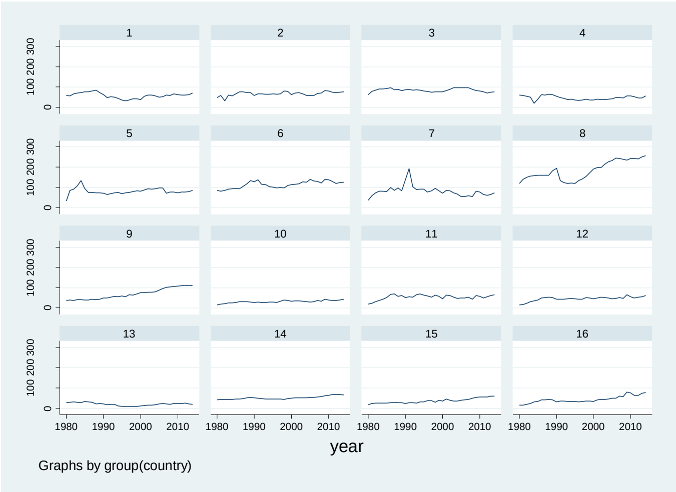


Graph 2- Domestic credit to the private sector as a % of GDP

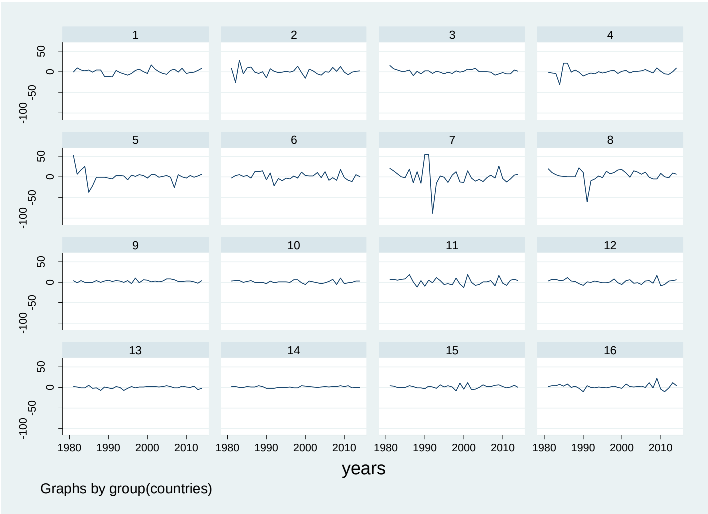


Graph 3- First differences Domestic credit to the private sector as a % of GDP

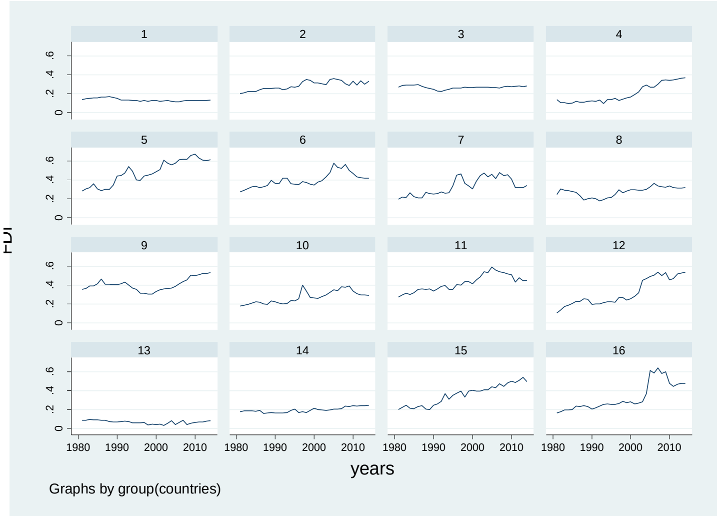
Graph 4-M2 as a percentage of GDP



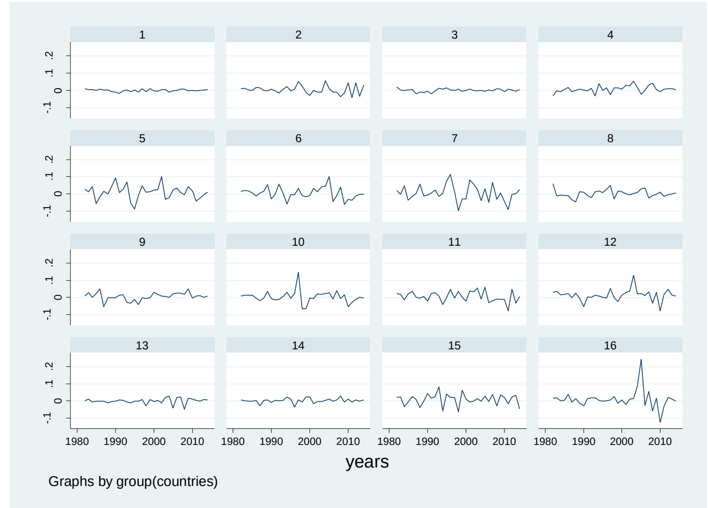
Graph 5- First differences M2 as a % of GDP



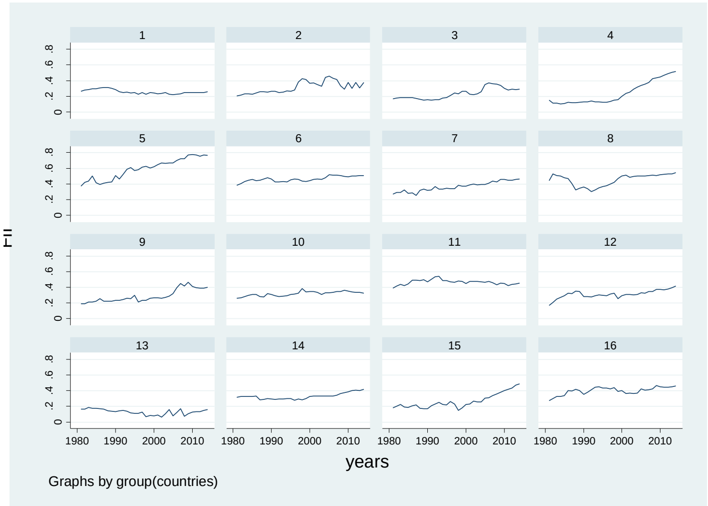
Graph 6- FDI



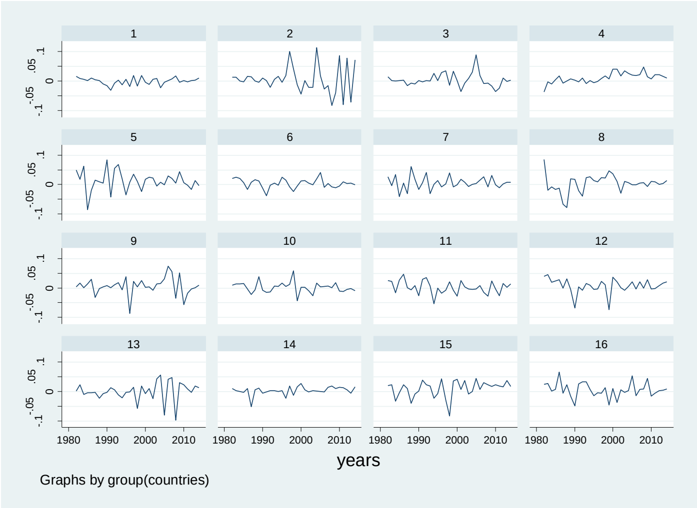
Graph 7- First Differences FDI



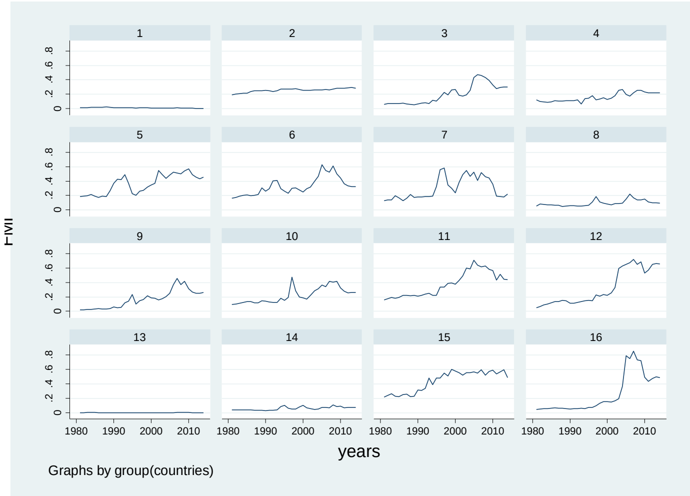
Graph 8- FII



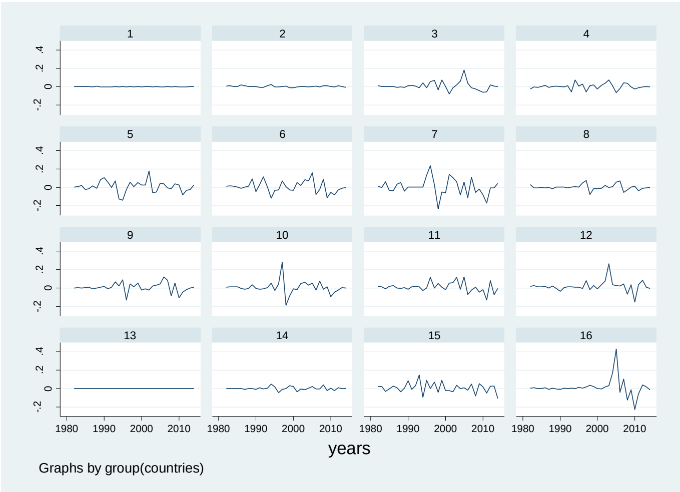
Graph 9- First Differences FII



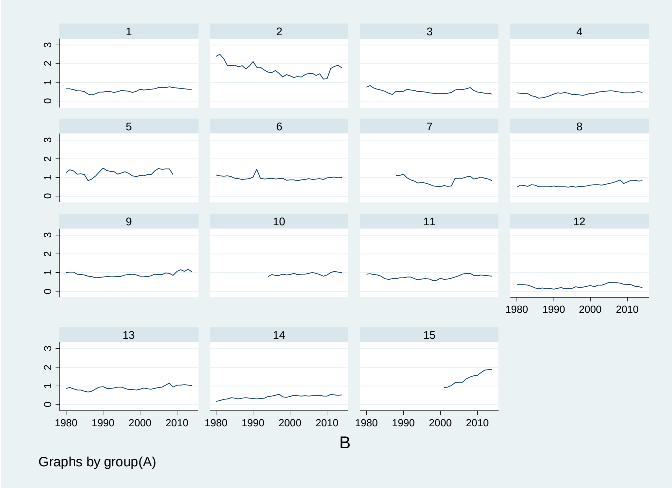
Graph 10- FMI



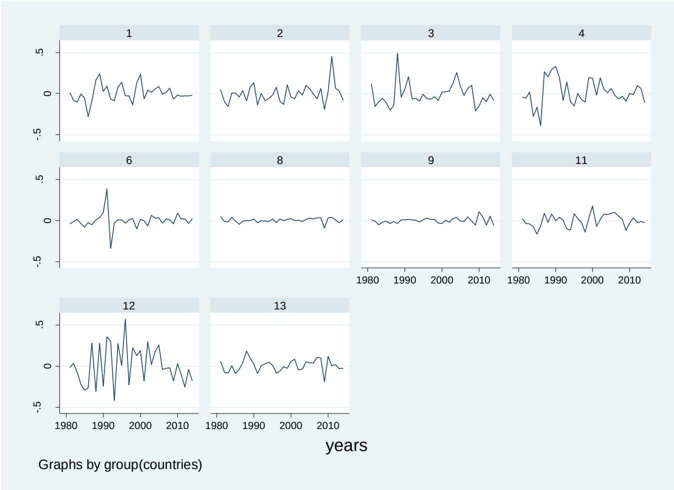
Graph 11- First Differences FMI



Graph 12- Total Trade as a % of GDP



Graph 13- First Differences Total Trade as a % of GDP



2. PVAR models lag specification

Table 1-PVAR lag specification: Growth-first differences domestic credit as a percentage of GDP

```
. pvarsoc WDIgrowth1 changem2, maxlag(3) pvaropts(instl (1/4))
Running panel VAR lag order selection on estimation sample
...

 Selection order criteria
 Sample:  1985 - 2013                          No. of obs      =       422
                                               No. of panels   =        16
                                               Ave. no. of T   =    26.375
```

lag	CD	J	J pvalue	MBIC	MAIC	MQIC
1	.606511	12.9158	.3751901	-59.62426	-11.0842	-30.26577
2	.6167284	4.729701	.7860366	-43.63034	-11.2703	-24.05802
3	.2810055	2.431463	.656949	-21.74856	-5.568537	-11.9624

Table 2- PVAR lag specification: Growth-first differences M2 as a percentage of GDP

```
. pvarsoc WDIgrowth1 changeDC, maxlag(3) pvaropts(instl (1/4))
Running panel VAR lag order selection on estimation sample
...

 Selection order criteria
 Sample:  1985 - 2013                          No. of obs      =       422
                                               No. of panels   =        16
                                               Ave. no. of T   =    26.375
```

lag	CD	J	J pvalue	MBIC	MAIC	MQIC
1	.4733915	8.373688	.7552888	-64.16638	-15.62631	-34.80789
2	.4775529	1.388869	.9944031	-46.97117	-14.61113	-27.39885
3	.2558225	.954249	.9166522	-23.22577	-7.045751	-13.43961

Table 3- PVAR lag specification: Growth-first differences FDI

```
. pvarsoc WDIgrowth1 diff_FDI, maxlag(3) pvaropts(instl (1/4))
Running panel VAR lag order selection on estimation sample
...

 Selection order criteria
 Sample:  1986 - 2013                               No. of obs      =       409
                                                    No. of panels   =        16
                                                    Ave. no. of T   =    25.563
```

lag	CD	J	J pvalue	MBIC	MAIC	MQIC
1	.39265	10.56038	.5669215	-61.6042	-13.43962	-32.49665
2	.3883289	7.430101	.4910164	-40.67962	-8.569899	-21.27458
3	.2397694	.1946596	.9955599	-23.8602	-7.80534	-14.15768

Table 4- PVAR lag specification: Growth-first differences FII

```
. pvarsoc WDIgrowth1 diff_FII, maxlag(3) pvaropts(instl (1/4))
Running panel VAR lag order selection on estimation sample
...

 Selection order criteria
 Sample:  1986 - 2013                               No. of obs      =       409
                                                    No. of panels   =        16
                                                    Ave. no. of T   =    25.563
```

lag	CD	J	J pvalue	MBIC	MAIC	MQIC
1	.4137597	13.41055	.3399194	-58.75403	-10.58945	-29.64647
2	.4155233	10.47908	.2329964	-37.63064	-5.520919	-18.2256
3	.2598172	2.851085	.5830472	-21.20378	-5.148915	-11.50126

Table 5- PVAR lag specification: Growth-first differences FMI

```
. pvarsoc WDIgrowth1 diff_FMI, maxlag(3) pvaropts(instl (1/4))
Running panel VAR lag order selection on estimation sample
...

 Selection order criteria
 Sample:  1986 - 2013                               No. of obs      =       409
                                                    No. of panels   =        16
                                                    Ave. no. of T   =    25.563
```

lag	CD	J	J pvalue	MBIC	MAIC	MQIC
1	.3784992	15.03523	.2395154	-57.12935	-8.96477	-28.02179
2	.3664287	8.135029	.4203926	-39.97469	-7.864971	-20.56965
3	.229011	.8439464	.9324612	-23.21091	-7.156054	-13.5084

Table 6- PVAR lag specification: Growth-first differences Total trade as a percentage of GDP

```
. pvarsoc TradepercChange WDIgrowth, maxlag(3) pvaropts(instl(1/4))
Running panel VAR lag order selection on estimation sample
...

 Selection order criteria
 Sample:  1985 - 2013                               No. of obs      =       290
                                                    No. of panels   =        10
                                                    Ave. no. of T   =    29.000
```

lag	CD	J	J pvalue	MBIC	MAIC	MQIC
1	.3179258	7.808768	.7998903	-60.2298	-16.19123	-33.83527
2	.3440255	1.817259	.9861107	-43.54179	-14.18274	-25.94543
3	.2419746	.825817	.9349538	-21.85371	-7.174183	-13.05553

3. PVAR model

Table 1-PVAR: Growth-first differences domestic credit as a percentage of GDP

Panel vector autoregresssion

GMM Estimation

Final GMM Criterion Q(b) = 3.59e-35
Initial weight matrix: Identity
GMM weight matrix: Robust

No. of obs = 470
No. of panels = 16
Ave. no. of T = 29.375

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.3019407	.089987	3.36	0.001	.1255694	.478312
perchangeDC L1.	.0329325	.0163841	2.01	0.044	.0008201	.0650448
perchangeDC						
WDIgrowth1 L1.	.0846533	.185754	0.46	0.649	-.279418	.4487245
perchangeDC L1.	.2127984	.0711401	2.99	0.003	.0733664	.3522305

Instruments : l(1/1).(WDIgrowth1 perchangeDC)

Table 2- PVAR: Growth-first differences M2 as a percentage of GDP

Final GMM Criterion Q(b) = .0428
Initial weight matrix: Identity
GMM weight matrix: Robust

No. of obs = 404
No. of panels = 16
Ave. no. of T = 25.250

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
changem2						
changem2 L1.	.0707958	.0708998	1.00	0.318	-.0681652	.2097568
WDIgrowth2 L1.	-2.833733	8.917639	-0.32	0.751	-20.31198	14.64452
WDIgrowth2						
changem2 L1.	-.0002673	.0003602	-0.74	0.458	-.0009733	.0004386
WDIgrowth2 L1.	.1654307	.0729586	2.27	0.023	.0224345	.308427

Instruments : l(1/5).(changem2 WDIgrowth2)

Table 3- PVAR: Growth-first differences FDI

Panel vector autoregresssion

GMM Estimation

Final GMM Criterion Q(b) = .0131
Initial weight matrix: Identity
GMM weight matrix: Robust

No. of obs = 441
No. of panels = 16
Ave. no. of T = 27.563

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
dif_FDI						
dif_FDI L1.	.0934234	.0752666	1.24	0.215	-.0540964	.2409432
WDIgrowth1 L1.	.0369033	.0388071	0.95	0.342	-.0391572	.1129638
WDIgrowth1						
dif_FDI L1.	.0422318	.0652332	0.65	0.517	-.0856229	.1700865
WDIgrowth1 L1.	.178762	.0703845	2.54	0.011	.0408109	.3167132

Instruments : l(1/2).(dif_FDI WDIgrowth1)

Table 4-PVAR: Growth-first differences FII

Panel vector autoregresssion

GMM Estimation

Final GMM Criterion Q(b) = .151
Initial weight matrix: Identity
GMM weight matrix: Robust

No. of obs = 311
No. of panels = 16
Ave. no. of T = 19.438

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
dif_FII						
dif_FII L1.	-.1065931	.0727545	-1.47	0.143	-.2491892	.036003
WDIgrowth2 L1.	-.0160858	.0354231	-0.45	0.650	-.0855137	.0533421
WDIgrowth2						
dif_FII L1.	.0172063	.0677703	0.25	0.800	-.115621	.1500336
WDIgrowth2 L1.	.2308125	.0654565	3.53	0.000	.1025202	.3591048

Instruments : l(1/10).(dif_FII WDIgrowth2)

Table 5- PVAR:Growth-first differences FMI

GMM Estimation

Final GMM Criterion Q(b) = 5.16e-35
Initial weight matrix: Identity
GMM weight matrix: Robust

No. of obs = 403
No. of panels = 13
Ave. no. of T = 31.000

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
diff_FMI						
diff_FMI L1.	.0975653	.1037992	0.94	0.347	-.1058774	.3010081
WDIgrowth2 L1.	.0996052	.0565172	1.76	0.078	-.0111665	.210377
WDIgrowth2						
diff_FMI L1.	.055002	.0369362	1.49	0.136	-.0173918	.1273957
WDIgrowth2 L1.	.2301308	.0803445	2.86	0.004	.0726585	.3876032

Instruments : l(1/1).(diff_FMI WDIgrowth2)

.

Table 6- PVAR: Growth-first differences Total trade as a percentage of GDP

Final GMM Criterion Q(b) = 2.05e-34
Initial weight matrix: Identity
GMM weight matrix: Robust

No. of obs = 388
No. of panels = 13
Ave. no. of T = 29.846

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
TrGDPChange						
TrGDPChange L1.	.0151437	.0868858	0.17	0.862	-.1551494	.1854367
WDIgrowth2 L1.	-.0559449	.1322648	-0.42	0.672	-.3151791	.2032893
WDIgrowth2						
TrGDPChange L1.	.050968	.0196809	2.59	0.010	.0123941	.0895419
WDIgrowth2 L1.	.2531946	.0838756	3.02	0.003	.0888015	.4175877

Instruments : l(1/1).(TrGDPChange WDIgrowth2)

4. PVAR Stability

Table 1-PVAR stability: Growth-first differences domestic credit as a percentage of GDP

Eigenvalue stability condition

Eigenvalue Real	Imaginary	Modulus
.3252074	0	.3252074
.1418704	0	.1418704

All the eigenvalues lie inside the unit circle.
pVAR satisfies stability condition.

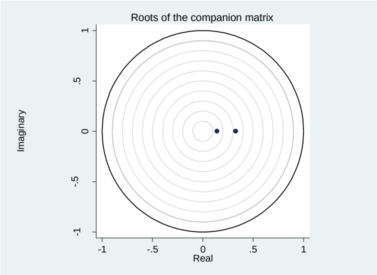


Table 2- PVAR stability: Growth-first differences M2 as a percentage of GDP

Eigenvalue stability condition

Eigenvalue Real	Imaginary	Modulus
.2099534	0	.2099534
.0694099	0	.0694099

All the eigenvalues lie inside the unit circle.
pVAR satisfies stability condition.

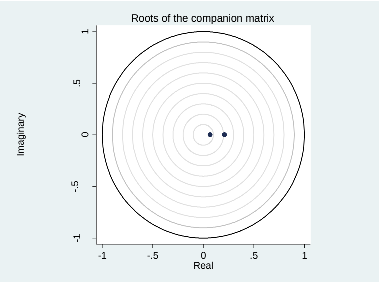


Table 4- PVAR stability: Growth-first differences FDI

. pvarstable, graph

Eigenvalue stability condition

Eigenvalue Real	Imaginary	Modulus
.1942233	0	.1942233
.0779622	0	.0779622

All the eigenvalues lie inside the unit circle.
pVAR satisfies stability condition.

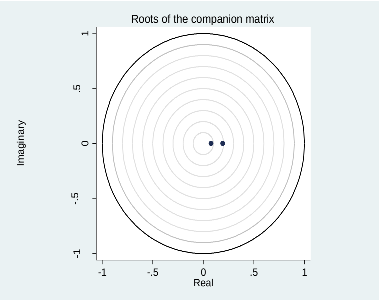


Table 4- PVAR stability: Growth-first differences FII

Eigenvalue stability condition

Eigenvalue Real	Imaginary	Modulus
.2326285	0	.2326285
-.1009732	0	.1009732

All the eigenvalues lie inside the unit circle.
pVAR satisfies stability condition.

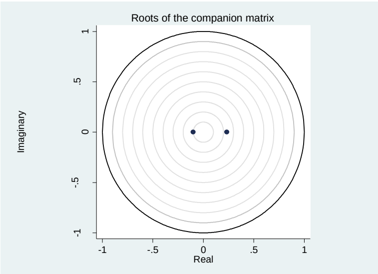


Table 5- PVAR stability: Growth-first differences FMI

. pvarstable, graph

Eigenvalue stability condition

Eigenvalue Real	Imaginary	Modulus
.247561	0	.247561
.0274751	0	.0274751

All the eigenvalues lie inside the unit circle.
pVAR satisfies stability condition.

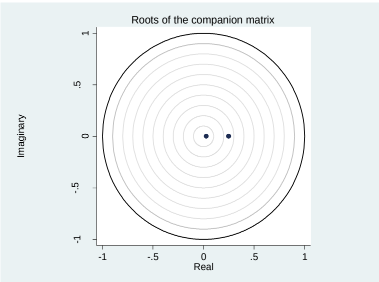


Table 6- PVAR stability: Growth-first differences FM

Eigenvalue stability condition

Eigenvalue Real	Imaginary	Modulus
.2479959	0	.2479959
.0806979	0	.0806979

All the eigenvalues lie inside the unit circle.
pVAR satisfies stability condition.

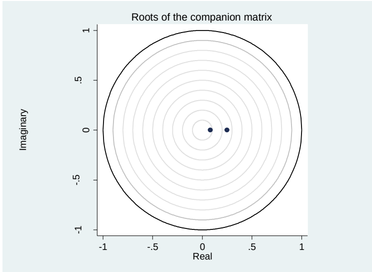
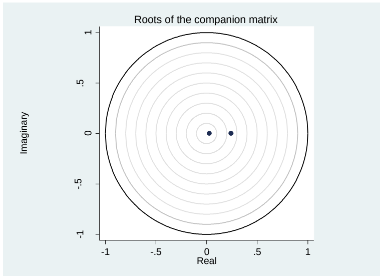


Table 7- PVAR stability: Growth-Total trade % of GDP

Eigenvalue stability condition

Eigenvalue Real	Imaginary	Modulus
.2405442	0	.2405442
.0277941	0	.0277941

All the eigenvalues lie inside the unit circle.
pVAR satisfies stability condition.



5. Dimirescu & Hurlin (2012) tests for non-causality

Table 1-Dumirescu & Hurlin test: Growth-first differences domestic credit as a percentage of income

```
. xtgcause perchangeDC WDIgrowth1 , lag(1)


Dumitrescu & Hurlin (2012) Granger non-causality test results:
--------------------------------------------------------------
Lag order: 1
W-bar =          1.8595
Z-bar =          2.1053   (p-value = 0.0353)
Z-bar tilde =    1.7059   (p-value = 0.0880)
--------------------------------------------------------------
H0: WDIgrowth1 does not Granger-cause perchangeDC.
H1: WDIgrowth1 does Granger-cause perchangeDC for at least one panelvar (countryn
> um).

Dumitrescu & Hurlin (2012) Granger non-causality test results:
--------------------------------------------------------------
Lag order: 1
W-bar =          2.7981
Z-bar =          4.5842   (p-value = 0.0000)
Z-bar tilde =    3.8903   (p-value = 0.0001)
--------------------------------------------------------------
H0: perchangeDC does not Granger-cause WDIgrowth1.
H1: perchangeDC does Granger-cause WDIgrowth1 for at least one panelvar (countrynum).
```

Table 2- Dumirescu & Hurlin test: Growth-first differences M2 as a percentage of income

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
--------------------------------------------------------------
Lag order: 1
W-bar =          2.5630
Z-bar =          3.9849   (p-value = 0.0001)
Z-bar tilde =    3.3607   (p-value = 0.0008)
--------------------------------------------------------------
H0: WDIgrowth1 does not Granger-cause changeM2.
H1: WDIgrowth1 does Granger-cause changeM2 for at least one panelvar (countrynum).

Dumitrescu & Hurlin (2012) Granger non-causality test results:
--------------------------------------------------------------
Lag order: 1
W-bar =          2.3516
Z-bar =          3.4460   (p-value = 0.0006)
Z-bar tilde =    2.8844   (p-value = 0.0039)
--------------------------------------------------------------
H0: changeM2 does not Granger-cause WDIgrowth1.
H1: changeM2 does Granger-cause WDIgrowth1 for at least one panelvar (countrynum).
```

Table 3- Dumirescu & Hurlin test: Growth-first differences FDI

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
--------------------------------------------------------------
Lag order: 1
W-bar =          1.0393
Z-bar =          0.1001   (p-value = 0.9202)
Z-bar tilde =   -0.0840   (p-value = 0.9330)
--------------------------------------------------------------
H0: WDIgrowth1 does not Granger-cause changeFDI.
H1: WDIgrowth1 does Granger-cause changeFDI for at least one panelvar (countrynum).

Dumitrescu & Hurlin (2012) Granger non-causality test results:
--------------------------------------------------------------
Lag order: 1
W-bar =          0.3044
Z-bar =         -1.7734   (p-value = 0.0762)
Z-bar tilde =   -1.7242   (p-value = 0.0847)
--------------------------------------------------------------
H0: changeFDI does not Granger-cause WDIgrowth1.
H1: changeFDI does Granger-cause WDIgrowth1 for at least one panelvar (countrynum).
```

Table 4- Dumirescu & Hurlin test: Growth-first differences FII

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
--------------------------------------------------------------
Lag order: 1
W-bar =          1.8425
Z-bar =          2.1480   (p-value = 0.0317)
Z-bar tilde =    1.7088   (p-value = 0.0875)
--------------------------------------------------------------
H0: WDIgrowth1 does not Granger-cause changeFII.
H1: WDIgrowth1 does Granger-cause changeFII for at least one panelvar (countrynum).
```

```
. xtgcause WDIgrowth1 giff_FII , lags(1)


Dumitrescu & Hurlin (2012) Granger non-causality test results:
--------------------------------------------------------------
Lag order: 1
W-bar =          1.3955
Z-bar =          1.0083   (p-value = 0.3133)
Z-bar tilde =    0.7209   (p-value = 0.4710)
--------------------------------------------------------------
H0: giff_FII does not Granger-cause WDIgrowth1.
H1: giff_FII does Granger-cause WDIgrowth1 for at least one panelvar (countrynum).
```

Table 5- Dumirescu & Hurlin test: Growth-first differences FMI

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
--------------------------------------------------------------
Lag order: 1
W-bar =          0.3044
Z-bar =         -1.7734   (p-value = 0.0762)
Z-bar tilde =   -1.7242   (p-value = 0.0847)
--------------------------------------------------------------
H0: changeFMI does not Granger-cause WDIgrowth1.
H1: changeFMI does Granger-cause WDIgrowth1 for at least one panelvar (countrynum).
Dumitrescu & Hurlin (2012) Granger non-causality test results:
--------------------------------------------------------------
Lag order: 1
W-bar =          1.0393
Z-bar =          0.1001   (p-value = 0.9202)
Z-bar tilde =   -0.0840   (p-value = 0.9330)
--------------------------------------------------------------
H0: WDIgrowth1 does not Granger-cause changeFMI.
H1: WDIgrowth1 does Granger-cause changeFMI for at least one panelvar (countrynum).
```

Table 6- Dumirescu & Hurlin test: Growth-first differences Trade % of GDP

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
--------------------------------------------------------------
Lag order: 1
W-bar =          1.3822
Z-bar =          0.8546   (p-value = 0.3928)
Z-bar tilde =    0.6141   (p-value = 0.5392)
--------------------------------------------------------------
H0: WDIgrowth2 does not Granger-cause TrGDPChange.
H1: WDIgrowth2 does Granger-cause TrGDPChange for at least one panelvar (countryn
> um).

Dumitrescu & Hurlin (2012) Granger non-causality test results:
--------------------------------------------------------------
Lag order: 1
W-bar =          2.4548
Z-bar =          3.2530   (p-value = 0.0011)
Z-bar tilde =    2.7336   (p-value = 0.0063)
--------------------------------------------------------------
H0: TrGDPChange does not Granger-cause WDIgrowth2.
H1: TrGDPChange does Granger-cause WDIgrowth2 for at least one panelvar (countryn
> um).
```

5. Individual country specific VARs and Granger causality tests

Table 1-VAR(1): Economic Growth-first diff.M2 as a percentage of GDP (Algeria)

```
Vector autoregression

Sample:  1984 - 2014                            No. of obs      =        31
Log likelihood =  98.41217                      AIC             = -5.962075
FPE            =  8.84e-06                      HQIC            = -5.871602
Det(Sigma_ml)  =  5.99e-06                      SBIC            = -5.684529

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
WDIgrowth2            3     .021212   0.3582   17.30229   0.0002
changeM2              3     .127775   0.0562   1.845943   0.3973
----------------------------------------------------------------
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth2						
WDIgrowth2 L1.	.5019844	.1447633	3.47	0.001	.2182536	.7857153
changeM2 L1.	.0537915	.0295605	1.82	0.069	-.0041459	.111729
_cons	.0031013	.0037608	0.82	0.410	-.0042697	.0104724
changeM2						
WDIgrowth2 L1.	.8061821	.872012	0.92	0.355	-.90293	2.515294
changeM2 L1.	.1540084	.1780636	0.86	0.387	-.1949899	.5030066
_cons	.000756	.022654	0.03	0.973	-.043645	.0451571

Table 2-Granger causality: Economic Growth-first diff.M2 as a percentage of GDP (Algeria)

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth2	changeM2	3.3114	1	0.069
WDIgrowth2	ALL	3.3114	1	0.069
changeM2	WDIgrowth2	.85472	1	0.355
changeM2	ALL	.85472	1	0.355

Table 3-VAR(1): Economic Growth-first diff. Dom. credit as a percentage of GDP (Algeria)

```
. var WDIgrowth2 changeDC, lag(1)

Vector autoregression

Sample:  1984 - 2014                            No. of obs      =        31
Log likelihood =  84.66603                      AIC             = -5.075228
FPE            =  .0000215                      HQIC            = -4.984755
Det(Sigma_ml)  =  .0000145                      SBIC            = -4.797682

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
WDIgrowth2            3      .02008   0.4249   22.90297   0.0000
changeDC              3     .211088   0.1670    6.21267   0.0448
----------------------------------------------------------------
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth2						
WDIgrowth2 L1.	.4126762	.1434001	2.88	0.004	.1316171	.6937352
changeDC L1.	.044603	.0165199	2.70	0.007	.0122246	.0769814
_cons	.0039781	.0035734	1.11	0.266	-.0030256	.0109819
changeDC						
WDIgrowth2 L1.	2.680875	1.507487	1.78	0.075	-.2737465	5.635496
changeDC L1.	.1883349	.1736647	1.08	0.278	-.1520417	.5287116
_cons	-.0160129	.0375651	-0.43	0.670	-.0896391	.0576132

Table 4-Granger causality: Economic Growth-first diff. Dom. credit as a percentage of GDP (Algeria)

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth2	changeDC	7.2898	1	0.007
WDIgrowth2	ALL	7.2898	1	0.007
changeDC	WDIgrowth2	3.1626	1	0.075
changeDC	ALL	3.1626	1	0.075

Table 5-VAR(1): Economic Growth-first diff. FII (Algeria)

Vector autoregression

Sample:	1985 - 2014	No. of obs	= 30
Log likelihood	= 164.9491	AIC	= -10.59661
FPE	= 8.58e-08	HQIC	= -10.50696
Det(Sigma_ml)	= 5.74e-08	SBIC	= -10.31637

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.021647	0.1548	5.49638	0.0640
diff_FII	3	.012305	0.0367	1.14183	0.5650

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.3724111	.1643763	2.27	0.023	.0502395	.6945826
diff_FII L1.	.1307019	.3184961	0.41	0.682	-.493539	.7549428
_cons	.0162264	.0057935	2.80	0.005	.0048713	.0275815
diff_FII						
WDIgrowth1 L1.	.0866807	.0934397	0.93	0.354	-.0964577	.2698191
diff_FII L1.	-.1097902	.1810491	-0.61	0.544	-.4646399	.2450595
_cons	-.0035941	.0032933	-1.09	0.275	-.0100489	.0028607

Table 6-Granger causality: Economic Growth-first diff.FII (Algeria)

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	diff_FII	.16841	1	0.682
WDIgrowth1	ALL	.16841	1	0.682
diff_FII	WDIgrowth1	.86056	1	0.354
diff_FII	ALL	.86056	1	0.354

Table 5-VAR(1): Economic Growth-first diff.M2 as a percentage of GDP (Bahrain)

Vector autoregression

Sample:	1984 - 2014	No. of obs	= 31
Log likelihood	= 89.98549	AIC	= -5.418419
FPE	= .0000152	HQIC	= -5.327946
Det(Sigma_ml)	= .0000103	SBIC	= -5.140873

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.035166	0.0095	.2976903	0.8617
changeM2	3	.102886	0.0358	1.151233	0.5624

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.0857216	.1783176	0.48	0.631	-.2637745	.4352177
changeM2 L1.	.0089507	.0325633	0.27	0.783	-.0548721	.0727735
_cons	.0435122	.0106731	4.08	0.000	.0225933	.0644311
changeM2						
WDIgrowth1 L1.	-.2699287	.5217025	-0.52	0.605	-1.292447	.7525895
changeM2 L1.	-.0912349	.0952701	-0.96	0.338	-.2779608	.095491
_cons	.0290324	.0312262	0.93	0.353	-.0321698	.0902346

Table 6-Granger causality: Economic Growth- first diff.M2 as a percentage of GDP (Bahrain)

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeM2	.07555	1	0.783
WDIgrowth1	ALL	.07555	1	0.783
changeM2	WDIgrowth1	.2677	1	0.605
changeM2	ALL	.2677	1	0.605

Table 7-VAR(1): Economic Growth-first diff. Dom. credit as a percentage of GDP (Bahrain)

Vector autoregression

Sample:	1984 - 2014	No. of obs	= 31
Log likelihood	= 108.564	AIC	= -6.617031
FPE	= 4.59e-06	HQIC	= -6.526558
Det(Sigma_ml)	= 3.11e-06	SBIC	= -6.339485

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.033563	0.0978	3.359348	0.1864
changeDC	3	.059363	0.0364	1.172342	0.5565

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
WDIgrowth1						
WDIgrowth1 L1.	.0134481	.1747141	0.08	0.939	-.3289851	.3558814
changeDC L1.	.1809797	.1025339	1.77	0.078	-.019983	.3819424
_cons	.0432048	.0100797	4.29	0.000	.023449	.0629606
changeDC						
WDIgrowth1 L1.	-.0458749	.3090188	-0.15	0.882	-.6515407	.5597909
changeDC L1.	.1955062	.1813529	1.08	0.281	-.1599389	.5509513
_cons	.0207164	.0178281	1.16	0.245	-.014226	.0556587

Table 8-Granger causality: Economic Growth-first diff. Dom. credit as a percentage of GDP (Bahrain)

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeDC	3.1155	1	0.078
WDIgrowth1	ALL	3.1155	1	0.078
changeDC	WDIgrowth1	.02204	1	0.882
changeDC	ALL	.02204	1	0.882

Table 9-VAR(1): Economic Growth-first diff. FII (Bahrain)

```
. var WDIgrowth diff_FII, lags(1)
```

Vector autoregression

Sample:	1985 - 2014	No. of obs	= 30
Log likelihood	= 158.5988	AIC	= -10.17325
FPE	= 1.31e-07	HQIC	= -10.0836
Det(Sigma_ml)	= 8.77e-08	SBIC	= -9.893012

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.014871	0.2496	9.980414	0.0068
diff_FII	3	.022446	0.1969	7.356812	0.0253

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
WDIgrowth1						
WDIgrowth1 L1.	.3330442	.1591204	2.09	0.036	.0211739	.6449145
diff_FII L1.	.2198775	.1097572	2.00	0.045	.0047573	.4349978
_cons	.0274153	.0073927	3.71	0.000	.0129259	.0419047
diff_FII						
WDIgrowth1 L1.	-.4099523	.2401753	-1.71	0.088	-.8806872	.0607826
diff_FII L1.	.3897455	.1656668	2.35	0.019	.0650446	.7144464
_cons	.0202612	.0111585	1.82	0.069	-.001609	.0421314

Table 10-Granger causality: Economic Growth-first diff. FII (Bahrain)

```
. vargranger
```

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	diff_FII	4.0132	1	0.045
WDIgrowth1	ALL	4.0132	1	0.045
diff_FII	WDIgrowth1	2.9135	1	0.088
diff_FII	ALL	2.9135	1	0.088

Table 11-VAR(1): Economic Growth-first diff.M2 as a percentage of GDP (Egypt)

Vector autoregression

Sample:	1984 - 2014	No. of obs	= 31
Log likelihood	= 138.1015	AIC	= -8.522678
FPE	= 6.83e-07	HQIC	= -8.432205
Det(Sigma_ml)	= 4.63e-07	SBIC	= -8.245132

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.015541	0.1827	6.931539	0.0312
changeM2	3	.049458	0.0347	1.113254	0.5731

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
WDIgrowth1						
WDIgrowth1 L1.	.3967127	.1572594	2.52	0.012	.08849	.7049354
changeM2 L1.	-.0247324	.0546948	-0.45	0.651	-.1319321	.0824674
_cons	.0255348	.0075187	3.40	0.001	.0107984	.0402713
changeM2						
WDIgrowth1 L1.	-.0626598	.5004772	-0.13	0.900	-1.043577	.9182575
changeM2 L1.	.1785428	.1740658	1.03	0.305	-.1626199	.5197056
_cons	-.0008663	.0239283	-0.04	0.971	-.047765	.0460324

Table 12-Granger causality: Economic Growth- first diff.M2 as a percentage of GDP (Egypt)

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeM2	.20448	1	0.651
WDIgrowth1	ALL	.20448	1	0.651
changeM2	WDIgrowth1	.01568	1	0.900
changeM2	ALL	.01568	1	0.900

Table 13-VAR(1): Economic Growth-first diff. Dom. credit as a percentage of GDP (Egypt)

Vector autoregression

```
Sample:  1984 - 2014                          No. of obs      =        31
Log likelihood =  138.1015                    AIC             = -8.522678
FPE            =  6.83e-07                    HQIC            = -8.432205
Det(Sigma_ml)  =  4.63e-07                    SBIC            = -8.245132
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.015541	0.1827	6.931539	0.0312
changeM2	3	.049458	0.0347	1.113254	0.5731

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.3967127	.1572594	2.52	0.012	.08849	.7049354
changeM2 L1.	-.0247324	.0546948	-0.45	0.651	-.1319321	.0824674
_cons	.0255348	.0075187	3.40	0.001	.0107984	.0402713
changeM2						
WDIgrowth1 L1.	-.0626598	.5004772	-0.13	0.900	-1.043577	.9182575
changeM2 L1.	.1785428	.1740658	1.03	0.305	-.1626199	.5197056
_cons	-.0008663	.0239283	-0.04	0.971	-.047765	.0460324

Table 14-Granger causality: Economic Growth-first diff. Dom. credit as a percentage of GDP (Egypt)

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeM2	.20448	1	0.651
WDIgrowth1	ALL	.20448	1	0.651
changeM2	WDIgrowth1	.01568	1	0.900
changeM2	ALL	.01568	1	0.900

Table 15-VAR(1): Economic Growth-first diff. FII (Egypt)

. var WDIgrowth diff_FII, lags(1)

Vector autoregression

```
Sample:  1985 - 2014                          No. of obs      =        30
Log likelihood =  158.5988                    AIC             = -10.17325
FPE            =  1.31e-07                    HQIC            =  -10.0836
Det(Sigma_ml)  =  8.77e-08                    SBIC            = -9.893012
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.014871	0.2496	9.980414	0.0068
diff_FII	3	.022446	0.1969	7.356812	0.0253

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.3330442	.1591204	2.09	0.036	.0211739	.6449145
diff_FII L1.	.2198775	.1097572	2.00	0.045	.0047573	.4349978
_cons	.0274153	.0073927	3.71	0.000	.0129259	.0419047
diff_FII						
WDIgrowth1 L1.	-.4099523	.2401753	-1.71	0.088	-.8806872	.0607826
diff_FII L1.	.3897455	.1656668	2.35	0.019	.0650446	.7144464
_cons	.0202612	.0111585	1.82	0.069	-.001609	.0421314

Table 16-Granger causality: Economic Growth-first diff. FII(Egypt)

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	diff_FII	4.0132	1	0.045
WDIgrowth1	ALL	4.0132	1	0.045
diff_FII	WDIgrowth1	2.9135	1	0.088
diff_FII	ALL	2.9135	1	0.088

Table 17-VAR(1): Economic Growth-first diff.M2 as a percentage of GDP (Iran)

Vector autoregression

Sample:	1984 - 2014	No. of obs	= 31
Log likelihood =	51.70034	AIC	= -2.948409
FPE =	.0001799	HQIC	= -2.857936
Det(Sigma_ml) =	.000122	SBIC	= -2.670863

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.052367	0.1145	4.010349	0.1346
changeM2	3	.233581	0.2000	7.747839	0.0208

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.1838943	.163414	1.13	0.260	-.1363913	.5041799
changeM2 L1.	-.0563571	.0363788	-1.55	0.121	-.1276583	.0149441
_cons	.0213364	.0100455	2.12	0.034	.0016476	.0410253
changeM2						
WDIgrowth1 L1.	-2.024159	.7289034	-2.78	0.005	-3.452783	-.5955342
changeM2 L1.	-.0710466	.1622666	-0.44	0.662	-.3890834	.2469901
_cons	.0879354	.0448077	1.96	0.050	.0001139	.1757569

Table 18-Granger causality: Economic Growth- first diff.M2 as a percentage of GDP (Iran)

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeM2	2.3999	1	0.121
WDIgrowth1	ALL	2.3999	1	0.121
changeM2	WDIgrowth1	7.7117	1	0.005
changeM2	ALL	7.7117	1	0.005

Table 19-VAR(1): Economic Growth-first diff. Dom. credit as a percentage of GDP (Iran)

Vector autoregression

Sample:	1984 - 2014	No. of obs	= 31
Log likelihood =	51.70034	AIC	= -2.948409
FPE =	.0001799	HQIC	= -2.857936
Det(Sigma_ml) =	.000122	SBIC	= -2.670863

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.052367	0.1145	4.010349	0.1346
changeM2	3	.233581	0.2000	7.747839	0.0208

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.1838943	.163414	1.13	0.260	-.1363913	.5041799
changeM2 L1.	-.0563571	.0363788	-1.55	0.121	-.1276583	.0149441
_cons	.0213364	.0100455	2.12	0.034	.0016476	.0410253
changeM2						
WDIgrowth1 L1.	-2.024159	.7289034	-2.78	0.005	-3.452783	-.5955342
changeM2 L1.	-.0710466	.1622666	-0.44	0.662	-.3890834	.2469901
_cons	.0879354	.0448077	1.96	0.050	.0001139	.1757569

Table 21-Granger causality: Economic Growth-first diff. Dom. credit as a percentage of GDP (Iran)

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeM2	2.3999	1	0.121
WDIgrowth1	ALL	2.3999	1	0.121
changeM2	WDIgrowth1	7.7117	1	0.005
changeM2	ALL	7.7117	1	0.005

Table 22-VAR(1): Economic Growth-first diff. FII (Iran)

```
. var WDIgrowth1 diff_FII , lags(1)
```

Vector autoregression

Sample:	1985 - 2014	No. of obs	= 30
Log likelihood =	140.5004	AIC	= -8.966692
FPE =	4.38e-07	HQIC	= -8.877041
Det(Sigma_ml) =	2.93e-07	SBIC	= -8.686453

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.050225	0.1166	3.960115	0.1381
diff_FII	3	.012117	0.3316	14.8858	0.0006

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.3162236	.1633068	1.94	0.053	-.0038519	.6362991
diff_FII L1.	.1396993	.5980022	0.23	0.815	-1.032363	1.311762
_cons	.0187523	.0120826	1.55	0.121	-.0049292	.0424339
diff_FII						
WDIgrowth1 L1.	.0779035	.0393996	1.98	0.048	.0006818	.1551252
diff_FII L1.	.4420901	.1442746	3.06	0.002	.1593171	.7248631
_cons	.0060946	.0029151	2.09	0.037	.0003812	.011808

Table 23-Granger causality: Economic Growth-first diff. FII (Iran)

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	diff_FII	.05457	1	0.815
WDIgrowth1	ALL	.05457	1	0.815
diff_FII	WDIgrowth1	3.9096	1	0.048
diff_FII	ALL	3.9096	1	0.048

Table 24-VAR(1): Economic Growth-first diff.M2 as a percentage of GDP (Israel)

Vector autoregression

```
Sample:  1984 - 2014                              No. of obs      =        31
Log likelihood =   105.202                        AIC             = -6.400127
FPE            =  5.70e-06                        HQIC            = -6.309654
Det(Sigma_ml)  =  3.87e-06                        SBIC            = -6.122582
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.021773	0.0769	2.581602	0.2751
changeM2	3	.105671	0.0230	.7294982	0.6944

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1						
L1.	.1628248	.1809237	0.90	0.368	-.1917791	.5174286
changeM2						
L1.	-.0366943	.0367606	-1.00	0.318	-.1087437	.0353551
_cons	.0333506	.0081104	4.11	0.000	.0174545	.0492467
changeM2						
WDIgrowth1						
L1.	.6638008	.8780891	0.76	0.450	-1.057222	2.384824
changeM2						
L1.	.1082494	.1784126	0.61	0.544	-.2414329	.4579317
_cons	-.0285532	.0393628	-0.73	0.468	-.105703	.0485965

Table 25-Granger causality: Economic Growth- first diff.M2 as a percentage of GDP (Israel)

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeM2	.9964	1	0.318
WDIgrowth1	ALL	.9964	1	0.318
changeM2	WDIgrowth1	.57148	1	0.450
changeM2	ALL	.57148	1	0.450

Table 26-VAR(1): Economic Growth-first diff. Dom. credit as a percentage of GDP (Israel)

Vector autoregression

```
Sample:  1984 - 2014                              No. of obs      =        31
Log likelihood =  113.8261                        AIC             = -6.956523
FPE            =  3.27e-06                        HQIC            =  -6.86605
Det(Sigma_ml)  =  2.22e-06                        SBIC            = -6.678977
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.02192	0.0643	2.131812	0.3444
changeDC	3	.076539	0.0698	2.327377	0.3123

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1						
L1.	.2010876	.1750042	1.15	0.251	-.1419144	.5440895
changeDC						
L1.	-.0375363	.0498126	-0.75	0.451	-.1351673	.0600946
_cons	.031843	.0079097	4.03	0.000	.0163404	.0473457
changeDC						
WDIgrowth1						
L1.	.9306412	.611065	1.52	0.128	-.2670241	2.128307
changeDC						
L1.	.0170513	.1739316	0.10	0.922	-.3238483	.3579509
_cons	-.0362341	.0276183	-1.31	0.190	-.090365	.0178969

Table 27-Granger causality: Economic Growth-first diff. Dom. credit as a percentage of GDP (Israel)

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeDC	.56784	1	0.451
WDIgrowth1	ALL	.56784	1	0.451
changeDC	WDIgrowth1	2.3195	1	0.128
changeDC	ALL	2.3195	1	0.128

<u>Table 28-VAR(1): Economic Growth-first diff. FII (Israel)</u>

```
. var WDIgrowth dif_G, lags(1)

Vector autoregression

Sample:  1985 - 2012                               No. of obs      =        28
Log likelihood =  124.2097                         AIC             =  -8.44355
FPE            =  7.39e-07                         HQIC            = -8.356278
Det(Sigma_ml)  =  4.81e-07                         SBIC            = -8.158078
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.022585	0.0448	1.313879	0.5184
dif_G	3	.034418	0.0403	1.176775	0.5552

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.2046848	.1813694	1.13	0.259	-.1507926	.5601623
dif_G L1.	-.0173422	.1178963	-0.15	0.883	-.2484146	.2137302
_cons	.0329773	.0085955	3.84	0.000	.0161305	.0498241
dif_G						
WDIgrowth1 L1.	.0806117	.2763987	0.29	0.771	-.4611198	.6223433
dif_G L1.	-.1850427	.1796685	-1.03	0.303	-.5371866	.1671012
_cons	.0080163	.0130991	0.61	0.541	-.0176574	.0336901

<u>Table 29-Granger causality: Economic Growth-first diff. FII (Israel)</u>

```
. vargranger

  Granger causality Wald tests
```

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	dif_G	.02164	1	0.883
WDIgrowth1	ALL	.02164	1	0.883
dif_G	WDIgrowth1	.08506	1	0.771
dif_G	ALL	.08506	1	0.771

<u>Table 30-VAR(1): Economic Growth-first diff. Dom. credit as a percentage of GDP (Jordan)</u>

```
Vector autoregression

Sample:  1984 - 2014                               No. of obs      =        31
Log likelihood =  94.23824                         AIC             =  -5.69279
FPE            =  .0000116                         HQIC            = -5.602317
Det(Sigma_ml)  =  7.84e-06                         SBIC            = -5.415244
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.046669	0.0988	3.399891	0.1827
changeM2	3	.077526	0.0032	.0990075	0.9517

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.2894396	.1934849	1.50	0.135	-.0897839	.668663
changeM2 L1.	-.028678	.1219682	-0.24	0.814	-.2677313	.2103753
_cons	.0285458	.0117129	2.44	0.015	.0055889	.0515027
changeM2						
WDIgrowth1 L1.	.094507	.3214173	0.29	0.769	-.5354594	.7244734
changeM2 L1.	.0084233	.2026137	0.04	0.967	-.3886923	.405539
_cons	.0093876	.0194575	0.48	0.629	-.0287484	.0475237

<u>Table 31-VAR(1): Economic Growth-first diff. Dom. credit as a percentage of GDP (Jordan)</u>

```
  Granger causality Wald tests
```

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeM2	.05528	1	0.814
WDIgrowth1	ALL	.05528	1	0.814
changeM2	WDIgrowth1	.08645	1	0.769
changeM2	ALL	.08645	1	0.769

<u>Table 32-VAR(1): Economic Growth-first diff. M2 as a percentage of GDP (Jordan)</u>

```
Vector autoregression

Sample:  1984 - 2014                               No. of obs      =        31
Log likelihood =  94.23824                         AIC             =  -5.69279
FPE            =  .0000116                         HQIC            = -5.602317
Det(Sigma_ml)  =  7.84e-06                         SBIC            = -5.415244
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.046669	0.0988	3.399891	0.1827
changeM2	3	.077526	0.0032	.0990075	0.9517

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.2894396	.1934849	1.50	0.135	-.0897839	.668663
changeM2 L1.	-.028678	.1219682	-0.24	0.814	-.2677313	.2103753
_cons	.0285458	.0117129	2.44	0.015	.0055889	.0515027
changeM2						
WDIgrowth1 L1.	.094507	.3214173	0.29	0.769	-.5354594	.7244734
changeM2 L1.	.0084233	.2026137	0.04	0.967	-.3886923	.405539
_cons	.0093876	.0194575	0.48	0.629	-.0287484	.0475237

Table 33-VAR(1) Economic Growth-first diff. M2as a percentage of GDP(Jordan)

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeM2	.05528	1	0.814
WDIgrowth1	ALL	.05528	1	0.814
changeM2	WDIgrowth1	.08645	1	0.769
changeM2	ALL	.08645	1	0.769

Table 34-VAR(1) Economic Growth-first diff. FII (Jordan)

```
. var WDIgrowth diff_FII, lags(1)

Vector autoregression

Sample:  1985 - 2012                          No. of obs      =        28
Log likelihood =  104.6393                    AIC             = -7.045663
FPE            =  2.99e-06                    HQIC            = -6.958391
Det(Sigma_ml)  =  1.95e-06                    SBIC            =  -6.76019
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.046764	0.1694	5.709821	0.0576
diff_FII	3	.034002	0.0634	1.896177	0.3875

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.3663686	.173045	2.12	0.034	.0272067	.7055306
diff_FII L1.	-.3607124	.2475658	-1.46	0.145	-.8459325	.1245076
_cons	.0281548	.0109913	2.56	0.010	.0066122	.0496973
diff_FII						
WDIgrowth1 L1.	-.110946	.1258198	-0.88	0.378	-.3575483	.1356563
diff_FII L1.	-.16009	.1800034	-0.89	0.374	-.5128902	.1927102
_cons	.015518	.0079917	1.94	0.052	-.0001454	.0311814

Table 36-Granger causality: Economic Growth-first diff. FII (Jordan)

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	diff_FII	2.123	1	0.145
WDIgrowth1	ALL	2.123	1	0.145
diff_FII	WDIgrowth1	.77754	1	0.378
diff_FII	ALL	.77754	1	0.378

Table 37-VAR(1): Economic Growth-first diff. Dom. credit as a percentage of GDP (Lebanon)

```
. var WDIgrowth changeDC , lags(1/1)

Vector autoregression

Sample:  1991 - 2014                          No. of obs      =        24
Log likelihood =  64.94779                    AIC             = -4.912316
FPE            =  .0000253                    HQIC            = -4.834182
Det(Sigma_ml)  =  .0000153                    SBIC            = -4.617803
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth	3	.056469	0.5026	24.24963	0.0000
changeDC	3	.101795	0.2669	8.737097	0.0127

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth						
WDIgrowth L1.	.6707908	.1421678	4.72	0.000	.392147	.9494346
changeDC L1.	.3493622	.1028674	3.40	0.001	.1477457	.5509787
_cons	.0033281	.0154627	0.22	0.830	-.0269783	.0336344
changeDC						
WDIgrowth L1.	-.6857729	.256281	-2.68	0.007	-1.188075	-.1834714
changeDC L1.	-.4325698	.1854356	-2.33	0.020	-.7960169	-.0691228
_cons	.0759523	.0278741	2.72	0.006	.02132	.1305846

Table 38-Granger Causality: Economic Growth-first diff. Dom. credit as a percentage of GDP (Lebanon)

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth	changeDC	11.534	1	0.001
WDIgrowth	ALL	11.534	1	0.001
changeDC	WDIgrowth	7.1602	1	0.007
changeDC	ALL	7.1602	1	0.007

Table 39-VAR(1): Economic Growth-first diff. M2 as a percentage of GDP (Lebanon)

```
. var WDIgrowth chaneM2, lags(1/1)

Vector autoregression

Sample:  1991 - 2014                            No. of obs      =        24
Log likelihood =  81.31945                      AIC             =  -6.27662
FPE            =  6.46e-06                      HQIC            = -6.198486
Det(Sigma_ml)  =  3.91e-06                      SBIC            = -5.982107

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
WDIgrowth            3     .059031   0.4564   20.15235   0.0000
chaneM2              3     .059706   0.5490   29.21012   0.0000
----------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
WDIgrowth    |
   WDIgrowth |
         L1. |   .8298292   .1852624     4.48   0.000     .4667215    1.192937
             |
     chaneM2 |
         L1. |   .5501815   .1885234     2.92   0.004     .1806826    .9196805
             |
       _cons |  -.0081434   .0187968    -0.43   0.665    -.0449845    .0286977
-------------+----------------------------------------------------------------
chaneM2      |
   WDIgrowth |
         L1. |  -.9547299   .1873817    -5.10   0.000    -1.321991   -.5874686
             |
     chaneM2 |
         L1. |  -.4334949   .1906799    -2.27   0.023    -.8072206   -.0597692
             |
       _cons |   .0881851   .0190118     4.64   0.000     .0509226    .1254476
------------------------------------------------------------------------------
```

Table 40-Granger causality: Economic Growth-fist diff.M2 as a percentage of GDP (Lebanon)

```
. vargranger

   Granger causality Wald tests
  +------------------------------------------------------------------+
  |          Equation           Excluded |   chi2     df Prob > chi2 |
  |--------------------------------------+---------------------------|
  |         WDIgrowth            chaneM2 |  8.5169     1    0.004    |
  |         WDIgrowth                ALL |  8.5169     1    0.004    |
  |--------------------------------------+---------------------------|
  |           chaneM2          WDIgrowth |   25.96     1    0.000    |
  |           chaneM2                ALL |   25.96     1    0.000    |
  +------------------------------------------------------------------+
```

Table 41-VAR(1): Economic Growth-first diff. FII (Lebanon)

```
. var WDIgrowth diff_FII, lags(1)

Vector autoregression

Sample:  1991 - 2014                            No. of obs      =        24
Log likelihood =  100.5595                      AIC             = -7.879954
FPE            =  1.30e-06                      HQIC            =  -7.80182
Det(Sigma_ml)  =  7.86e-07                      SBIC            = -7.585441

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
WDIgrowth            3     .067462   0.2901   9.805816   0.0074
diff_FII             3     .015139   0.4219   17.51699   0.0002
----------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
WDIgrowth    |
   WDIgrowth |
         L1. |   .4919078   .1571815     3.13   0.002     .1838378    .7999779
             |
    diff_FII |
         L1. |   .6769852   .7148037     0.95   0.344    -.7240044    2.077975
             |
       _cons |   .0190769   .0185001     1.03   0.302    -.0171828    .0553365
-------------+----------------------------------------------------------------
diff_FII     |
   WDIgrowth |
         L1. |  -.1295246   .0352715    -3.67   0.000    -.1986555   -.0603937
             |
    diff_FII |
         L1. |   .1515362    .160402     0.94   0.345    -.1628459    .4659183
             |
       _cons |   .0151599   .0041514     3.65   0.000     .0070232    .0232965
------------------------------------------------------------------------------
```

Table 42-Granger causality: Economic Growth-first diff. FII (Lebanon)

```
. vargranger

   Granger causality Wald tests
  +------------------------------------------------------------------+
  |          Equation           Excluded |   chi2     df Prob > chi2 |
  |--------------------------------------+---------------------------|
  |         WDIgrowth           diff_FII |  .89698     1    0.344    |
  |         WDIgrowth                ALL |  .89698     1    0.344    |
  |--------------------------------------+---------------------------|
  |          diff_FII          WDIgrowth |  13.485     1    0.000    |
  |          diff_FII                ALL |  13.485     1    0.000    |
  +------------------------------------------------------------------+
```

Table 43-VAR(1): Economic Growth-first diff. Dom. credit as a percentage of GDP (Kuwait)

```
. var WDIgrowth changeDC , lags(1/1)

Vector autoregression

Sample:  1995 - 2014                            No. of obs      =        20
Log likelihood =  42.98053                      AIC             = -3.698053
FPE            =  .0000853                      HQIC            = -3.639739
Det(Sigma_ml)  =  .0000466                      SBIC            = -3.399333
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth	3	.047727	0.1793	4.36875	0.1125
changeDC	3	.185633	0.0509	1.072253	0.5850

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth						
WDIgrowth L1.	.3230734	.2121758	1.52	0.128	-.0927836	.7389303
changeDC L1.	.0494698	.0558744	0.89	0.376	-.0600419	.1589815
_cons	-.0274057	.0145775	-1.88	0.060	-.0559771	.0011657
changeDC						
WDIgrowth L1.	-.3420581	.8252551	-0.41	0.679	-1.959528	1.275412
changeDC L1.	.2240316	.2173226	1.03	0.303	-.2019129	.6499761
_cons	.037644	.0566991	0.66	0.507	-.0734842	.1487722

Table 44-Granger causality: Economic Growth-first diff. Dom. credit as a percentage of GDP (Kuwait)

```
. vargranger

  Granger causality Wald tests
```

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth	changeDC	.78389	1	0.376
WDIgrowth	ALL	.78389	1	0.376
changeDC	WDIgrowth	.1718	1	0.679
changeDC	ALL	.1718	1	0.679

Table 45-VAR(1): Economic Growth-first diff. M2 as a percentage of GDP (Kuwait)

```
. var WDIgrowth changeM2 , lags(1/1)

Vector autoregression

Sample:  1995 - 2014                            No. of obs      =        20
Log likelihood =  49.89417                      AIC             = -4.389417
FPE            =  .0000427                      HQIC            = -4.331104
Det(Sigma_ml)  =  .0000233                      SBIC            = -4.090698
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth	3	.047346	0.1923	4.761846	0.0925
changeM2	3	.16516	0.0194	.3966418	0.8201

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth						
WDIgrowth L1.	.2343197	.2437102	0.96	0.336	-.2433435	.7119829
changeM2 L1.	.0826493	.0781256	1.06	0.290	-.070474	.2357725
_cons	-.0266367	.0136621	-1.95	0.051	-.053414	.0001405
changeM2						
WDIgrowth L1.	.4345883	.8501412	0.51	0.609	-1.231658	2.100834
changeM2 L1.	-.1618892	.2725277	-0.59	0.552	-.6960336	.3722552
_cons	.0155494	.0476579	0.33	0.744	-.0778584	.1089572

Table 46-Granger causality: Economic Growth-fist diff.M2 as a percentage of GDP (Kuwait)

```
. vargranger

  Granger causality Wald tests
```

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth	changeM2	1.1192	1	0.290
WDIgrowth	ALL	1.1192	1	0.290
changeM2	WDIgrowth	.26132	1	0.609
changeM2	ALL	.26132	1	0.609

Table 47-VAR(1): Economic Growth-first diff. FII (Kuwait)

```
Sample:  1996 - 2014                            No. of obs      =        19
Log likelihood =  89.45667                      AIC             = -8.784913
FPE            =  5.27e-07                      HQIC            = -8.734438
Det(Sigma_ml)  =  2.79e-07                      SBIC            = -8.486669
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth	3	.049192	0.1776	4.102297	0.1286
diff_FII	3	.014165	0.0832	1.724213	0.4223

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth						
WDIgrowth L1.	.3336215	.2186778	1.53	0.127	-.0949791	.762222
diff_FII L1.	.6764876	.7881775	0.86	0.391	-.8683119	2.221287
_cons	-.027539	.015025	-1.83	0.067	-.0569874	.0019094
diff_FII						
WDIgrowth L1.	-.0146576	.0629676	-0.23	0.816	-.1380717	.1087566
diff_FII L1.	-.2672394	.2269532	-1.18	0.239	-.7120594	.1775806
_cons	.0072974	.0043264	1.69	0.092	-.0011822	.0157769

Table 48-Granger causality: Economic Growth-first diff. FII (Kuvait)

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth	diff_FII	.73667	1	0.391
WDIgrowth	ALL	.73667	1	0.391
diff_FII	WDIgrowth	.05419	1	0.816
diff_FII	ALL	.05419	1	0.816

Table 49-VAR(1): Economic Growth-first diff. Dom. credit as a percentage of GDP (Morocco)

```
. var WDIgrowth changeDC , lags(1/1)

Vector autoregression

Sample:  1984 - 2014                          No. of obs      =        31
Log likelihood =   95.5507                    AIC             = -5.777464
FPE            =  .0000106                    HQIC            = -5.686991
Det(Sigma_ml)  =  7.21e-06                    SBIC            = -5.499918

Equation           Parms      RMSE     R-sq      chi2     P>chi2

WDIgrowth1            3     .029456   0.4140   21.90091   0.0000
changeDC              3     .104464   0.2020   7.847059   0.0198


                  Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]

WDIgrowth1
  WDIgrowth1
         L1.  -.6990207   .1545902    -4.52   0.000    -1.002012   -.3960295

    changeDC
         L1.  -.0537333   .0513064    -1.05   0.295    -.1542921    .0468255

       _cons   .0712013    .009304     7.65   0.000     .0529659    .0894368

changeDC
  WDIgrowth1
         L1.   1.534219   .5482388     2.80   0.005     .4596908    2.608747

    changeDC
         L1.   .2178193   .1819532     1.20   0.231    -.1388025    .5744411

       _cons  -.0222197   .0329956    -0.67   0.501      -.08689    .0424505
```

Table 50-Granger causality: Economic Growth-first diff. Dom. credit as a percentage of GDP (Morocco)

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeDC	1.0968	1	0.295
WDIgrowth1	ALL	1.0968	1	0.295
changeDC	WDIgrowth1	7.8313	1	0.005
changeDC	ALL	7.8313	1	0.005

Table 51-VAR(1): Economic Growth-first diff. M2 as a percentage of GDP (Morocco)

```
. var WDIgrowth1 changeM2, lags(1/1)

Vector autoregression

Sample:  1984 - 2014                          No. of obs      =        31
Log likelihood =  127.6563                    AIC             = -7.848791
FPE            =  1.34e-06                    HQIC            = -7.758318
Det(Sigma_ml)  =  9.08e-07                    SBIC            = -7.571245

Equation           Parms      RMSE     R-sq      chi2     P>chi2

WDIgrowth1            3     .029971   0.3934   20.10031   0.0000
changeM2              3     .041291   0.3702   18.22238   0.0001


             |     Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]

WDIgrowth1   |
  WDIgrowth1 |
         L1. | -.6143281    .194972    -3.15   0.002    -.9964662   -.2321899
             |
    changeM2 |
         L1. |  .0093941   .1423616     0.07   0.947    -.2696295    .2884178
             |
       _cons |  .0646336    .013015     4.97   0.000     .0391248    .0901425

changeM2     |
  WDIgrowth1 |
         L1. |  .9806784   .2686171     3.65   0.000     .4541985    1.507158
             |
    changeM2 |
         L1. |  .1924965   .1961347     0.98   0.326    -.1919205    .5769134
             |
       _cons | -.0118826    .017931    -0.66   0.508    -.0470267    .0232615
```

Table 52-Granger causality: Economic Growth-fist diff.M2 as a percentage of GDP (Morocco)

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeM2	.00435	1	0.947
WDIgrowth1	ALL	.00435	1	0.947
changeM2	WDIgrowth1	13.329	1	0.000
changeM2	ALL	13.329	1	0.000

Table 53-VAR(1): Economic Growth-first diff. FII (Morocco)

```
. var WDIgrowth diff_FII, lags(1)

Vector autoregression

Sample:  1985 - 2014                          No. of obs      =        30
Log likelihood =   127.954                    AIC             = -8.130267
FPE            =  1.01e-06                    HQIC            = -8.040616
Det(Sigma_ml)  =  6.77e-07                    SBIC            = -7.850027

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
WDIgrowth1            3     .030498   0.3882   19.03541   0.0001
diff_FII              3     .029983   0.1592   5.680562   0.0584
----------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
WDIgrowth1   |
  WDIgrowth1 |
         L1. |  -.6138186   .1478867    -4.15   0.000    -.9036713    -.323966
             |
    diff_FII |
         L1. |   .0321432   .1766993     0.18   0.856    -.3141811    .3784675
             |
       _cons |   .0646334    .008308     7.78   0.000     .0483501    .0809167
-------------+----------------------------------------------------------------
diff_FII     |
  WDIgrowth1 |
         L1. |   .3085348   .1453895     2.12   0.034     .0235767    .5934929
             |
    diff_FII |
         L1. |  -.0826771   .1737155    -0.48   0.634    -.4231533     .257799
             |
       _cons |  -.0058337   .0081677    -0.71   0.475    -.0218421    .0101746
------------------------------------------------------------------------------
```

Table 54-Granger causality: Economic Growth-first diff. FII (Morocco)

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	diff_FII	.03309	1	0.856
WDIgrowth1	ALL	.03309	1	0.856
diff_FII	WDIgrowth1	4.5034	1	0.034
diff_FII	ALL	4.5034	1	0.034

Table 54-VAR(1): Economic Growth-first diff. Dom. credit as a percentage of GDP (Oman)

```
. var WDIgrowth changeDC , lags(1/1)

Vector autoregression

Sample:  1984 - 2014                          No. of obs      =        31
Log likelihood =   77.8129                    AIC             =  -4.63309
FPE            =  .0000334                    HQIC            = -4.542617
Det(Sigma_ml)  =  .0000226                    SBIC            = -4.355544

Equation           Parms      RMSE     R-sq      chi2     P>chi2

WDIgrowth1            3     .042442   0.1713   6.409719   0.0406
changeDC              3     .124334   0.0972   3.336981   0.1885


                Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]

WDIgrowth1
  WDIgrowth1
         L1.   .3859787   .1525404     2.53   0.011     .0870051    .6849523

    changeDC
         L1.  -.0319042    .058999    -0.54   0.589    -.1475402    .0837317

       _cons   .0277134   .0104046     2.66   0.008     .0073208     .048106

changeDC
  WDIgrowth1
         L1.   .7494197   .4468628     1.68   0.094    -.1264152    1.625255

    changeDC
         L1.   .0500085    .172836     0.29   0.772    -.2887438    .3887608

       _cons   .0001921     .03048     0.01   0.995    -.0595476    .0599317
```

Table 55-Granger causality: Economic Growth-first diff. Dom. credit as a percentage of GDP (Oman)

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeDC	.29242	1	0.589
WDIgrowth1	ALL	.29242	1	0.589
changeDC	WDIgrowth1	2.8126	1	0.094
changeDC	ALL	2.8126	1	0.094

Table 56-VAR(1): Economic Growth-first diff. M2 as a percentage of GDP (Oman)
& Table 57-Granger causality: Economic Growth-fist diff.M2 as a percentage of GDP (Oman)

```
. var WDIgrowth1 changeM2, lags(1/1)

Vector autoregression

Sample:  1984 - 2014                            No. of obs      =         31
Log likelihood =  138.1361                      AIC             = -8.524908
FPE            =  6.81e-07                      HQIC            = -8.434435
Det(Sigma_ml)  =  4.62e-07                      SBIC            = -8.247362

Equation           Parms      RMSE     R-sq      chi2     P>chi2

WDIgrowth1            3      .02341   0.1382   4.972392   0.0832
changeM2              3     .033024   0.2491   10.28503   0.0058


                    Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]

WDIgrowth1
  WDIgrowth1
         L1.    -.2812195   .1806882    -1.56   0.120    -.6353619     .072923

    changeM2
         L1.     -.245079   .1185386    -2.07   0.039    -.4774104   -.0127476

       _cons     .0548707   .0090449     6.07   0.000     .0371429    .0725984

changeM2
  WDIgrowth1
         L1.     .4289463   .2548977     1.68   0.092     -.070644    .9285366

    changeM2
         L1.     .5291075    .167223     3.16   0.002     .2013566    .8568585

       _cons    -.0104981   .0127597    -0.82   0.411    -.0355067    .0145105


. vargranger

   Granger causality Wald tests

             Equation           Excluded     chi2     df Prob > chi2

           WDIgrowth1           changeM2    4.2746     1    0.039
           WDIgrowth1                ALL    4.2746     1    0.039

             changeM2         WDIgrowth1    2.8319     1    0.092
             changeM2                ALL    2.8319     1    0.092


. var WDIgrowth changeDC , lags(1/1)
```

Table 58-VAR(1): Economic Growth-first diff. FII (Oman)

```
. var WDIgrowth1 diiff_FII, lags(1)

Vector autoregression

Sample:  1987 - 2014                            No. of obs      =         28
Log likelihood =  121.0113                      AIC             = -8.215091
FPE            =  9.29e-07                      HQIC            = -8.127819
Det(Sigma_ml)  =  6.04e-07                      SBIC            = -7.929618

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
WDIgrowth1            3     .037161   0.0218   .6242692   0.7319
diiff_FII             3     .026532   0.2598   9.828036   0.0073
----------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
WDIgrowth1   |
  WDIgrowth1 |
         L1. |   .1314579   .2101107     0.63   0.532    -.2803515    .5432673
             |
   diiff_FII |
         L1. |  -.1828852    .255206    -0.72   0.474    -.6830798    .3173093
             |
       _cons |   .0337654   .0105646     3.20   0.001     .0130591    .0544717
-------------+----------------------------------------------------------------
diiff_FII    |
  WDIgrowth1 |
         L1. |   .0934524   .1500111     0.62   0.533    -.2005639    .3874688
             |
   diiff_FII |
         L1. |  -.5491118   .1822075    -3.01   0.003    -.9062319   -.1919918
             |
       _cons |  -.0041651   .0075427    -0.55   0.581    -.0189486    .0106184
------------------------------------------------------------------------------
```

Table 59-Granger causality: Economic Growth- first diff. FII (Oman)

```
. vargranger

   Granger causality Wald tests

  +------------------------------------------------------------------+
  |          Equation           Excluded |   chi2     df Prob > chi2 |
  |--------------------------------------+---------------------------|
  |        WDIgrowth1          diiff_FII |  .51354     1    0.474    |
  |        WDIgrowth1                ALL |  .51354     1    0.474    |
  |--------------------------------------+---------------------------|
  |         diiff_FII         WDIgrowth1 |  .38809     1    0.533    |
  |         diiff_FII                ALL |  .38809     1    0.533    |
  +------------------------------------------------------------------+
```

Table 60-VAR(1): Economic Growth-first diff. Dom. credit as a percentage of GDP (S.Arabia)

```
. var WDIgrowth changeDC , lags(1/1)

Vector autoregression

Sample:  1984 - 2014                            No. of obs      =        31
Log likelihood =  70.92977                      AIC             = -4.189018
FPE            =   .000052                      HQIC            = -4.098544
Det(Sigma_ml)  =  .0000353                      SBIC            = -3.911472

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
WDIgrowth1            3     .052213   0.2930   12.84599   0.0016
changeDC              3     .129952   0.0030   .0918588   0.9551
----------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
WDIgrowth1   |
  WDIgrowth1 |
         L1. |  -.2016821   .1362981    -1.48   0.139    -.4688215    .0654573
             |
    changeDC |
         L1. |  -.2590011   .0723059    -3.58   0.000    -.4007182   -.1172841
             |
       _cons |   .0488289   .0107131     4.56   0.000     .0278316    .0698263
-------------+----------------------------------------------------------------
changeDC     |
  WDIgrowth1 |
         L1. |  -.0621677   .3392288    -0.18   0.855     -.727044    .6027086
             |
    changeDC |
         L1. |   .0275835   .1799603     0.15   0.878    -.3251323    .3802993
             |
       _cons |     .04853   .0266637     1.82   0.069    -.0037298    .1007898
------------------------------------------------------------------------------
```

Table 61-Granger causality: Economic Growth-first diff. Dom. credit as a percentage of GDP (S.Arabia)

```
. vargranger

   Granger causality Wald tests
  +------------------------------------------------------------------+
  |          Equation           Excluded |   chi2     df Prob > chi2 |
  |--------------------------------------+---------------------------|
  |        WDIgrowth1           changeDC |  12.831     1    0.000    |
  |        WDIgrowth1                ALL |  12.831     1    0.000    |
  |--------------------------------------+---------------------------|
  |          changeDC         WDIgrowth1 |  .03358     1    0.855    |
  |          changeDC                ALL |  .03358     1    0.855    |
  +------------------------------------------------------------------+
```

Table 62-VAR(1): Economic Growth-first diff. M2 as a percentage of GDP (S. Arabia)

```
. var WDIgrowth1 changeM2, lags(1/1)

Vector autoregression

Sample:  1984 - 2014                            No. of obs      =        31
Log likelihood =  73.34769                      AIC             = -4.345012
FPE            =  .0000445                      HQIC            = -4.254539
Det(Sigma_ml)  =  .0000302                      SBIC            = -4.067467

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
WDIgrowth1            3     .056596   0.1693   6.317966   0.0425
changeM2              3     .114075   0.0398   1.286114   0.5257
----------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
WDIgrowth1   |
  WDIgrowth1 |
         L1. |  -.1842726   .1522177    -1.21   0.226    -.4826138    .1140686
             |
    changeM2 |
         L1. |  -.2248589   .0895499    -2.51   0.012    -.4003734   -.0493444
             |
       _cons |   .0417482   .0111466     3.75   0.000     .0199012    .0635951
-------------+----------------------------------------------------------------
changeM2     |
  WDIgrowth1 |
         L1. |  -.3354157   .3068107    -1.09   0.274    -.9367536    .2659222
             |
    changeM2 |
         L1. |  -.0382862   .1804971    -0.21   0.832     -.392054    .3154817
             |
       _cons |   .0373929   .0224672     1.66   0.096     -.006642    .0814277
------------------------------------------------------------------------------
```

Table 63-Granger causality: Economic Growth-fist diff.M2 as a percentage of GDP (S. Arabia)

```
. vargranger

   Granger causality Wald tests
  +------------------------------------------------------------------+
  |          Equation           Excluded |   chi2     df Prob > chi2 |
  |--------------------------------------+---------------------------|
  |        WDIgrowth1           changeM2 |  6.3051     1    0.012    |
  |        WDIgrowth1                ALL |  6.3051     1    0.012    |
  |--------------------------------------+---------------------------|
  |          changeM2         WDIgrowth1 |  1.1952     1    0.274    |
  |          changeM2                ALL |  1.1952     1    0.274    |
  +------------------------------------------------------------------+
```

Table 64-VAR(1): Economic Growth-first diff. FII (S. Arabia)

```
. var WDIgrowth diF_FII, lags(1)

Vector autoregression

Sample:  1985 - 2014                            No. of obs      =        30
Log likelihood =  114.2648                      AIC             = -7.217652
FPE            =  2.52e-06                      HQIC            = -7.128001
Det(Sigma_ml)  =  1.69e-06                      SBIC            = -6.937412

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
WDIgrowth1            3     .059454   0.0604   1.928475   0.3813
diF_FII               3      .02428   0.6180   48.53392   0.0000
----------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
WDIgrowth1   |
  WDIgrowth1 |
         L1. |  -.2070362   .1737714    -1.19   0.233    -.5476218    .1335494
             |
     diF_FII |
         L1. |   .2683603   .3018426     0.89   0.374    -.3232403    .8599609
             |
       _cons |  -.0472858   .0963741    -0.49   0.624    -.2361756    .1416041
-------------+----------------------------------------------------------------
diF_FII      |
  WDIgrowth1 |
         L1. |  -.0458805   .0709664    -0.65   0.518    -.1849722    .0932111
             |
     diF_FII |
         L1. |   .8571052   .1232694     6.95   0.000     .6155016    1.098709
             |
       _cons |   .0517798   .0393582     1.32   0.188    -.0253609    .1289205
------------------------------------------------------------------------------

.
```

Table 65-Granger causality: Economic Growth- first diff. FII (S. Arabia)

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	diF_FII	.79045	1	0.374
WDIgrowth1	ALL	.79045	1	0.374
diF_FII	WDIgrowth1	.41798	1	0.518
diF_FII	ALL	.41798	1	0.518

Table 66-VAR(1): Economic Growth-first diff. Dom. credit as a percentage of GDP (Tunisia)

. var WDIgrowth changeDC , lags(1/1)

Vector autoregression

Sample:	1984 - 2014	No. of obs	= 31
Log likelihood	= 53.73859	AIC	= -3.079909
FPE	= .0001578	HQIC	= -2.989436
Det(Sigma_ml)	= .000107	SBIC	= -2.802363

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.043247	0.1613	5.963751	0.0507
changeDC	3	.267215	0.0731	2.443781	0.2947

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.0817435	.1684748	0.49	0.628	-.2484609	.411948
changeDC L1.	.0645336	.0290171	2.22	0.026	.007661	.1214061
_cons	.0369274	.0100779	3.66	0.000	.017175	.0566797
changeDC						
WDIgrowth1 L1.	.3066739	1.040969	0.29	0.768	-1.733588	2.346936
changeDC L1.	.2564398	.1792906	1.43	0.153	-.0949634	.6078429
_cons	-.0034719	.0622692	-0.06	0.956	-.1255173	.1185736

Table 67-Granger causality: Economic Growth-first diff. Dom. credit as a percentage of GDP (Tunisia)

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeDC	4.9461	1	0.026
WDIgrowth1	ALL	4.9461	1	0.026
changeDC	WDIgrowth1	.08679	1	0.768
changeDC	ALL	.08679	1	0.768

Table 68-VAR(1): Economic Growth-first diff. M2 as a percentage of GDP (Tunisia)

. var WDIgrowth1 changeM2, lags(1/1)

Vector autoregression

Sample:	1984 - 2014	No. of obs	= 31
Log likelihood	= 68.40177	AIC	= -4.025921
FPE	= .0000613	HQIC	= -3.935448
Det(Sigma_ml)	= .0000415	SBIC	= -3.748375

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.046326	0.0377	1.213337	0.5452
changeM2	3	.154138	0.0257	.8190744	0.6640

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.1610091	.1760744	0.91	0.360	-.1840904	.5061085
changeM2 L1.	.0307852	.0538795	0.57	0.568	-.0748166	.1363871
_cons	.0348559	.0107455	3.24	0.001	.0137951	.0559166
changeM2						
WDIgrowth1 L1.	-.0382326	.5858384	-0.07	0.948	-1.186455	1.10999
changeM2 L1.	.1621879	.1792689	0.90	0.366	-.1891727	.5135485
_cons	-.0009057	.0357526	-0.03	0.980	-.0709795	.0691682

Table 69-VAR(1): Economic Growth-first diff. FII (Tunisia)

. var WDIgrowth diff_FII, lags(1)

Vector autoregression

Sample:	1985 - 2014	No. of obs	= 30
Log likelihood	= 158.3301	AIC	= -10.15534
FPE	= 1.33e-07	HQIC	= -10.06569
Det(Sigma_ml)	= 8.93e-08	SBIC	= -9.875099

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.025105	0.0270	.8329526	0.6594
diff_FII	3	.0138	0.1620	5.798997	0.0551

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	-.1226516	.188401	-0.65	0.515	-.4919108	.2466076
diff_FII L1.	.1321672	.3242452	0.41	0.684	-.5033417	.7676761
_cons	.0440731	.0090081	4.89	0.000	.0264176	.0617287
diff_FII						
WDIgrowth1 L1.	.2385758	.1035576	2.30	0.021	.0356066	.441545
diff_FII L1.	.007805	.1782265	0.04	0.965	-.3415126	.3571225
_cons	-.0067149	.0049514	-1.36	0.175	-.0164195	.0029898

Table 70-Granger causality: Economic Growth- first diff. FII (Tunisia)

. varstable, graph

Eigenvalue stability condition

Eigenvalue	Modulus
-.2465969	.246597
.1317502	.13175

All the eigenvalues lie inside the unit circle.
VAR satisfies stability condition.

Table 71-VAR(1): Economic Growth-first diff. Dom. credit as a percentage of GDP (Turkey)

. var WDIgrowth changeDC , lags(1/1)

Vector autoregression

Sample: 1984 - 2014		No. of obs	= 31
Log likelihood =	76.73668	AIC	= -4.563657
FPE =	.0000358	HQIC	= -4.473184
Det(Sigma_ml) =	.0000243	SBIC	= -4.286111

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.044815	0.1089	3.789512	0.1504
changeDC	3	.133132	0.1422	5.14053	0.0765

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	-.2513501	.1929246	-1.30	0.193	-.6294754	.1267751
changeDC L1.	.1200844	.0634449	1.89	0.058	-.0042653	.2444341
_cons	.0530783	.0111525	4.76	0.000	.0312198	.0749369
changeDC						
WDIgrowth1 L1.	-.7723398	.5731257	-1.35	0.178	-1.895646	.350966
changeDC L1.	.4231965	.1884773	2.25	0.025	.0537878	.7926052
_cons	.0657998	.0331311	1.99	0.047	.0008641	.1307356

Table 73-Granger causality: Economic Growth-first diff. Dom. credit as a percentage of GDP (Turkey)

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeDC	3.5824	1	0.058
WDIgrowth1	ALL	3.5824	1	0.058
changeDC	WDIgrowth1	1.816	1	0.178
changeDC	ALL	1.816	1	0.178

Table 74-VAR(1): Economic Growth-first diff. M2 as a percentage of GDP (Turkey)

. var WDIgrowth1 changeM2, lags(1/1)

Vector autoregression

Sample: 1984 - 2014		No. of obs	= 31
Log likelihood =	81.03517	AIC	= -4.840979
FPE =	.0000271	HQIC	= -4.750506
Det(Sigma_ml) =	.0000184	SBIC	= -4.563433

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.04362	0.1558	5.721941	0.0572
changeM2	3	.120495	0.1932	7.422935	0.0244

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.1589955	.1933142	0.82	0.411	-.2198932	.5378843
changeM2 L1.	.1601947	.0682863	2.35	0.019	.026356	.2940334
_cons	.0342857	.0130106	2.64	0.008	.0087855	.0597859
changeM2						
WDIgrowth1 L1.	-.1327574	.5340133	-0.25	0.804	-1.179404	.9138894
changeM2 L1.	-.461348	.1886349	-2.45	0.014	-.8310656	-.0916304
_cons	.0593206	.0359405	1.65	0.099	-.0111216	.1297627

Table 75-Granger causality: Economic Growth-fist diff.M2 as a percentage of GDP (Turkey)

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeM2	5.5034	1	0.019
WDIgrowth1	ALL	5.5034	1	0.019
changeM2	WDIgrowth1	.0618	1	0.804
changeM2	ALL	.0618	1	0.804

Table 76-VAR(1): Economic Growth-first diff. FII (Turkey)

```
. var WDIgrowth diff_FII, lags(1)

Vector autoregression

Sample:  1985 - 2014                          No. of obs      =        30
Log likelihood =  119.7147                    AIC             = -7.580979
FPE            =  1.75e-06                    HQIC            = -7.491328
Det(Sigma_ml)  =  1.17e-06                    SBIC            = -7.300739

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
WDIgrowth1           3       .04789   0.0126   .3836884   0.8254
diff_FII             3      .025287   0.1943   7.235833   0.0268
----------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
WDIgrowth1   |
  WDIgrowth1 |
         L1. |  -.0884935    .182443    -0.49   0.628    -.4460753    .2690883
             |
    diff_FII |
         L1. |  -.1396979   .3136469    -0.45   0.656    -.7544345    .4750388
             |
       _cons |   .0512419   .0120144     4.27   0.000      .027694    .0747897
-------------+----------------------------------------------------------------
diff_FII     |
  WDIgrowth1 |
         L1. |  -.0551789   .0963366    -0.57   0.567     -.243995    .1336373
             |
    diff_FII |
         L1. |   .4191325    .165617     2.53   0.011     .0945292    .7437358
             |
       _cons |   .0037649   .0063441     0.59   0.553    -.0086692     .016199
------------------------------------------------------------------------------
```

Table 77-Granger causality: Economic Growth-first diff. FII (Turkey)

```
. vargranger

   Granger causality Wald tests
```

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	diff_FII	.19838	1	0.656
WDIgrowth1	ALL	.19838	1	0.656
diff_FII	WDIgrowth1	.32807	1	0.567
diff_FII	ALL	.32807	1	0.567

Table 78-VAR(1): Economic Growth-first diff. Dom. credit as a percentage of GDP (Qatar)

```
Vector autoregression

Sample:  2002 - 2014                          No. of obs      =        13
Log likelihood =  31.24919                    AIC             = -3.884491
FPE            =  .0000717                    HQIC            = -3.938086
Det(Sigma_ml)  =   .000028                    SBIC            = -3.623745

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
WDIgrowth            3      .050798   0.3714   7.681199   0.0215
ChangeDC             3      .135516   0.1470   2.241112   0.3261
----------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
WDIgrowth    |
   WDIgrowth |
         L1. |   .3710971   .2238214     1.66   0.097    -.0675848    .8097791
             |
    ChangeDC |
         L1. |   .2177793   .0871571     2.50   0.012     .0469546     .388604
             |
       _cons |   .0567567    .027267     2.08   0.037     .0033145     .110199
-------------+----------------------------------------------------------------
ChangeDC     |
   WDIgrowth |
         L1. |   .4803225   .5970988     0.80   0.421    -.6899697    1.650615
             |
    ChangeDC |
         L1. |  -.2520193   .2325129    -1.08   0.278    -.7077363    .2036976
             |
       _cons |  -.0100443   .0727414    -0.14   0.890    -.1526148    .1325261
------------------------------------------------------------------------------
```

Table 79-Granger causality: Economic Growth-first diff. Dom. credit as a percentage of GDP (Qatar)

```
   Granger causality Wald tests
```

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth	ChangeDC	6.2435	1	0.012
WDIgrowth	ALL	6.2435	1	0.012
ChangeDC	WDIgrowth	.6471	1	0.421
ChangeDC	ALL	.6471	1	0.421

Table 80-VAR(1): Economic Growth-first diff. M2 as a percentage of GDP (Qaatar)

```
Vector autoregression

Sample:  2003 - 2014                          No. of obs      =        12
Log likelihood =  27.59072                    AIC             = -2.931787
FPE            =  .0002035                    HQIC            = -3.081395
Det(Sigma_ml)  =  .0000345                    SBIC            = -2.527698

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
WDIgrowth            5       .06545   0.2415   3.820963   0.4308
changeM2             5      .166552   0.2314   3.612241   0.4610
----------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
WDIgrowth    |
   WDIgrowth |
         L1. |   .2041931   .2738644     0.75   0.456    -.3325713    .7409575
         L2. |   .3241603   .2817308     1.15   0.250    -.2280219    .8763425
             |
    changeM2 |
         L1. |   .0503186   .1053585     0.48   0.633    -.1561802    .2568174
         L2. |  -.0526375   .0875572    -0.60   0.548    -.2242465    .1189715
             |
       _cons |   .0508153   .0411963     1.23   0.217     -.029928    .1315586
-------------+----------------------------------------------------------------
changeM2     |
   WDIgrowth |
         L1. |   .1410467   .6969097     0.20   0.840    -1.224871    1.506965
         L2. |   .0901713   .7169275     0.13   0.900    -1.314981    1.495323
             |
    changeM2 |
         L1. |  -.3589035   .2681083    -1.34   0.181    -.8843862    .1665792
         L2. |  -.3294037   .2228091    -1.48   0.139    -.7661016    .1072941
             |
       _cons |   .0039498   .1048333     0.04   0.970    -.2015197    .2094193
------------------------------------------------------------------------------
```

Table 81-Granger causality: Economic Growth-fist diff.M2 as a percentage of GDP (Qatar)

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth	changeM2	.7361	2	0.692
WDIgrowth	ALL	.7361	2	0.692
changeM2	WDIgrowth	.07194	2	0.965
changeM2	ALL	.07194	2	0.965

Table 82-VAR(1): Economic Growth-fist diff. FII (Qatar)

. var WDIgrowth diff_FII, lags(1)

Vector autoregression

```
Sample:  2003 - 2014                          No. of obs      =        12
Log likelihood =  53.72752                    AIC             = -7.954587
FPE            =  1.23e-06                    HQIC            = -8.044352
Det(Sigma_ml)  =  4.43e-07                    SBIC            = -7.712134
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth	3	.064063	0.0657	.8438037	0.6558
diff_FII	3	.014255	0.3346	6.034424	0.0489

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
WDIgrowth						
WDIgrowth L1.	.2644215	.302153	0.88	0.382	-.3277875	.8566305
diff_FII L1.	.5774247	1.148097	0.50	0.615	-1.672805	2.827654
_cons	.0800201	.0362649	2.21	0.027	.0089421	.151098
diff_FII						
WDIgrowth L1.	-.1442256	.0672318	-2.15	0.032	-.2759976	-.0124536
diff_FII L1.	-.4410996	.2554623	-1.73	0.084	-.9417965	.0595974
_cons	.0128906	.0080693	1.60	0.110	-.0029249	.0287061

Table 83-Granger causality: Economic Growth-fist diff. FII (Qatar)

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth	diff_FII	.25295	1	0.615
WDIgrowth	ALL	.25295	1	0.615
diff_FII	WDIgrowth	4.6019	1	0.032
diff_FII	ALL	4.6019	1	0.032

Table 84-VAR(1): Economic Growth-first diff. Dom. credit as a percentage of GDP (UAE)

. var WDIgrowth1 changeM2, lags(1/1)

Vector autoregression

```
Sample:  1984 - 2014                          No. of obs      =        31
Log likelihood =   73.0953                    AIC             = -4.328729
FPE            =  .0000453                    HQIC            = -4.238256
Det(Sigma_ml)  =  .0000307                    SBIC            = -4.051183
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.059756	0.0506	1.651537	0.4379
changeM2	3	.135467	0.0008	.0241634	0.9880

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
WDIgrowth1						
WDIgrowth1 L1.	.1009438	.221093	0.46	0.648	-.3323905	.5342782
changeM2 L1.	-.0637203	.1019288	-0.63	0.532	-.263497	.1360564
_cons	.0395771	.0160278	2.47	0.014	.0081632	.070991
changeM2						
WDIgrowth1 L1.	.0215268	.5012154	0.04	0.966	-.9608373	1.003891
changeM2 L1.	-.0200223	.2310714	-0.09	0.931	-.4729139	.4328692
_cons	.0478579	.0363348	1.32	0.188	-.0233571	.1190729

Table 85-Granger causality: Economic Growth-first diff. Dom. credit as a percentage of GDP (UAE))

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeM2	.39081	1	0.532
WDIgrowth1	ALL	.39081	1	0.532
changeM2	WDIgrowth1	.00184	1	0.966
changeM2	ALL	.00184	1	0.966

Table 86-VAR(1): Economic Growth-first diff. M2 as a percentage of GDP (UAE))

```
. var WDIgrowth1 changeM2, lags(1/1)

Vector autoregression

Sample:  1984 - 2014                            No. of obs      =        31
Log likelihood =   73.0953                      AIC             = -4.328729
FPE            =  .0000453                      HQIC            = -4.238256
Det(Sigma_ml)  =  .0000307                      SBIC            = -4.051183
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.059756	0.0506	1.651537	0.4379
changeM2	3	.135467	0.0008	.0241634	0.9880

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.1009438	.221093	0.46	0.648	-.3323905	.5342782
changeM2 L1.	-.0637203	.1019288	-0.63	0.532	-.263497	.1360564
_cons	.0395771	.0160278	2.47	0.014	.0081632	.070991
changeM2						
WDIgrowth1 L1.	.0215268	.5012154	0.04	0.966	-.9608373	1.003891
changeM2 L1.	-.0200223	.2310714	-0.09	0.931	-.4729139	.4328692
_cons	.0478579	.0363348	1.32	0.188	-.0233571	.1190729

Table 87-Granger causality: Economic Growth-fist diff.M2 as a percentage of GDP (UAE)

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeM2	.39081	1	0.532
WDIgrowth1	ALL	.39081	1	0.532
changeM2	WDIgrowth1	.00184	1	0.966
changeM2	ALL	.00184	1	0.966

Table 88-VAR(1): Economic Growth-fist diff. FII (UAE)

```
. var WDIgrowth dif_FII, lags(1)

Vector autoregression

Sample:  1985 - 2014                            No. of obs      =        30
Log likelihood =  118.0273                      AIC             = -7.468489
FPE            =  1.96e-06                      HQIC            = -7.378838
Det(Sigma_ml)  =  1.31e-06                      SBIC            = -7.188249
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.060378	0.0653	2.09722	0.3504
dif_FII	3	.021536	0.8702	201.1867	0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.1848822	.1778233	1.04	0.298	-.163645	.5334095
dif_FII L1.	.1678806	.1914516	0.88	0.381	-.2073577	.543119
_cons	-.029762	.0713964	-0.42	0.677	-.1696965	.1101724
dif_FII						
WDIgrowth1 L1.	.0806456	.0634257	1.27	0.204	-.0436665	.2049577
dif_FII L1.	.9474366	.0682866	13.87	0.000	.8135973	1.081276
_cons	.0209623	.0254655	0.82	0.410	-.0289493	.0708739

Table 89-Granger causality: Economic Growth-fist diff. FII (UAE)

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	dif_FII	.76892	1	0.381
WDIgrowth1	ALL	.76892	1	0.381
dif_FII	WDIgrowth1	1.6167	1	0.204
dif_FII	ALL	1.6167	1	0.204

Table 89-VAR(1): Economic Growth-fist diff. Dom. credit as a percentage of GDP (Sudan)

. var WDIgrowth1 changeDC , lags(1)

Vector autoregression

Sample: 1984 - 2014		No. of obs	= 31
Log likelihood	= 53.73859	AIC	= -3.079909
FPE	= .0001578	HQIC	= -2.989436
Det(Sigma_ml)	= .000107	SBIC	= -2.802363

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.043247	0.1613	5.963751	0.0507
changeDC	3	.267215	0.0731	2.443781	0.2947

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.0817435	.1684748	0.49	0.628	-.2484609	.411948
changeDC L1.	.0645336	.0290171	2.22	0.026	.007661	.1214061
_cons	.0369274	.0100779	3.66	0.000	.017175	.0566797
changeDC						
WDIgrowth1 L1.	.3066739	1.040969	0.29	0.768	-1.733588	2.346936
changeDC L1.	.2564398	.1792906	1.43	0.153	-.0949634	.6078429
_cons	-.0034719	.0622692	-0.06	0.956	-.1255173	.1185736

Table 89-Granger causality: Economic Growth-fist diff. Dom. credit as a percentage of GDP (Sudan)

. vargranger

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeDC	4.9461	1	0.026
WDIgrowth1	ALL	4.9461	1	0.026
changeDC	WDIgrowth1	.08679	1	0.768
changeDC	ALL	.08679	1	0.768

Table 90-VAR(1): Economic Growth-fist diff.M2 as a percentage of GDP (Sudan)

Vector autoregression

Sample: 1984 - 2014		No. of obs	= 31
Log likelihood	= 68.40177	AIC	= -4.025921
FPE	= .0000613	HQIC	= -3.935448
Det(Sigma_ml)	= .0000415	SBIC	= -3.748375

Equation	Parms	RMSE	R-sq	chi2	P>chi2
WDIgrowth1	3	.046326	0.0377	1.213337	0.5452
changeM2	3	.154138	0.0257	.8190744	0.6640

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
WDIgrowth1						
WDIgrowth1 L1.	.1610091	.1760744	0.91	0.360	-.1840904	.5061085
changeM2 L1.	.0307852	.0538795	0.57	0.568	-.0748166	.1363871
_cons	.0348559	.0107455	3.24	0.001	.0137951	.0559166
changeM2						
WDIgrowth1 L1.	-.0382326	.5858384	-0.07	0.948	-1.186455	1.10999
changeM2 L1.	.1621879	.1792689	0.90	0.366	-.1891727	.5135485
_cons	-.0009057	.0357526	-0.03	0.980	-.0709795	.0691682

Table 91-Granger causality: Economic Growth-fist diff.M2 as a percentage of GDP (Sudan)

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
WDIgrowth1	changeM2	.32647	1	0.568
WDIgrowth1	ALL	.32647	1	0.568
changeM2	WDIgrowth1	.00426	1	0.948
changeM2	ALL	.00426	1	0.948