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Essays on International Competitiveness, Investment and Competition

PANAGIOTIS V. BARKAS

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The views and ideas represented hereby are those of the author and do not necessarily reflect those of the institutions and organisations he might be or have been affiliated to.

To my parents, who always wanted me to become a "Doctor".

Doctoral Supervising and Final Examining Committee

Principal Supervisor:	Prof. Louka Katseli[1]
Supervising Committee Members:	Prof. Evangelia Papapetrou[2]
	Prof. Alexandros Sarris
Members of Final Examining Committee:	Prof. Louka Katseli (*Chair*)
	Prof. Evangelia Papapetrou
	Prof. Andreas Papandreou
	Prof. Panagiotis Alexakis
	Assoc. Prof. Nikolina Kosteletou
	Assoc. Prof. Nektarios Alexopoulos[3]
	Assist. Prof. Paraskevi Boufounou

[1] As per the decision of the Faculty of Economics Assembly on July 20th, 2017, Professor Louka Katseli (National and Kapodistrian University of Athens) replaced Associate Professor Nicholas Theocharakis (Principal Supervisor, Supervising Committee decided on October 8th, 2020, National and Kapodistrian University of Athens) as a principal supervisor of the supervising committee.

[2] As per the decision of the Faculty of Economics Assembly on July 20th, 2017, Professor Evangelia Papapetrou (National and Kapodistrian University of Athens) replaced Professor Nikolaos Milonas (Member of the Supervising Committee decided on October 8th, 2020, National and Kapodistrian University of Athens) as a member of the supervising committee.

[3] As per the decision of the Faculty of Economics Assembly on July 1st, 2020, Associate Professor Nektarios Alexopoulos (University of Crete) replaced Emeritus Alexandros Sarris (Member of the Supervising Committee decided on October 8th, 2020, National and Kapodistrian University of Athens) as a member of the final examining committee.

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That is it. Five years of work, progress, challenges and hope have finally borne fruits; the work outcome of lonely evenings, busy weekends, summer trips for academic conferences and winter trips for consultations, invigilation sessions in university auditoria, effort for personal and professional development along with researchers and international organisation officials and, certainly, a persistent desire to become a more useful person to the academic and policy community. All these would have certainly not sufficed had it not been for the warm support and continuous encouragement of beloved and much appreciated people who surrounded me throughout these challenges and years.

First of all, I would like to express my deep gratitude to my principal supervisor, Prof. Louka Katseli, who graciously embraced the diversity of my ideas and believed in my ability to defend them to the end. Endeavouring to write a thesis, which would combine the academic and policy approaches, constituted a pivotal point for me to engage into doctoral studies. The support of Prof. Katseli was thus crucial, while her previous exposure to both academic and policy economics laid the foundations for our sound collaboration, communication, and her understanding towards my needs and thoughts. This hybrid approach is neither taken for granted, nor easy, in any academic community. It was, however, a genuine motivation for my decision to delve into a double life of an academic and policy practitioner. I trust that the outcome of this effort reflects this motivation and contributes to bringing closer these two worlds through an analysis that endeavours to synthesise the benefits of the two. In doing so, the thesis aims to establish rigorous and relevant findings concerning the structural transformation of the economy and the exercise of economic policy in the areas of international competitiveness, investment and competition.

The outcome would not have been the present one, had it not been for the guidance and goading of Prof. Katseli, who knew not only when to provide me with the space and time to reflect and create, but also when to step in and encourage me or channel my efforts into their most productive use. Unconditional and continuous support was also kindly provided by the other two members of my doctoral supervising committee, Prof. Evangelia Papapetrou and Prof. Alexandros Sarris, who were available and devoted time for a constructive exchange of ideas and critical discussion in their areas of academic expertise. The same holds true for other faculty members of the Faculty of Economics of the National and Kapodistrian University of Athens, and particularly, Prof. Panayiotis Alexakis, Assoc. Prof. Nikolina Kosteletou, Prof. Nikolaos Milonas, Prof. Panagiotis Petrakis, Prof. Andreas Papandreou, Prof. Ioannis Stournaras, Prof. Nikolaos Theocarakis, and the Director of the Doctoral Programme in Economics, Prof. Stelios Kotsios.

My decision to conduct doctoral research in economics matured over the years, whereas the interest in policy mostly stems from three facts: the involvement in economic policy of many of our faculty members during my studies in Athens, my opportunity to work for two renowned international organisations, the OECD and the WTO, and my MPhil studies at the University of Cambridge. Perhaps influenced from one of my mentors in Cambridge, Dr. William Janeway, I came to read economics and finance through the lens of their practical applicability throughout these years. In other words, models were only relevant if I could see them translating into implementable policies, while findings useful only if they could have an impact on the life of people and provide a realistic evidence-based recommendation to improve an economic system.

When deciding to leave the world of finance and delve into writing and working on policy, I knew this would bear risks. Yet, one of the main lessons my finance studies taught me was that increased

risks translate into higher expected return on my intellectual investment. Besides an academic, Janeway is also a legendary venture capitalist, and I could have never imagined a better way to learn about the concept of risky investments. I was glad to have him advise me, particularly during my first months after Cambridge in 2014 and the first steps in the world of doctoral studies and my professional career.

The lessons of Bill Janeway were crucial for my research agenda, as well as my professional development. At the intersection of policy and economics, I decided that there was nothing more worth my late twenties than simultaneously exploring how I could make academic research relevant for policymakers and how I could embed the practical side of policy analysis into the academic debate. I really hope that this thesis renders the gap between the two somehow narrower.

Escaping from the classical paradigms of economics and enriching my thesis with some policy analysis and, what I consider, relevant actuality allowed me to keep abreast of latest economic developments, publish my writings and contribute to some extent to the economic policy debate in Greece and Europe. Hence, my writings emerged from the friction with the work of international academic and policy communities. In this respect, besides the crucial support of the university community, I owe a lot to my colleagues and mentors in the World Trade Organization (WTO), the Organisation for Economic Co-operation and Development (OECD) and the Bank of Greece, who kindly supported my effort throughout this journey. High-level debates and a series of events in the WTO and OECD policy environment constituted a real-world check for my interest and knowledge. I acknowledge that I largely benefitted from both worlds.

My thesis would have not been the same had I not had the chance to work in the Trade in Services and Investment Division of the WTO and the Country Studies Branch of the Economics Department, the Competition Division of the Directorate for Financial and Enterprise Affairs, the

Science and Technology Policy Division of the Directorate for Science, Technology and Innovation and the South East Europe Division of the Global Relation Secretariat of the OECD. Significant fraction of the research included hereby benefitted from numerous OECD and WTO publications, Working Parties, formal and informal meetings, while I am also grateful for the access to data and documents I was provided with. Without this support, a large part of this thesis would have been impossible to complete.

The work for and in the WTO and the OECD boosted my motivation to give the present thesis its final shape. Ever since my years in Cambridge, I considered that, while international organisations have a lot to learn from academia, it is also true that academic research outputs would better serve their purpose by being relevant to the world of international organisations and policymakers. To this aim, the thesis aims at synthesising academic and policy essays that answer similar questions related to structural transformation in three different areas of economic policymaking: international competitiveness, investment and competition. While my WTO and OECD experience transcended the borders of Greece and allowed me to research and contribute to the design of evidence-based policies for countries like Albania, Bosnia and Herzegovina, Croatia, Cuba, Kosovo, Kuwait, Montenegro, North Macedonia, Serbia, Slovenia, and Tunisia, my choice and focus of this thesis is on Greece. I firmly believe that the transferability of knowledge and skills that I acquired from my engagement in these projects allowed me to enrich my research and improve the quality of my output. I deeply hope this will be a flagship work of mine, which I will refer to for many years to come.

This thesis would have not been conceived, let alone written, were it not for the support of my colleagues, supervisors, and friends. Most of all, I owe a gratitude expression to my parents,

Vasilis and Olga, my brother, Enos, and Chrysi, my partner in life. Their support and belief in my skills and interest urged me to persist and invest time and effort to this thesis. For all these, I am greatly indebted and wholeheartedly grateful.

Following numerous rounds of reviews from supervisors and mentors, I do affirm my own sole responsibility for all errors of omission, commission and interpretation that may reside herein.

Panagiotis V. Barkas

Athens, Greece, 2020

Contents

List of figures

List of tables

List of boxes

Abbreviations and acronyms

AMECO	Annual Macro-Economic Database of the European Commission
ANBERD	ANalytical Business Enterprise Research and Development
ATC	Anatomical Therapeutic Chemical Classification System
BC	Bankruptcy Code
BMD4	Benchmark Definition 4th Edition
BoG	Bank of Greece
CET1	Common Equity Tier 1
CIS	Community Innovation Survey
DEU	Germany
EA	Euro Area
EC	European Commission
ECA	European Court of Auditors
ECB	European Central Bank
ECFIN	Economic and Financial Affairs Council
EFSF	European Financial Stability Facility
EFSI	European Fund for Structural Investment
EIB	European Investment Bank
EIBIS	EIB Group Survey on Investment and Investment Finance
EKT	National Documentation Centre
ELA	Emergency Liquidity Assistance
ELSTAT	Hellenic Statistical Authority
EOF	National Organisation for Medicines
EPO	European Patent Office

ESM	European Stability Mechanism
EU	European Union
EUR	Euro
FDI	Foreign Direct Investment
FRA	France
GAAP	Generally Accepted Accounting Principles
GBR	Great Britain
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on Research and Development
GFCF	Gross Fixed Capital Formation
GRC	Greece
GSEVEE	Hellenic Confederation of Professionals, Craftsmen and Merchants
GSRT	General Secretariat for Research and Technology
GVC	Global Value Chains
HBA	Hellenic Bank Association
HCC	Hellenic Competition Commission
HFRI	Hellenic Foundation for Research and Innovation
HFSF	Hellenic Financial Stability Fund
HTA	Health Technology Assessment
ICT	Information and Communication Technologies
IFRS	International Financial Reporting Standard
II	International Institutions
IMF	International Monetary Fund
IMF OAP	IMF Regional Office for Asia and the Pacific

INN	International Non-proprietary Name
IOBE	Foundation for Economic & Industrial Research
IPR	Intellectual Property Rights
ISO	International Organization for Standardization
IT	Information Technology
ITA	Italy
I-TIP	Integrated Trade Intelligence Portal of the WTO
JPN	Japan
JPY	Japanese Yen
KBC	Knowledge-Based Capital
KEPE	Centre of Planning and Economic Research
LDC	Least Developed Countries
LSDV	Least Squares Dummy Variable
MAH	Market Authorisation Holders
MFI	Monetary Financial Institutions
MFP	Multifactor Productivity
MNE	Multinational Enterprise
MoU	Memorandum of Understanding
NAGREF	National Agricultural Research Foundation
NBG	National Bank of Greece
NCRI	National Council of Research and Innovation
NFC	Non-financial Counterparty
NPE	Non-performing Exposures
NPL	Non-performing Loans
NSF	National Science Foundation

NSRF	National Strategic Reference Framework
OECD	Organisation for Economic Co-operation and Development
OFT	Office of Fair Trading
OTC	Over-The-Counter Medicines
PA	Price Advantage
PIP	Public Investment Programme
PMR	Product Market Regulation
PRT	Portugal
PSI	Private Sector Involvement
PWC	PricewaterhouseCoopers
R&D	Research and Development
RCA	Revealed Comparative Advantage
RCC	Resolution and Collection Corporation
REER	Real Effective Exchange Rate
SEE	South Eastern Europe
SFEE	Hellenic Association of Pharmaceutical Companies
SME	Small and Medium Enterprises
STPD	Services Trade Policy Database (WTO)
STRI	Service Trade Restrictiveness Index (OECD)
TFP	Total Factor Productivity
TiVA	Trade in Value Added
UNCTAD	United Nations Conference on Trade and Development
USA	United States of America
VAT	Value Added Tax

WEF	World Economic Forum
WHO	World Health Organisation
WIPO	World Intellectual Property Organisation
WTO	World Trade Organization

1. Introduction: On the policy drivers of effective structural transformation

1.1. Tying up the three essays

The present thesis comprises three essays-chapters exploring selected policy and institutional determinants of the dynamics of economic transformation. It focuses on the policy dimension of economic transformation during the great recession in Greece and the European South. The common underlying theme running through all chapters of this dissertation consists in the investigation of the role of economic policies and institutions in driving structural change. The notion of structural change entails changes in the composition of production and the transformation of production and consumption patterns driven by policies to improve international competitiveness, investment and consumer welfare.

It follows from the previous paragraph that this thesis touches upon different strands of policy and microeconomic literature falling within the realm of industrial organisation, microeconomic foundations of investment and competition economics. While the thesis does not aim to be all-encompassing in analysing the parameters driving the three aspects of structural change examined hereby, it does endeavour to explain the underlying economic relationships between the policy variables under scrutiny. Each of the three essays seeks to provide an analysis of the respective research questions and to highlight the interdependences across different policy areas.

This thesis starts macro and ends micro. It considers a number of policies set out to tackle specific problems, ranging from broad economic reforms through programmes of international financial conditionality to the optimal design of sectoral industrial policies that could, unintentionally and unnecessarily, distort competition in the product market and impede reforms from levelling the

playing field and maximising social welfare. A common feature of all chapters consists in that they deploy interdisciplinary approaches and a combination of research methodologies for policy evaluation. At the same time, they consider the negative and unintended externalities of reforms, regulations and policies in the frame of optimal policy design for structural transformation.

Identifying the policy drivers of effective structural transformation constitutes an important challenge often faced by governments and institutions in the design and implementation of economic policy. The aim of this thesis is to examine how economic policies have and can be designed in a manner that facilitates structural transformation during the great recession in Greece. The literature on economic policy during the crisis has so far analysed either macro or microeconomic effects, but not yet the combined macro and micro dimensions of structural reforms. Thus, the contributions of this thesis to the economic and policy literature comprise empirical findings and theoretical insights on how policy tools may achieve, or not, their initial objectives. We investigate policy effects in three dimensions of the Greek economy during the crisis that capture both the internal and the external market. In order to do so, the present thesis investigates how policy variables are related to the implementation success of structural reforms and the desired structural economic transformation. This overarching notion underpins the key research questions of each chapter.

In this respect, the first essay endeavours to analyse how policies and institutional hurdles contribute to the structural transformation of the Greek economy, and particularly, its international trade competitiveness. The second essay contributes to the ongoing discussion on how policy reforms and institutions can help boost investment. Given that the notion of structural reforms is quite broad in the relevant literature, the third essay specifically investigates the potential

implementation challenges of competition policy, as a much debated area of recent structural reforms. It uses insights from microeconomics and public finance to show how competition policy can be applied in the public policy domain of pharmaceutical pricing to enhance the effectiveness of structural reforms and the maximisation of consumer surplus, under fiscal constraints.

1.2. Objectives and structure of the thesis

As discussed above, this thesis is a synthesis of essays which complement and extend the literature and research framework on interdependent decisions of economic policy under imperfect competition, market frictions, bounded rationality and limited fiscal space. In practice, these have proven to be often accompanied by radical uncertainty, especially during times of severe economic downturn. As Keynes stressed back in 1921, radical uncertainty does not just refer to the inability to estimate the likelihood of events and the distribution of potential outcomes. "*By uncertain knowledge,*" wrote Keynes, "*I do not mean merely to distinguish what is known for certain from what is only probable. The sense in which I am using the term is that in which the prospect of a European war is uncertain… There is no scientific basis to form any calculable probability whatever. We simply do not know*" (Keynes, 1921). The unfolding of events in the Greek and Euro crisis has shown that strategic foresight for anticipating the previously unimaginable could be the way forward and that reforms should take into account the interrelated aspects of economic and social policy.

It does constitute a key goal of this work to disentangle between three intertwined economic drivers, often used in designing and evaluating economic policy: competitiveness, investment and competition. The deductive narrative of the thesis proceeds in the logic of moving step by step,

from the rationale behind national and international policy making to a specific case study, and from the horizontal policy and institutional challenges of trade, structural competitiveness and investment promotion to the undesired competition effects of certain policy reforms. As a result, the thesis evolves from general issues to more specific ones, from those of policy determinants of trade competitiveness to the profit maximisation incentives of firms in a dynamic sector of the Greek economy.

The thesis starts with an essay that examines the impact of policy decisions on the outcomes of structural reforms, focusing on aspects of international trade competitiveness of Greek goods and services. It then continues by examining the impact of various policy variables on a key element of economic growth, investment. Finally, it illustrates the potential positive and negative aspects of the implementation of certain reforms on consumer welfare. In this framework, the third and last essay focuses on reforms that pertain to competition policy, as a policy area where a number of measures have been taken in recent years and which directly impacts a large number of sectors. The sector of pharmaceuticals is chosen as reference, as pharmaceutical pricing reforms constitute a good example of an area where a continuous balance needs to be struck between public policy related to health protection, industrial policy and market competition objectives.

The following three sections provide a synopsis of the main points for each of the three essays of this thesis, outlining their research questions, main contributions and key findings.

1.2.1. Synopsis of Essay 1 on international competitiveness: Research questions, main contributions and key findings

Has the implementation of structural policy reforms or lack thereof in the countries of the European periphery shifted the structure of exports and their competitiveness in the global markets? The first essay[4] attempts to link the research stream of economic policymaking with that of structural competitiveness. It investigates the effects and channels of transmission that institutional bottlenecks and sectoral policies had on the export competitiveness of Greek commodities and services during the crisis.

Greece has been often described in the past as a closed or introvert economy with high dependence on international markets, but limited openness to trade and investment. Therefore, the focus of domestic and international economic policies has been on switching from an inward economic growth model, driven by internal consumption and demand of non-tradable goods and services, to an extrovert one, based on exports and FDI. By choosing structural trade competitiveness as a proxy for the evaluation of success in policy implementation, the first essay uses a combination of theoretical and empirical research methodologies to analyse the structural change that occurred during the first years of the implementation of the Memoranda of Understanding between Greece and its creditors. The essay focuses on the international trade competitiveness of the Greek economy and, in particular, of its tradable products and services. It thus aims relate economic policies and institutional bottlenecks to the structural transformation of international trade. The

[4] This essay builds upon the personal research of the author on the role of economic policies on trade competitiveness and parts of it have been published as a book chapter with the following citation details: *"International economic policy and Keynes rediscovery in the Greek-Euro crisis"*, (2015), in Collective Volume *"Modern dilemmas: Understanding collective action in the 21st century"*, Kissane, D. and Volacu, A., Ibidem Press (link), Germany.

issue of structural transformation is hereby examined by focusing on export composition and sectoral comparative advantages, as an important indicator of international competitiveness.

The essay finds and documents a shifting structure of international competitiveness for a number of commodities and service sectors. Empirical results point to a deterioration of the competitive position of sectors with historically significant comparative advantage and a slight improvement for those with historically lower comparative advantage.

A further contribution of the analysis lies at extending the trade theory of comparative advantage to service trade. For countries of the European periphery with a strong focus on the production and trade of services, any examination of competitiveness should take services into account. Therefore, this essay extends the classical use of the Revealed Comparative Advantage (RCA) index to account for the international competitiveness of trade in services. We also test econometrically whether various policy variables have affected the competitiveness of internationally tradable services. Our findings suggest that high barriers to competition and low regulatory transparency hamper the competitiveness of tradable services. On the other hand, improvements in the international competitiveness of services are found to be positively associated with labour mobility and R&D expenditure.

Trade theory and the stated justification of policy interventions suggest that Greece and other countries of the European periphery should support and foster sectors in which they traditionally have a strong competitive advantage. The empirical findings of this essay suggest that a diversification strategy which strengths small sectors without strong historical precedent of comparative advantage might mitigate risks in times of crisis and enhance comparative advantage in the medium run.

1.2.2. Synopsis of Essay 2 on investment: Research questions, main contributions and key findings

How did policy and institutional reforms impact the performance of the public and private investment in Greece? What policies can and should be promoted to rebound stagnant investment? This essay[5] endeavours a systematic examination of the most important factors that economic literature deems relevant for encouraging or deterring investment growth during the economic crisis in Greece.

Aggregate investment has declined markedly since the start of the global financial crisis. Reviving investment and improving its quality is crucial to supporting the nascent recovery and raising living standards. This hinges primarily on improving the business environment and strengthening public governance. Lowering product market impediments and enhancing regulatory quality constitute key instruments to achieve these goals. These, in turn, are shown to strengthen investment incentives, attract more FDI, and foster a country's integration into global value chains. Other key policies involve further streamlining of insolvency procedures, building an innovation ecosystem, overcoming structural problems in the banking sector and enhancing the quality of public investment through long-term planning.

The second essay focuses thus on what is often considered to be the optimal way out of economic stagnation, namely on boosting investment. Given the sharp decline both private and public investment recorded in Greece since 2008, this essay aims at shedding light on the key policy

[5] Sections of this essay were published as an OECD Working Paper in 2018. The full citation details are the following: Barkas, P. and M. Pisu (2018), "Boosting investment in Greece", *OECD Economics Department Working Papers*, No. 1506, OECD Publishing, Paris, https://doi.org/10.1787/53961c92-en. It also features as a thematic chapter in the OECD Economic Survey of Greece 2018. The full citation details are the following: OECD (2018), *OECD Economic Surveys: Greece 2018*, OECD Publishing, Paris, https://doi.org/10.1787/eco_surveys-grc-2018-en.

determinants of private and public investment, which are necessary for the rebound of economic activity.

By reviewing the recent literature and Greece's data, we analyse the binding institutional and policy factors that have hampered investment growth in the past decade, as well as the most pertinent implementation challenges of needed structural reforms. Unlike the other two essays, the present analysis is based on a comparative and qualitative methodology, rather than a quantitative one. The essay seeks to analyse how corporate investment in Greece has responded to recent policy developments and considers a number of reform priorities to support investment growth. It also considers the case of public investment and examines the potential efficiency gains that could be achieved in the current framework of governance, while mapping out the possibility of some incremental steps, necessary for pursuing a long-term public investment strategy.

1.2.3. Synopsis of Essay 3 on competition policy: Research questions, main contributions and key findings

Could policies of fiscal consolidation pursued through the pricing policy of pharmaceuticals, cause competition-distorting side-effects in product markets? How can policies be designed in a way that ensures the achievement of their objectives without distorting the level playing field in the competition between market actors?

In the context of the first essay, fair competition and less restrictive regulation are found to be crucial for the international competitiveness of goods and services. Furthermore, the second essay documents that the quality and restrictiveness of product market regulation constitute key

determinants for boosting investment in Greece. In line with those, the third essay[6] sheds light on competition-distorting negative externalities that may arise from policy interventions in the pharmaceutical sector. It aims at identifying health policy regulations in pricing policy that impede healthy competition among pharmaceuticals. The essay attempts thus to highlight through an example how economic policies could generate undesired effects against generally agreed upon principles.

The analysis focuses on the distortion of competitive neutrality that can be caused by myopic pricing and licencing rules of pharmaceutical products. The examination of potential competition-distorting effects of market regulations is based on a case study of the pricing of generic, patented and off-patent medicines, as envisaged in Greece's 2016 health policy legislation. By using the methodology of the OECD Competition Assessment Toolkit, the essay identifies specific pricing rules that may distort competition between generic and originator pharmaceutical products. The essay elaborates on the competition effects of these pharmaceutical pricing rules and examines competition advantages and disadvantages afforded to substitute pharmaceutical products.

By linking aspects of public finance and microeconomics, the essay examines the potential effects of a price mark-up regulation that was imposed in 2016 in the Greek pharmaceutical market concerning generic medicines. By using actual data on 2016 quantities and prices of more than 9500 medicines that were priced by the Greek National Organisation of Medicines, the paper quantifies the welfare effects of the pharmaceutical pricing reform. It also provides a theoretical

[6] Sections of this essay were published by the author as part of his work for the publication of the *OECD Competition Assessment Reviews: Greece*. Paris: OECD Publishing. Retrieved from https://doi.org/10.1787/9789264088276-en

framework concerning the measurement of competition effects of pricing rules in place for the case of generic drugs. The findings suggest a welfare loss for patients of about EUR 414 million.

We show the importance of good regulatory practices and their potential contribution towards the structural transformation of the pharmaceutical sector in order to both serve the industry and achieve the social targets of pharmaceutical policy. By systematising the applicative legislation, the essay estimates the potential gains in consumer welfare that could be achieved by lifting the competition-distorting regulation and streamlining it with other EU regimes. The findings of the essay suggest that a one-size-fits-all approach might not be optimal in areas of public interest. Under such circumstances, the examination of fiscal effects of a reform is insufficient. In accordance with recent literature findings, our research suggests that policy reforms need to be accompanied by a "regulatory guillotine" and a regulatory impact assessment of the potential and undesired competition-distorting effects.

The essay concludes by proposing an alternative re-pricing rule. The recommended policy alternative is shown to be able to lift the unnecessary and anti-competitive burden and maximise consumer welfare, without incurring additional public expenditure costs as a consequence of the pharmaceutical reimbursement policy.

2. The impact of institutional bottlenecks and economic policies on structural competitiveness

2.1. Introduction

It has become common knowledge that the global economic crisis hit countries of the European periphery like Ireland, Portugal, Spain, Italy, and especially Greece more severely than any other within the European Union. Since the crisis erupted, these countries have experienced considerable GDP contraction, high levels of debt, considerably high unemployment rates, and devastating economic and social consequences. Furthermore, the problems that they faced caused significant spillovers in the European and global economy.

The potential externalities and contagion effects of the crisis and implemented policies urged national governments to cooperate with international institutions (IIs) in order to structurally reform countries through policies that promote long-term financial and economic sustainability. The effectiveness of these policies and their success in addressing the fiscal, structural or financial targets have often been subject to debate. Depending on the scope, previous research has used different theoretical and empirical tools for policy evaluation. Such research has mostly been undertaken by institutions, rather than the academic and research community.

2.1.1. Content and contribution

Given the ongoing structural reforms, this essay focuses on the first years of reform implementation in Greece and the country's effort to promote economic adjustment. While Greece followed the going-for-growth policy recommendations better than any other OECD country, it faced the harshest economic recession among European countries (OECD, 2012). The essay aims

to contribute towards explaining this paradox by evaluating the policy impact on structural competitiveness of Greek commodities and internationally tradable services. In particular, it endeavours to explore the channels through which implemented economic policy reforms have achieved one of their main goals, that of extroversion through enhanced trade competitiveness and structural transformation.

The ECB (2005) has defined structural competitiveness as a set of characteristics of an economy that can determine its export performance. These characteristics include, inter alia, human capital, infrastructure, regulations on product and labour market, the legal and institutional framework, as well as taxes. Structural competitiveness promotes trade openness. By investigating export performance, we attempt to evaluate how policies have affected trade competitiveness of both products and services. We also benchmark against other European periphery economies, which also lagged before the crisis in terms of competitiveness of their products and services in the international markets.

Existing studies have elaborated on the channels through which global economic conditions have initially impacted Greece and other countries of the European periphery. A typical narrative of such studies consists in viewing the Greek crisis as a problem of unsound macroeconomic foundations, which was further exacerbated by the great recession, starting with the 2008 financial market crisis in the United States. The lack of financing options from the capital markets led countries of the European periphery to shift to institutional channels of lending, such as the International Monetary Fund (IMF) and the European Stability Mechanism (ESM). Debt refinancing was accompanied by policy conditionality, which often obliged countries to pursue a specific reform path, with a view to bringing public debt to sustainable levels and structurally

transforming their economies (ESM, 2018). However, achieving the long-term goal of these policies largely relied not only on improving the fiscal balances, but also on addressing the challenging issue of structural competitiveness, particularly in the sectors in which countries traded internationally with comparative advantage.

Recent debates on trade wars and the potential shift towards protectionist policies stress the need to better understand the benefits of trade and how policies affect the international trade aspect of national economies, particularly through the channel of exports. This constitutes another reason why structural competitiveness and the role of policies and institutions in enhancing it are considered to be crucial. In this context, this essay examines whether the international competitiveness of Greek products and services improved in the sectors with comparative advantage or whether a successful effort for structural transformation in external trade took place.

The essay also aims to explain the evolution of sectoral indices of structural competitiveness in service sectors and relate it to policy determinants, such as the measures of trade and regulatory restrictiveness, and the sectoral R&D intensity. These constitute research questions, which are yet to be thoroughly examined in the recent academic literature on policy evaluation. Instead, as demonstrated by the literature examined below, evaluations have typically focused either on the implementation of reforms, without particular attention to subsequent structural effects, or on the achievement of fiscal targets. Moreover, the literature on the role of policies has usually placed significant attention on fiscal measures, and less often on structural competitiveness ones. Instead of focusing on the overall effect of policies on the economy, the present chapter attempts to highlight particularities and trends in the analysis of sectoral comparative advantages and explain them through a policy perspective. Hence, this essay aspires to contribute to the discussion by extending it towards the evaluation of structural competitiveness targets at the sectoral level.

The essay also introduces a methodological novelty. The related literature so far uses the absolute export value as a measure of international competitiveness. The present paper approaches the competitiveness question through the use of indices, primarily focusing on the Revealed Comparative Advantage (RCA) index. The paper offers thus an innovative approach in assessing the effectiveness of structural reforms. This approach has the advantage of better cross-sectoral and cross-country comparability, while it tackles the challenge of potential positive or negative effects owed to international macroeconomic conditions. The methodology is based on the identification of structural breaks in the time series of data, which are then linked to the timing of policy reforms in the early years of the crisis. We attempt to evaluate the impact of institutional bottlenecks on structural competitiveness and explore how different products and services have responded to implemented policies and policy prescriptions of international institutions during the great recession. This allows the examination of whether reforms have been associated with short-term gains or losses in the competitiveness of both commodities and services.

In this aspect, this work differs from previous ones in many ways. Firstly, unlike many institutional reports that examine all the European periphery countries or the entire Euro-Area, the focus of this essay is exclusively on the Greek case. Secondly, the analysis of the Greek economy and the need for structural reforms is prioritised over the fiscal consolidation recipe that has been previously followed. Most of the existing literature argues in favour of a simultaneous promotion of fiscal and structural reforms, or the need to implement structural reforms following budget consolidation. This paper argues that, in view of limited administrative capacity to implement a wide range of reforms, the sequence of structural reforms is a crucial parameter in policy effectiveness. Moreover, the empirical analysis focuses on the key aspects of structural

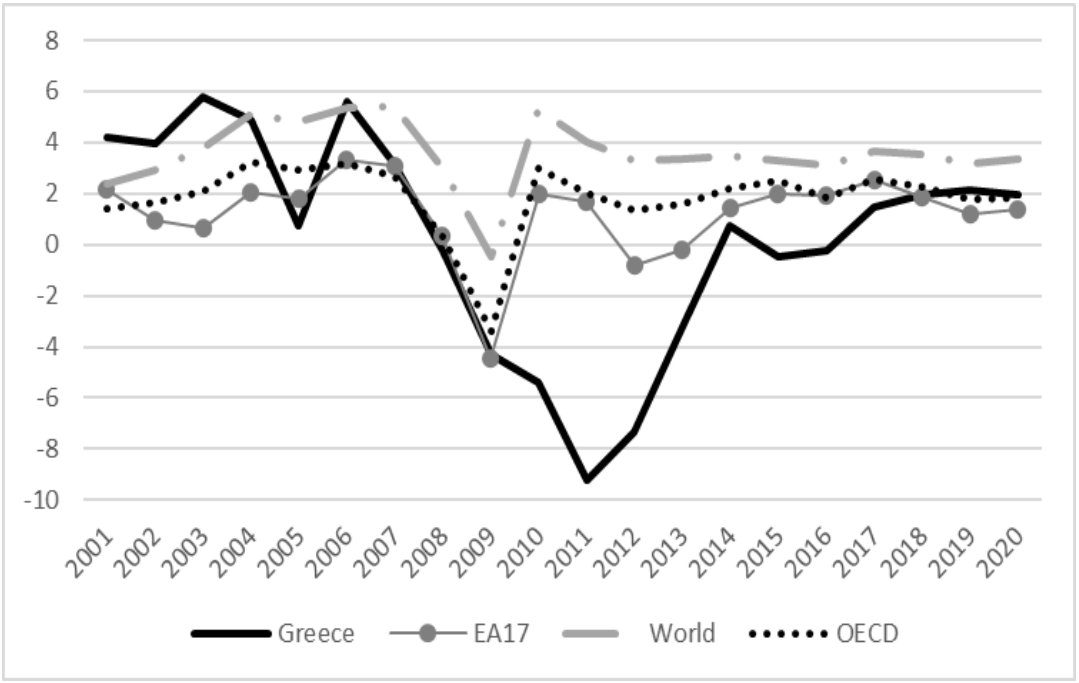
transformation and international trade competitiveness. The indices of competitiveness, which we analyse in the empirical part, are calculated both for commodity and for service trade. This constitutes another novelty of this research, as the service sectors have been generally understudied, particularly due to the fact that services data are more recent in the international trade literature.

2.1.2. The macroeconomic environment

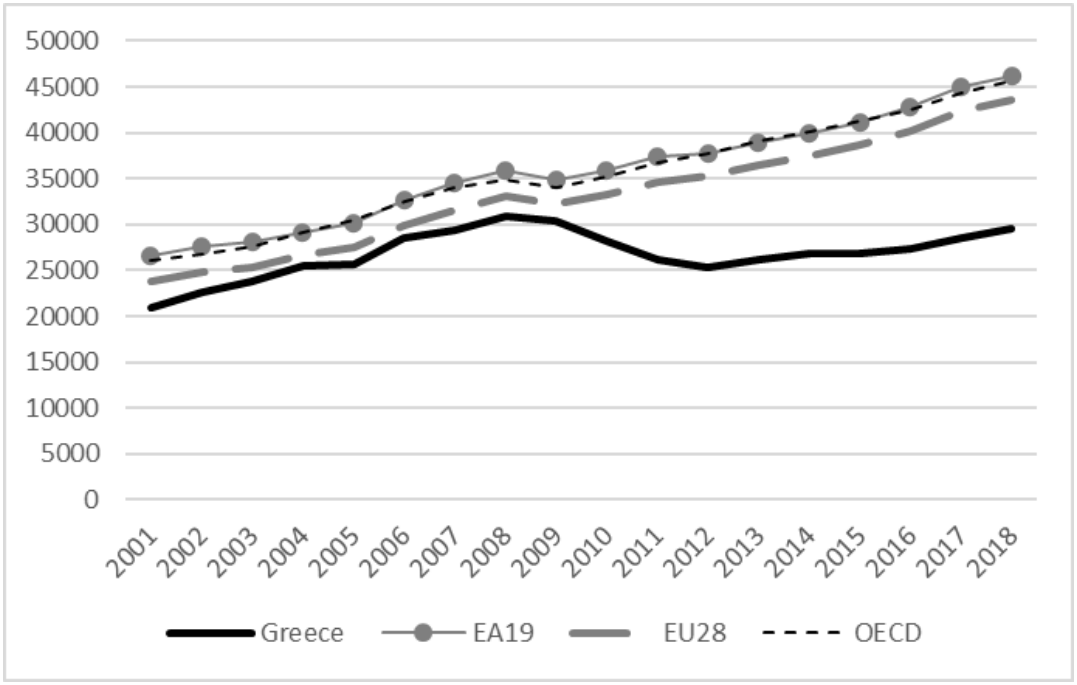
The macroeconomic environment in which the crisis unfolded, as well as its implications, constitute important aspects affecting sectoral economic performance to consider prior to analysing the sectoral determinants of structural competitiveness. This section provides a snapshot of some key facts and macroeconomic developments related to the Greek crisis showing the impact of the crisis on economic output, both on growth and development terms. As it becomes clear from the two panels of Figure 2.1, despite the gradual improvement of growth rates, the convergence in GDP per capita between Greece and other advanced economies would require growth rates above EU averages, i.e. a positive investment shock.

Figure 2.1 GDP effects of the economic crisis

Panel A: Real GDP growth



Panel B: GDP per capita



Source: OECD (2019), Real GDP forecast (indicator). doi: 10.1787/1f84150b-en & Gross domestic product (GDP) (indicator). doi: 10.1787/dc2f7aec-en (Accessed on 16 October 2019)

Since the formal transmission of the international financial crisis in Greece in the middle of 2009, the economy has experienced an unprecedented shock and shrinkage. GDP growth remained negative for years, while estimations about the potential date of economic recovery were postponed for years until the first registered growth figures in 2014. The subsequent reversal of growth trends during the following two years caused a temporary shrinkage of the output of the economy, which returned positive in 2017. Meanwhile, unemployment reached record levels of 27%, before subduing again to 18% in 2018. Greek governments, along with their international partners, have been struggling to stabilize fiscal parameters in order to bring the national economy back into a sustainable path.

Strict austerity aiming at fiscal consolidation has had devastating impacts on the society, while the measures have affected primarily the most vulnerable social groups, including the retired and social benefit recipients (Matsaganis, 2011). Domestic consumption expenditure, which has constituted by far the primary component of the GDP, declined by 17.4%, on a per capita basis, between 2009 and 2012, and more than 25% in its lowest point. Meanwhile, the debt to GDP ratio maintained its upward trend, increasing from about 113% in 2008 to 175% in 2013 and exceeding 180% by 2018.

The emphasis on public sector shrinkage and internal devaluation in an economy based on domestic consumption, imports and limited exports (93%, 31% and 19% of GDP respectively in 2009) resulted in a cumulative fall of living standard by 24% (2007-2013), as measured by GDP per capita. Furthermore, this was accompanied by positive inflation rates up to 4.7% in 2010, worsening of the sectoral economic performances, and a fall in labour productivity. National innovation and competitiveness performance, although focal points of the crisis reforms, have

deteriorated as well (European Commission, 2013b; Barkas, 2013; OECD, 2013b), while it took many years for export competitiveness to improve.

By the end of 2008, Greece had entered into a recession. Since 2010, despite the surveillance of IIs, the country faced an unprecedented crisis, which affected all economic parameters. While average unemployment from 2000 to the first half of 2010 was below 10%, it sharply increased since then, reaching its peak level at about 27%. From 2007 to 2010, real GDP and GDP per capita fell by eight and nine percent respectively, while, from 2010 to 2013, they further fell by seventeen and sixteen percent (European Commission, 2013a). Overall, the great recession had a total cost of about a quarter of the Greek GDP.

The active involvement of IIs in the Greek-Euro crisis started in December 2009, when they started providing technical assistance to Greece on tax administration, expenditure management, fiscal and structural reforms (IMF, 2013b). In May 2010, the first Stand-by-Agreement was signed between the Greek government and the Troika. Moreover, two long-maturity loans of EUR 110 and EUR 130 billion respectively were subsequently approved and paid in instalments, conditional on fiscal and structural reforms. A number of other loan instalments have been also approved and disbursed, each of which was preceded by long negotiations and thorough reviews and evaluations of actual achievements in the implementation of fiscal consolidation and structural reforms. Along with the loans, reforms and debt restructurings, IIs have closely monitored the developments in Greece throughout this period.

Although Greece followed the recommendations of IIs better than any other country in the OECD area, previous research has usually attributed the poor outcomes of policies to the inefficiency of the Greek institutions to implement them (Kaplanoglou and Rapanos, 2011; OECD, 2012).

Reform implementation has progressed despite frictions and resistance. According to the ESM (2020), Greece has carried out since 2010 a comprehensive range of reforms, which can be grouped into four areas: restoring the sustainability of public finances, safeguarding financial sustainability, structural policies to enhance growth, competitiveness and investment, and the functioning of Greece's public sector. The scope of this essay is mostly aligned with the third area of reform, and particularly, the enhancement of international competitiveness through reforms and policies targeting distortions in the Greek economy and institutional bottlenecks.

2.1.3. Structure of the essay

In order to evaluate the effects of economic policies and institutional bottlenecks on the structural transformation of external trade of Greece, we structure this essay into five sections. Following the introductory section (2.1), we conduct a brief literature review (section 2.2) pertaining to the importance of economic policy and institutional reform on structural competitiveness. The section analyses arguments and findings of previous evaluations and critiques of implemented policies in the Greek-Euro crisis (section 2.2.1). It also examines literature findings that link structural competitiveness to institutional and regulatory factors (section 2.2.2).

While the literature review section discusses in parallel the cases of both commodities and services, the section (2.3) distinguishes between the research framework and analysis that we adopt in dealing with each of the two. Hence, after describing the deployed measures of structural competitiveness (2.3.1), we investigate separately the impact of policy changes and institutional bottlenecks on structural competitiveness of commodity (section 2.3.2) and service (section 2.3.3) trade. In both cases, we start by looking at the indices trends and provide a comparative analysis of the patterns of structural competitiveness across South European countries. We then present

the methodological approach and the econometric model, as well as the main results of the empirical analysis, for each of the two cases.

Based on the comparative and empirical analysis, section 2.4 interprets the results and attempts a critical evaluation of the economic policies of international and Greek authorities in dealing with the crisis, focusing primarily on the trade and competitiveness transformation of the economy. Section 2.5 provides concluding remarks.

2.2. Literature review

To investigate the role of policies and institutional factors in improving structural competitiveness of goods and services, two streams of literature are relevant. The first one focuses on the role of institutions and policies at the national level, as well as on the role played by international institutions in advising on and guiding the reform process in Greece. The second stream of literature focuses on inter-sectoral differences in structural competitiveness. In this respect, the literature review takes stock of previous empirical and policy work and endeavours to discuss the channels through which a number of factors - such as the barriers to entry, regulatory restrictiveness, barriers to trade, barriers to competition and sectoral innovation intensity - affect trade competitiveness across various sectors.

In light of the above, we concentrate our research on empirically evaluating the role of specific on export performance and service competitiveness and the role of structural reforms in improving them. The evaluation of fiscal and financial reforms in influencing structural competitiveness are indirectly related to the core research question of this essay. Hence, we have not included them in

the literature review[7]. Yet, post-2015 developments in the financial sector, such as the capital controls and the boom in non-performing loans, render necessary a separate analysis of their key determinants, and their implications for growth and investment. Some of these aspects are analysed in the following chapter of this thesis on the institutional and policy determinants for rebooting investment in Greece (chapter 3.).

The next section of the literature review (2.2.1) presents the various perspectives and evaluation efforts previously undertaken concerning the impact of reforms on the Greek economy. It analyses the main findings from recent research, as presented in academic and policy papers. The following section (2.2.2) examines the literature on the impact of institutional factors on structural competitiveness, with a focus on trade, to which our research questions and findings mostly relate. This section does not focus only on Greece, but also on evidence from cross-country analysis. The third section (2.3) puts in perspective the theoretical and econometric techniques deployed in this essay to evaluate the implemented policies in dealing with the Greek-Euro crisis, with a focus on international competitiveness.

2.2.1. Policy evaluation and structural competitiveness in the Greek-Euro crisis

During the fifteen years preceding the crisis, the Greek economy experienced rapid economic growth, with its internal market dominated by very small firms[8]. Despite the effect of tourism, which is by definition an outward-oriented sector, most of these firms were arguably producing for local consumption (IOBE, 2013), rather than competing in international markets. The crisis

[7] See Petrakis (2010) for more details and an extensive discussion.

[8] 96.6% of total firms in 2012 (IME-GSEVEE, 2013)

that erupted in Greece in 2009 was initially perceived as a fiscal crisis that soon became a solvency crisis. IIs and Greek governments focused their efforts on balancing the two aspects of the budgetary deficit, increasing tax revenues and cutting expenditure. Given the immediate need for fiscal space, policy evaluation in the literature usually emphasised fiscal aspects over structural reforms.

A 2013 Bruegel report (Pisani-Ferry et al., 2013) demonstrated that, unlike in Ireland and Portugal, which started recovering from the crisis and re-accessed the international financial markets relatively quickly, the programme of economic adjustment in Greece was less successful. It attributes this to three factors: the extremely adverse initial conditions, the weak administrative capacity for tax collection and the fact that Greece was the first country in need of financial assistance from international institutions, which were unprepared to face such situations and design appropriate responses. These factors jointly contributed to the creation of institutional bottlenecks, hampering the improvement of structural competitiveness. Although IIs recommendations were initially followed better than in any other European country (OECD, 2012) and significant progress was made in deficit reduction, the real economy was hit more than expected, while some sectors suffered more than others.

The most important early evaluation studies on IIs intervention in the Greek-Euro crisis come from the IMF (2013a,b,c) and the Pisani-Ferry et al. (2013) reports. The ESM also regularly assessed progress achieved in the three pillars of intervention: namely, fiscal consolidation, structural reforms and financial stability. The conclusions of institutional evaluations on the progress of the economy during the early years of the programme often contradicted their prior expectations and scenarios of forecasts. While acknowledging the successes in the first and third

pillar, the IMF for example has often admitted flawed assumptions regarding the impact of these successes in the real economy. The IMF (2013b) noted that, instead of higher productivity, deficit shrinkage and fiscal adjustment in Greece was achieved through expenditure cuts, which have deepened and prolonged economic recession.

Following a more institutional perspective, Pisani-Ferry et al. (2013) examine the economic policy developments by focusing on European periphery countries. Besides analysing the successes in fiscal targets, they also criticise the political economy rationale of IIs policies. However, given that they examine the entire Euro-Area, their analysis does not allow for country-specific analysis. Although all European periphery countries confronted debt and deficit crises, their paper argues that the root of the problem differs significantly across countries and tailor-made treatment policies are required.

Earlier studies on the topic of structural reform design and implementation, focusing on the fiscal crisis and governance issues, stress the ineffectiveness of IIs in acting as signalling mechanisms. Kaplanoglou and Rapanos (2011) discuss the unrealistically optimistic macroeconomic forecasts of IIs even before crisis eruption. The authors argue that, apart from the weaknesses of the Greek institutional fiscal framework, these optimistic forecasts further exacerbated the poor fiscal performance. Erce (2013) and Arghyrou and Tsoukalas (2011) consider the inconsistency in IIs decisions and their coordination failures to be factors of instability and uncertainty in market expectations. These, in turn, increased the uncertainty of firms' investment and deterred export behaviour.

Economic theory posits that international competitiveness is a function of both price and non-price factors and relates to numerous economic variables. Having calculated the elasticities of price and non-price competitiveness in Greece, Athanasoglou et al. (2010) found that while the

former was around one, the latter was larger than one, meaning that exports can be primarily enhanced through the emphasis on non-price competitiveness factors. Apergis (2013) also estimated that non-price competitiveness explains about one third of the persistent inflation in Greece. Nicolitsas (2013) argues that inflation can be also partly explained by the inflexibility of pricing policies followed by Greek firms. However, most of the literature, including Stournaras and Albani (2008), Mitrakos and Zonzilos (2006), and Pelagidis and Toay (2007), attribute it primarily to the rigidities of product and labour markets.

The common conclusion of the abovementioned studies is that improvements in labour cost competitiveness alone are insufficient to reboot exports. This is verified both by the data and theory. While real unit labour costs fell by 14% between 2009 and 2012 (the European Union average increased by 5%), Greece did not manage to recover or become more competitive internationally (Katseli, 2010; Katseli, 2012; Felipe and Kumar, 2011a,b). By aiming at relatively lower domestic prices, II policies to reduce labour costs, proved once again Kaldor's paradox, according to which, internal devaluations focusing on unit labour cost reductions do not lead to a market share increase, but the opposite (Kaldor, 1978).

The small degree of diversification in exports ranks Greece among the last EU countries regarding export complexity (Abdon et al., 2010). Regulatory barriers on market access and competition, inefficiency, low level of market-based practices and over-regulation in most areas of economic activity constitute typical regulatory and institutional bottlenecks in the economy, with the state being its most important player (Stournaras and Albani, 2008; OECD, 2016).

The private sector faces serious challenges, keeping productivity subdued. Low technology products, weak linkages between businesses, academia and research institutions, and relatively

poor innovation and entrepreneurship performance are typical of the economy. Given the unsound foundations of the Greek economic model, the sharp increase in demand that followed the adoption of the Euro and the consequent fall in interest rates, led to a form of *irrational exuberance*, reflected in increased consumption and credit propensity.

Criticism in the literature regarding the management of the Greek-Euro crisis has mainly focused on reform implementation, the delay in promoting debt restructuring and the austerity imposed by creditor institutions. Petrakis (2010, 2012) argues that the MoU signed in 2010 between Greece and the IIs places a relatively heavier weight on labour cost reduction and less on other important parameters: capital, transaction and governance costs. He addresses the issue of competitiveness primarily as an issue of structural reforms as opposed to fiscal consolidation.

Despite meeting fiscal targets, the programme of economic adjustment produced a prolonged recession and incurred high economic and social costs (IMF, 2013b; Pisani-Ferry et al., 2013; Matsaganis, 2011). The current account deficit was narrowed in the first years of the crisis from 14.9% in 2008 to 3.1% in 2012, which was the lowest of the last fifteen years. However, this was achieved through a sharp decline in imports and a small decline in exports (-35.9% and -4.8% respectively), while public debt kept increasing. Most importantly, the economy did not strengthen its competitive position (European Commission, 2013a).[9]

In an effort to improve the limited openness of the Greek economy, the European Commission (2014) estimated that structural reforms focusing on aligning the Greek institutional framework with the EU/OECD average would close the Greek export gap between 50% and 75%. The paper

[9] Yet, this is a multifaceted issue. As Krugman (1994: p.31) had written may years ago, *"A trade surplus may be a sign of national weakness, a deficit a sign of strength"*.

claims that structural reforms must focus on addressing non-cost competitiveness factors and the underlying institutional deficits to unlock Greece's export growth potential.

Linking export performance to labour and non-labour costs, the OECD (2016) has argued that international competitiveness of Greek products and services mostly depends on structural factors. A related paper of the OECD found that structural problems in product markets, such as barriers to exporting, access to finance and administrative burden, affect competitiveness and export performance (de la Maisonneuve, 2016).

Trade and competitiveness effects of the Greek economy have been examined both in terms of export complexity, as well as in terms of policy factors affecting their evolution during the crisis. Athanasoglou et al. (2010) find that the pattern of comparative advantage and the technological intensity of Greek exports improved significantly in the pre-crisis period, despite the fact that exports remained concentrated in low- and medium-technology sectors. At the same time, they find that product variety and quality declined. The inelasticity of export market shares with respect to relative and absolute prices points to non-price factors as drivers of competitiveness in international markets.

2.2.2. Institutions, regulation and structural competitiveness

While empirical evidence suggests that governments around the world have proceeded to liberalise markets in recent decades by adopting far more liberalising rather than restrictive measures, the number of trade restrictive policies increased in the aftermath of the 2008-09 crisis (Roy, 2016). The OECD (2018a) examined the impact of measures concerning trade facilitation

and trade liberalisation across 44 countries. It concludes that between 2014 and 2017, the effects of new trade restrictive measures have been larger than those of trade facilitating measures, even though liberalising measures have prevailed compared to trade-restrictive ones. The study also indicates that services seem to have been shielded from protectionist pressures to a greater extent than commodity trade. Hence, this section of the literature review focuses on services, while similar effects are also found to be true for commodity trade competitiveness (OECD, 2018a). It has been found that service sectors are subject to larger trade frictions than goods sectors (Miroudot et al., 2013). Yet, competition in services is considered to be overall less intense than in goods sectors (Bottini and Molnar, 2010).

Measuring international competitiveness in services is a relatively new research area, particularly due to data challenges (Peterson and Barras, 1987; Diaz de la Guardia et al., 2005). While services have been gaining ground both in terms of their contribution to GDP and employment for more than a century, they have also become increasingly important in world trade (McKinsey Global Institute, 1988). As data on services and service trade become available, particularly through the WTO Trade in Services and Investment and the OECD Services Trade Restrictiveness databases, our understanding of the drivers of services' competitiveness is still limited and underresearched.

A number of studies have shed light on the relationship between structural competitiveness and various market policies that impose direct or indirect regulations and trade costs. Trade costs are typically associated with high barriers to entry and exit at the sectoral level, lower productivity, regulatory restrictiveness, low investment in digital infrastructure and R&D, low FDI and, ultimately, reduced international competitiveness of exports. Service sectors with lower trade costs – which are themselves associated with lower service barriers – tend to be more productive and show higher productivity growth than those with higher trade costs (Miroudot et al., 2012).

According to the World Bank (2016), a negative correlation also exists between entry barriers and regulatory restrictiveness in goods and services, on the one hand, and investment in digital technologies and ICT, on the other. This suggests that barriers to entry and competition in service sectors reduce the incentive of suppliers to invest in digital technologies (e.g. use of cloud facilities by transport companies, supply of online services by professional service firms, or use of the Internet by retailers). Countries with lower restrictiveness are significantly more likely to attract foreign investment than countries with more trade-restrictive regulatory frameworks (Rouzet et al., 2017).

Restrictiveness in service trade raises costs for foreign exporters, thereby limiting cross-border trade in services – including services supplied over digital networks. These restrictions also limit the service exports of the country imposing the measures (Nordås and Rouzet, 2016). The reason for this is that restrictions limit competition, and thus, negatively affect the performance of domestic suppliers. Restrictions also reduce incentives to improve efficiency through innovation, adoption of new technologies and investment. These, in turn, affect the capacity of domestic suppliers to compete in international markets. Furthermore, given that services companies – such as producers of manufactured goods - use inputs from other service sectors, raising the cost of imported inputs can make them less competitive and limit their export potential (Nordås and Rouzet, 2016).

2.3. Research framework and analysis

This paper builds on findings of existing empirical and theoretical research to evaluate the effectiveness of implemented policies and draw relevant conclusions regarding the case under examination. It complements existing research by testing for structural breaks in the evolution of structural competitiveness indices of commodities and by estimating a linear regression model to determine the factors affecting the structural competitiveness of services. The estimates are obtained using the techniques described in the following sections and the use of RCA indices for measuring structural competitiveness.

2.3.1. The revealed comparative advantage of commodity and service exports

In order to quantify structural competitiveness in commodity and service sectors, the Revealed Comparative Advantage (RCA) or Balassa index (Balassa, 1965) is used hereby. Other measurements of international competitiveness commonly found in the literature WEF competitiveness indices, market share analysis, relative export prices, real effective exchange rates, etc.

Overall, the RCA index constitutes a valid reflection of industry developments, which is preferable to simply looking at export growth rates or shares of individual sectors. Taken in isolation, export growth rates and shares of an industry's export value are more prone to shocks in global markets that affect all countries, while the RCA is better related to features of structural transformation. Generally, the RCA index represents a useful tool for investigating the pattern of sectoral specialisation in a given country and the drivers of its international competitiveness. The use of revealed comparative advantage indices is also deemed to be appropriate because they

capture the *relative* importance of Greek exports compared to the rest of the world. Any other index of trade competitiveness that describes the evolution of Greek exports, without due consideration of the evolution of exports of other countries and their penetration in third markets, might be considered improper, as changes might be attributed to the global economic environment or to shifts in global demand for certain commodities, as opposed to specific policies in one country.

Based on data availability, RCA indices are initially calculated for seventeen categories of commodities and sixteen categories of services exported from Greece to the rest of the world. We use export data with annual frequency from 1980 for goods and from 2005 for services[10]. We calculate the RCA by deploying the following formula:

$$RCA_{ij} = \frac{X_{ij}/\sum_i X_{ij}}{\sum_j X_{ij}/\sum_i \sum_j X_{ij}} \qquad (1)$$

Where X_{ij} is the value of country's j exports of commodity i, $\Sigma_i X_{ij}$ is the total value of country's j exports, and $\Sigma_j X_{ij}$ is the total value of exports of commodity i across countries.

The RCA index reflects a country's relative level of specialisation in international trade for a specific product. The equivalent holds true for specialisation of services. Comparative advantage is calculated by using the product's share in a country's total exports relative to the respective product's share in global trade. An RCA index value larger than one means that the value of the specific commodity export as a share of the country's total exports is larger than its respective share in total world exports. Therefore, the product would be traded with a comparative advantage.

[10] Data are more recent in the case of services due to measurement challenges concerning trade in services, which is a relatively new and expanding area of work for the WTO.

On the contrary, a product would be traded with a comparative disadvantage if the RCA is estimated to take a value below one.

The calculated indices of revealed comparative advantage for Greece have shown considerable volatility in the past four decades for which export data are available. Based on the average pre-crisis (before 2010) value of RCA indices, commodities are grouped in three categories. The first one (*balassa1* in Table 2.1) includes products the RCA indices of which are constantly well above one and include agricultural products, food, textiles, clothing, pharmaceuticals, and chemicals. These are products in the trade of which Greece has historically exhibited a significant comparative advantage. The second category (*balassa2* in Table 2.1) consists of commodities the RCA indices of which vary between 0.5 and 1.3. These are products which Greece has been exporting modestly compared to other exporters or in which it has a slight comparative advantage. These include fuel, mining products, manufactures, and telecommunications equipment. The third category (*balassa3* in Table 2.1) includes commodities with small shares in Greece's exports compared to the rest of the world and RCA indices below 0.5. This category includes automotive products, telecommunications, office and electronic data processing equipment, and integrated circuits and electronic components.

Next, the paper develops RCA indices the trade competitiveness of services. By analogy with commodity trade, formula 1 above is used to quantify their level of competitiveness. Trade in services and, particularly, service exports, are much less studied than commodities in the literature of international trade and policy. According to Liu, Nath and Tochkov (2015), this is primarily due to the lack of relevant data and the peculiarities of service trade. In the case of Greece, the evolution of the computed RCA index for services is analysed with reference to two groups, based on their importance for the economy. The first one includes services related to transport and travel

industries, which jointly accounted for about 42% of total service exports in 2017. In the second group, construction, financial and other business services are included. They account for about 53% of total service exports. The remaining 5% comprises other services which are not included hereby as they have a much smaller weight in the composition of service exports.

Macroeconomic and international trade data are taken from a variety of institutional sources. The main data on exports and structure of the Greek economy are taken from the WTO and OECD databases. National accounts data are obtained from the OECD, the Annual Macro-Economic Database (AMECO) and Eurostat database of the European Commission. We also benchmark against three other countries of Southern Europe - namely, Italy, Portugal and Spain - data for all of which have been taken from the WTO database. Service trade data are taken from the WTO Trade in Services database and the Integrated Trade Intelligence Portal (I-TIP). The OECD Services Trade Restrictiveness Index (STRI) and ANalytical Business Enterprise Research and Development (ANBERD) database are used for the measurement of institutional and policy drivers of services' structural competitiveness.

A limitation of the RCA index is that it does not capture domestic aspects of trade. Trade of these commodities and services within the country is not captured by the index and does not influence the results of the estimations described below. However, this is considered of limited importance, as the objective of the analysis is to evaluate the international aspect of policies and the extent to which they have succeeded in promoting openness and competitiveness in international markets.

Another potential limitation lies in the fact that domestic policy distortions in terms of industry protection and support, as well as exchange rates, can generally inflate or deflate the RCA indices without necessarily reflecting any changes in the underlying comparative advantage. The

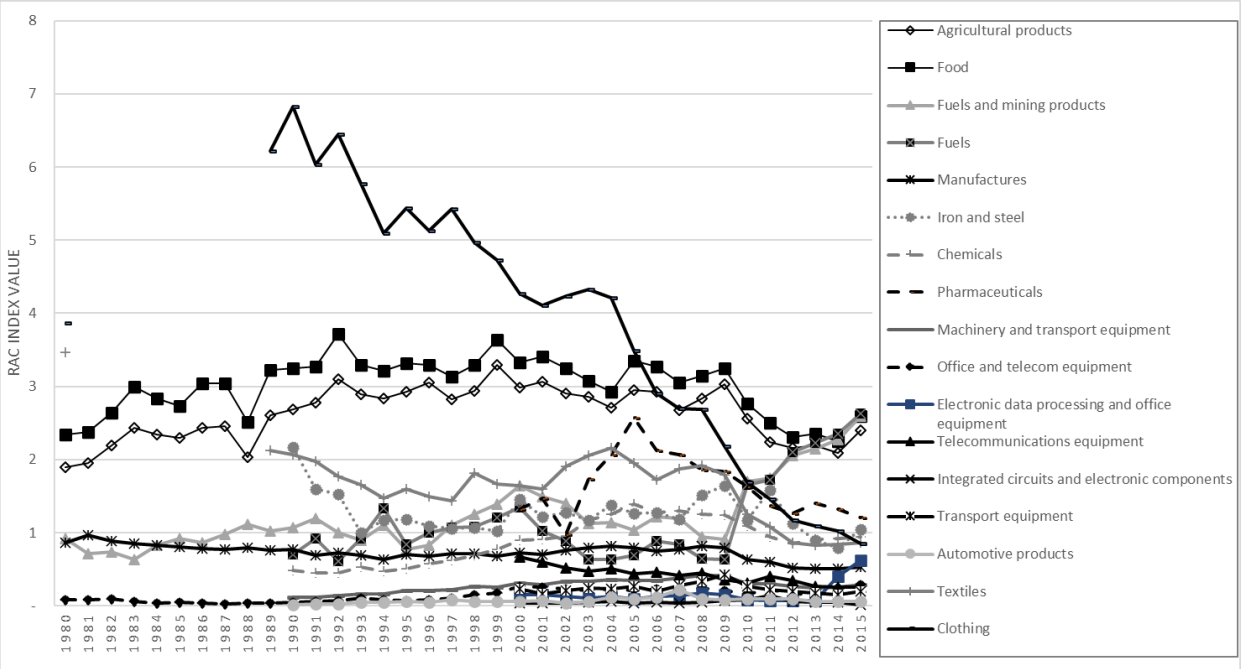
influence of exchange rate changes in this context does not pose serious problems, as the examined countries are mostly trading within the EU monetary union. While the distorting effects of policies could be endogenous to the changes of RCA values and trends, our methodology allows for a detection of structural breaks in RCA trends, which could then be used to evaluate the attainment or not of specific policy goals.

2.3.2. Evaluating the impact of policy changes on structural competitiveness of commodity trade

Trends and comparative analysis

The following figure shows the evolution of the seventeen RCA indices for commodities since the 1980s. As can be seen, Greece's specialisation and main comparative advantage in its recent history has been in products of the primary sector, as well as in manufactured goods with low technological content. Yet, a change in both trend and values is registered during the first years of the crisis.

Figure 2.2 RCA indices by commodity in Greece



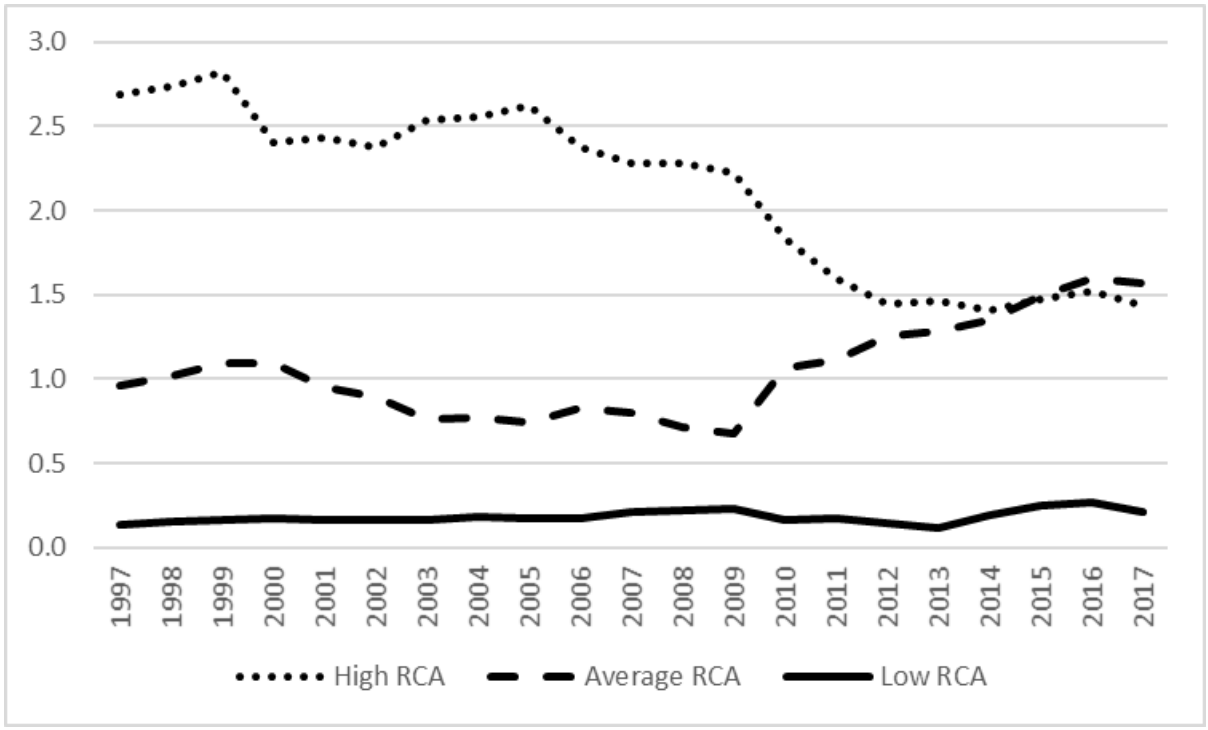
Source: WTO data and author's calculations

As shown in Figure 2.2, Greece's comparative advantage before the crisis lied in clothing, food and agricultural products. Other textile, pharmaceutical, fuel and mining products were also recording relatively high levels of RCA indices. On the contrary, automotive products, transport equipment, integrated circuits and electronic components were traded without a comparative advantage and comprised a relatively small share of Greek exports.

Based on a classification of commodities according to the average historical level of the RCA index, Figure 2.3 shows the evolution of the average RCA per category of commodities. A convergence is observed between high- and average-RCA commodities in recent years. The low-RCA category of commodities, on the other hand, has shown little responsiveness to policy changes and little overall variation.

While the first category of high RCA sectors has shown more volatility during the crisis, it is also shown that the trend of its RCA indices has turned negative. Structural transformation in export competitiveness was accompanied by an improvement of the trade position for a number of other sectors. Thus, while sectors of historically high-RCA values have exhibited higher volatility, the recent crisis has rendered them even less internationally competitive than the previously average-RCA sectors.

Figure 2.3 The evolution of RCA indices by group of commodities



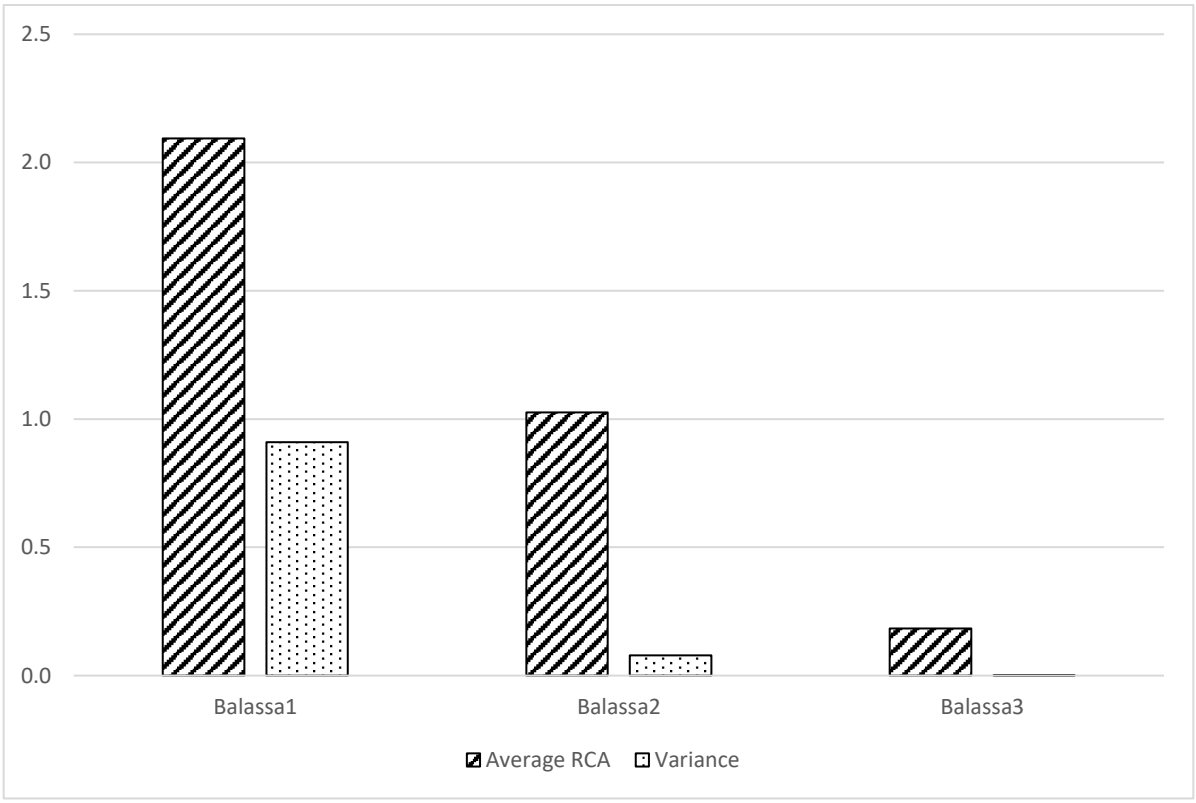
Source: WTO data and author's calculations

Figure 2.4 presents the average RCA index across the three categories analysed above (*balassa1*, *balassa2* and *balassa3*), as well as their variance for the period 1997[11] to 2017. The variance of

[11] Due to limited data availability, we present data since 200 for the following sectors: Pharmaceuticals, Machinery and transport equipment, Office and telecom equipment, Electronic data processing and office equipment, Telecommunications equipment, Integrated circuits and electronic components, Transport equipment.

trade competitiveness exhibited through the analysis of the sectoral RCA indices is positively correlated with the value of the indices. High RCA sectors are found to have the highest variance of their RCA indices, followed by the average RCA and the low RCA sectors. This implies that the first category is more sensitive to external shocks and overall macroeconomic conditions.

Figure 2.4 Structural competitiveness and RCA index volatility



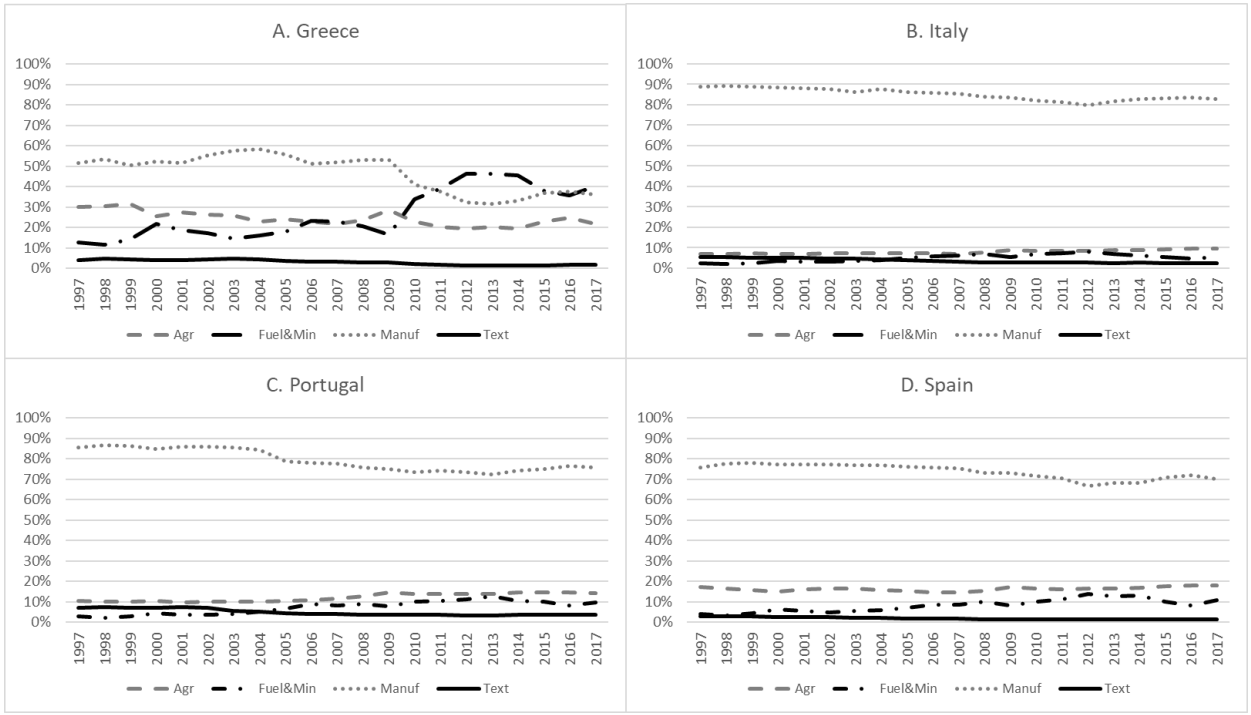
Source: WTO data and author's calculations

Comparative analysis with other South European countries

Unlike other countries of the European South, such as Italy, Portugal and Spain, Greece has exhibited low comparative advantage in manufacturing sectors, which have been the principal drivers of exports of most industrialised countries in 2017. As shown in Figure 2.5, manufactures

in Italy, Portugal and Spain comprised more than 70% of total exports to the rest of the world[12]. Manufactures in Greece comprised only about 50-60% before the crisis and were hit harder than other exporting sectors during the crisis.

Figure 2.5 Commodity export structure in the European South



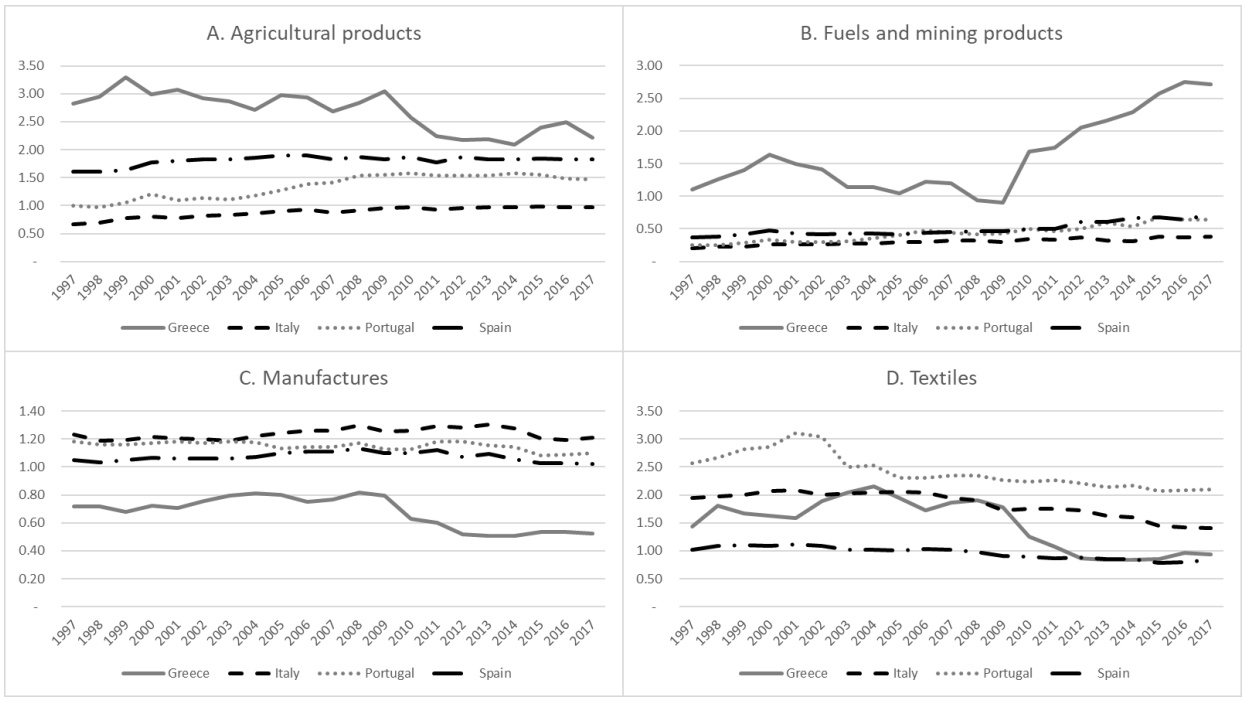
Source: WTO data and author's calculations

Figure 2.6 presents RCA calculations for four principal categories of exported commodities. As noticed, Greek RCA indices have been relatively high compared to those of other South European countries for agricultural, fuel and mining commodities. The findings also demonstrate that Greek textiles and manufactures have been internationally traded with smaller comparative advantage than those of Italy, Portugal and Spain (only Spanish textiles exports exhibited lower RCA indices relative to Greece). Another finding derived from the comparison of Greek RCA indices with other countries of the European South is that the other countries have been relatively stable in

[12] The world average in 2017 was about 69%.

terms of sectoral structural competitiveness compared to Greece (the variance of the values of indices of Greece is about six times larger than those of Portugal, about eleven times larger than those of Spain, and about twenty times larger than those of Italy).

Figure 2.6 RCA indices by main categories of commodity in the European South



Source: WTO data and author's calculations

Methodology

In order to test empirically the effect of policies on the competitiveness of Greek commodity exports, we evaluate the existence or absence of structural breaks in the data. We use for this purpose the Fixed Effects or Least Squares Dummy Variable (LSDV) method with unbalanced panels (Greene, 2003). We split the sectors depending on their indices into low, average and highly competitive, as discussed in sections 2.3.1. Following this methodology, the model below is estimated for each of the three groups of indices:

$$Y_{ti} = \alpha_i + (\beta_i + \gamma_i * d_{ti}) * t + \varepsilon_{ti}$$

$$= \alpha_i + \beta_i * t + \gamma_i * (d_{ti} * t) + \varepsilon_{ti} \qquad (2)$$

Where,

Y_{ti} : is the year *t* value of the RCA Index for commodity *i*

t : is the time variable which takes values from 1 (1980) to 32 (2011)

d_{ti} : is a dummy variable which takes the value 0 up to 2010 and 1 afterwards

α_i, β_i, γ_i : are the coefficients that the regression will estimate.

This approach has been primarily followed in analysing financial developments and the role of specific policy or market shocks. Through the use of a similar model and the identification of structural breaks in the Financial Stress Index, Illing and Liu (2006) and Christopoulos et al. (2011) evaluate the effect of the financial crisis on international money markets. Our estimated model differs from theirs in two aspects: the choice of the dependent variable and its relation to time, as an independent dummy variable. To focus on the effect of IIs' and Greek governments' policies on economic competitiveness, the RCA index is used as a dependent variable in this case. To allow for trend characteristics during the 32 years covered in the present analysis, the model has been extended through the addition of a time variable (*t*). The use of unbalanced panels is necessary because the number of years with available data differs across commodities and sectors.

Unlike a simple ordinary least squares model, the breakpoints identified by the model allow for shifts in data and trends. To capture the significance of policy changes on structural

competitiveness, a dummy variable is used. Given that 2011[13] was the first year after the significant policy intervention and the first Memorandum of Understanding signed between IIs and Greece, we have chosen to give to the dummy a null value before 2011 and one after.

The trend in the evolution of RCA indices is captured by coefficient β_i, while the significance of policies implemented after 2010 is captured by coefficient γ_i, which reflects changes in the long-term trend of RCA indices. A statistically significant value of the γ_i coefficient would indicate a significant effect of these policies. Policy changes in any given year are considered to have an impact with hysteresis of one year, i.e. to affect the RCA indices of the following year. This seems reasonable, given that most of exports, as international trade commodities, are planned and usually ordered in advance.

Empirical results

Table 2.1 shows the impact of implemented policies on the structural competitiveness of commodities, as described by the estimation of Equation 2. The estimated coefficients of Equation 2 indicate the policy effects for the three categories of commodities. The coefficients evaluate the statistical significance of the time trend variable (t), changes in the trend due to the 2010 policy change ($d_{ti}*t$) and the intercept of the equation. We are interested in the sign of the coefficients capturing the policy change effect ($d_{ti}*t$). We show the statistical significance of estimations both at the 5% and 1% significance level.

[13] Breakpoints or shift periods known a priori may be specified as described above. If unknown, they can be estimated using the Bai (1997), Bai and Perron (1998) or other related techniques.

Table 2.1 Empirical results of the impact of policies on the RCA indices of commodities

	Balassa1 *(high RCA)*	Balassa2 *(average RCA)*	Balassa3 *(low RCA)*
t	0.002	0.007	0.007
	(0.29)	*(1.89)*	*(10.34)***
d_i*t	-0.027	0.010	-0.001
	*(3.14)***	*(2.78)***	*(1.44)*
Intercept	2.413	0.462	-0.050
	*(3.95)***	*(2.68)***	*(1.74)*
N	142	78	78

* p<0.05; ** p<0.01

The estimation of our econometric model for Greece shows significant effects of policies for the first two categories of commodities. The three estimated equations – one for each category or sector – are referred to as *balassa1* (high-RCA), *balassa2* (average-RCA) and *balassa3* (low-RCA). The coefficient γ_j before the (d_i*t) variable is found to be negative for the first category, and positive for the second one. They are both statistically significant at the 1% significance level. The effect on the third category is not statistically significant. This means that the structural break that we test for was statistically significant and positive for sectors of average RCA levels, while it was statistically significant and negative for sectors of high RCA levels.

The change in the relative export importance of specific sectors of the economy testifies the structural transformation taking place during the recent years. Our findings indicate that the crisis and implemented policies led to a deterioration of the structural competitiveness of traditional sectors in Greece. At the same time, sectors with average levels of comparative advantage experienced a significant upturn of their RCA indices, showing an improvement of their trade competitiveness in international markets. The findings remain inconclusive concerning the impact of policies on the structural competitiveness of low-RCA sectors.

2.3.3. Evaluating the impact of institutional bottlenecks on structural competitiveness of service trade

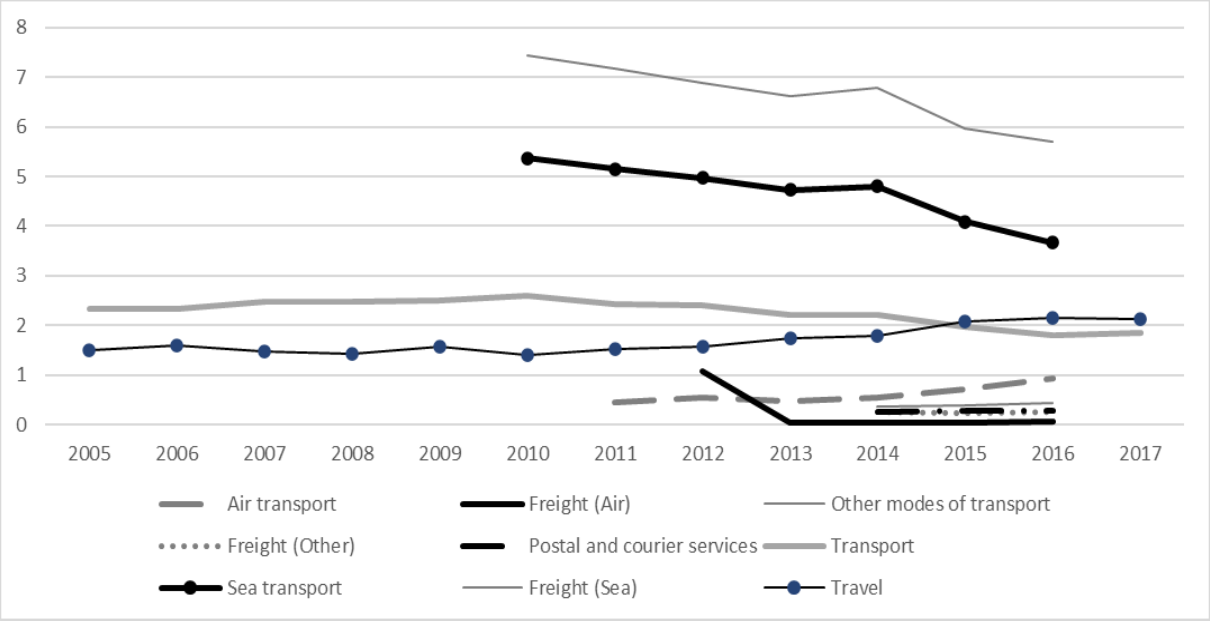
To evaluate the effects of institutional bottlenecks and policy changes due to the crisis on the competitiveness of services, RCA indices are calculated for sixteen categories of services, traded between Greece and the rest of the world. Data are taken from the WTO Trade in Services and Investment Division database and are grouped into two categories, based on the calculated RCA values and the nature of each service sector. The first group comprises the historically high-RCA travel and transport services, while all other services are included in the second group (see Figure 2.7). We then investigate separately the competitiveness effects of the crisis on the two groups of services. Secondly, we endeavour to establish whether service sectors improved or deteriorated their international competitiveness position during the crisis. Lastly, we empirically evaluate the role of institutional reforms in the overall competitiveness of service trade.

Trends and comparative analysis

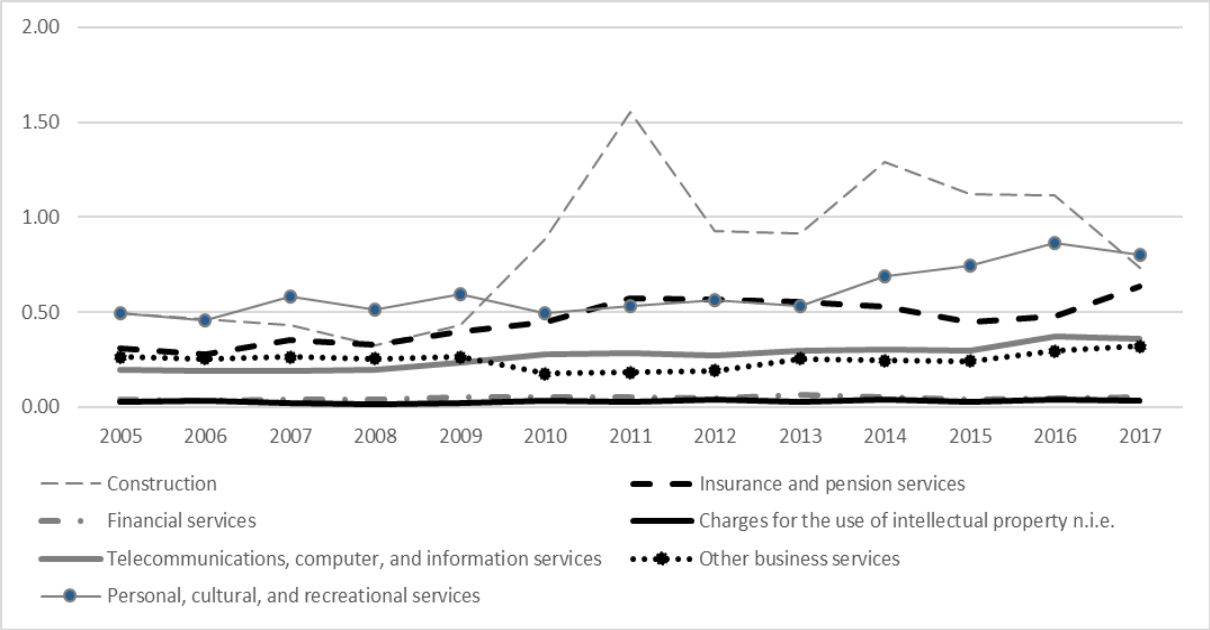
Most of the traded services are found to have lost comparative advantage since the eruption of the crisis (Figure 2.7). RCA indices have improved marginally only for a few categories of services, including construction, personal, cultural and recreational activities and insurance and pension services. The loss in competitiveness in the main exported services, that of sea and sea freight transport, has been significant. Export of travel services, on the other hand, are shown to have progressively improved (panel A).

Figure 2.7 RCA indices of Greek service sectors

Panel A: Transport and travel services



Panel B: Construction, financial and other business services



Source: WTO trade in services data and author's calculations

Service trade data are limited and restricted to the last few years. Yet, our analysis shows that travel and transport services have been mostly traded with a comparative advantage in Greece.

The highest RCA values – although declining during the crisis – have been recorded in sea and freight sea transport (panel A). In panel B, we find that construction, financial, IT and other business services have been internationally traded without a significant competitive advantage – possibly, focusing on the local market. Out of the sectors of the latter group, only construction services were found to have experienced years of RCA indices above one.

Methodology

Besides evaluating their evolution during the crisis, we also test empirically whether the competitiveness of commercial services in Greece has been overall affected by the regulatory and innovation characteristics of each sector. Data on regulatory restrictions and R&D intensity are taken from the OECD Services Trade Restrictiveness Index (STRI) Regulatory Database and the OECD ANalytical Business Enterprise Research and Development (ANBERD) database. In order to capture the source of variation among the policy variables considered for the construction of the STRI index, we use the sub-indicators mentioned below, which are also available at the same OECD database. The linear model we use for this purpose takes the form:

$$RCA_i = \alpha + \beta_1 * R\&D_i + \beta_2 * For\_Entry_i + \beta_3 * Mov\_People_i + \beta_4 * Bar\_Comp_i + \beta_5 * Reg\_Trans_i + \sum_{i=0}^{5} d_i + \varepsilon_i \qquad (3)$$

In this model, we regress the calculated RCA values measuring competitiveness of the service sectors against the R&D investment and sub-indices of institutional barriers related to service trade restrictiveness at sectoral level. The sources and description of data are as follows:

1. *R&D investment of the sector*: Total business enterprise expenditure measured in national currency and current prices. The OECD ANalytical Business Enterprise Research and Development (ANBERD) database presents annual data on Research and Development (R&D) expenditures by industry and was developed to provide analysts with comprehensive data on business R&D expenditures. This variable is measured at sectoral level, for each sector *i*.

2. *STRI (the OECD Services Trade Restrictiveness Index)*: The STRI indices take values in the range between 0 and 1, reflecting the *de jure* service trade restrictions. Complete openness to trade and investment gives a score of zero, while a regime completely closed to foreign service providers yields a score of one[14]. In order to capture the source of variation within the categories of service restrictiveness and understand the policy drivers of structural competitiveness, we use the detailed data on STRI components. To this aim, the OECD STRI database also estimates the following sub-indicators, which we use for the purposes of our empirical estimations (Nordås & Ragoussis, 2015):

    a. *Restrictions on foreign entry* (*variable: For_Entry*) include information on foreign equity limitations, requirements that management or board of directors must be nationals or residents, foreign investment screening, restrictions on cross-border mergers and acquisitions, capital controls and a number of sector-specific measures.

    b. *Restrictions to movement of people* (*variable: Mov_People*) include information on quotas, labour market tests and duration of stay for foreign natural persons

[14] The STRI database, indices, methodology, country notes, sector notes etc. are available at http://oe.cd/stri. The methodology is explained in Geloso Grosso et al. (2015).

providing services as intra-corporate transferees, contractual services suppliers or independent service suppliers. This policy area also contains information on recognition of foreign qualifications in regulated professions.

c. *Other discriminatory measures* (*variable: Oth_Discr*) include discrimination of foreign services suppliers as far as taxes and subsidies are concerned; and instances where national standards differ from international standards, where relevant.

d. *Barriers to competition* (*variable: Bar_Comp*) include information on anti-trust policy, government ownership of major firms and the extent to which government owned enterprises enjoy privileges and are exempted from competition laws and regulations. Sector-specific pro-competitive regulation in network industries also falls under this category.

e. *Regulatory transparency* (*variable: Reg_Trans*) includes information on consultations and publications prior to the entry into force of laws and regulations. It also records information on administrative procedures related to establishing a company, obtaining a license or a visa, etc.

All five sub-indicators are estimated and available at sectoral level, as per the OECD database. In order to avoid multicollinearity, however, the RCA indices in our model should not be regressed both on the STRI values and all five sub-components of it. Besides the R&D sectoral values, we have chosen to regress the RCA on four variables of restrictiveness capturing the restrictions on foreign entry (For_Entry_i), the restrictions to movement of people (Mov_People_i) the barriers to competition (Bar_Comp_i) and regulatory transparency (Reg_Trans_i). These variables capture

institutional policy changes (OECD, 2018), which are in line with the theoretical assumptions and are used to test our hypothesis. The model captures cross-sectoral variation through five dummy variables (d_i)[15], which account for sector-specific characteristics. The following section presents and analyses the results obtained.

Empirical results

This section presents the results of the estimation of Equation 3 concerning the relation between the RCA of service sectors and a number of institutional variables, such as the R&D intensity of the sector, the STRI sub-indicators on restrictions on foreign entry, restrictions to movement of people, barriers to competition and regulatory transparency. As argued in the methodological section, data concerning service trade are more recent than those of commodity trade. They cover a smaller number of years, as the statistical framework for service trade was developed only in the early 2000s. Moreover, policy variables quantifying trade restrictiveness and regulatory quality that are used for the calculation of the OECD STRI indicators were estimated for the first time in 2014. Hence, the coverage is shorter in terms of the number of periods, while the findings relate to more recent years.

Equation 3 is used to empirically test the hypothesis of whether structural competitiveness of commercial services in Greece has been overall affected by the regulatory and innovation characteristics of each sector. The results of the estimation provide evidence that services'

[15] Table 2.2 in the annex presents the nine service sectors covered in the analysis, for which export data are available through the WTO database. However, due to limitations of the OECD STRI database, some sectors are grouped as the STRI data are not available at the sub-sector level. In this respect, the three transport-related sectors (sea transport, air transport, postal and courier services) are assigned the same dummy variable. Moreover, the two finance-related sectors (insurance and pension services, financial services) are assigned the same dummy variable. As a result, the regression is run with STRI variables for six sectors. In order to avoid any multicollinearity issues in the econometric estimation, the number of dummies is (n-1), i.e. five.

competitiveness is significantly influenced by the regulatory characteristics of each sector, while it remains inconclusive concerning the impact of R&D intensity on sectoral competitiveness. The estimation of Equation 3, using OECD data on sectoral innovation activity and regulatory restrictiveness, yields the outcomes of Table 2.3, presented below.

[Insert Table 2.3 about here]

Table 2.3 shows the empirical results of the impact of innovation activity and regulatory restrictiveness on the RCA indices of services. As noticed, we find statistically significant evidence that services' international competitiveness benefits from low barriers to competition and low restrictions on the movement of people. This means that sector-specific pro-competitive regulation favours more internationally competitive sectors. The same holds true for the positive relation between structural competitiveness and the free movement of people providing services. The latter may include intra-corporate transferees, contractual services suppliers or independent service suppliers. On the other hand, we find significant evidence that restrictions on foreign entry tend to boost sectoral competitiveness in Greece, which would be consistent with the infant industry protection literature. This finding calls for future research elaborating on the channels through which such a protection of the local service industry has resulted in increased structural competitiveness.

The estimations remain inconclusive on the impact of R&D intensity and regulatory transparency on competitiveness indices. Although the estimated coefficients for both these variables are positive, they lack statistical significance both at the 1% and the 5% significance level. Hence, we cannot reject the null hypothesis that they do not have an important impact on the RCA sectoral

indices. Finally, the model shows very good fit to the data, as its correlation coefficient is higher than 99%, while the F-statistic is also found to be statistically significant.

2.4. Discussion and policy implications

It has been argued that, by the beginning of 2013, the competitiveness gap between Greece and the EU had closed by 75%, showing a positive response of the economy to reform implementation (Masourakis, 2013). An early evaluation of the OECD (2013a) also acknowledged progress in competitiveness and export performance. The outcomes of the present essay, however, suggest that this has been true only partly. Competitiveness effects of policies and institutional bottlenecks have been uneven across sectors and categories of commodities. In the case of service trade, structural competitiveness is found to have been negatively correlated to regulations imposing barriers to competition and restrictions to the movement of people.

We firstly discuss the case of the structural competitiveness of commodities. By splitting the examined sectors according to their level of structural competitiveness (as measured by RCA indices), the analysis hereby considers three categories of commodities. We provide evidence supporting the structural transformation narrative and show that the restructuring of exports has tilted competitiveness towards previously under-exported commodities. The results of our analysis suggest a decline in the structural competitiveness of sectors with historically high levels of comparative advantage, while sectors of average RCA indices experienced a statistically significant positive shift. The estimation results do not indicate a statistically significant change in the structural competitiveness of low-RCA sectors. In parallel, we compare export features

across countries of Southern Europe and show that both commodity export structure and structural competitiveness of commodity exports has been more volatile and prone to shocks in Greece.

We then consider the case of services. Our econometric results lend compelling support to the argument that the competitiveness of tradable services is negatively affected by high barriers to competition and restrictions to the movement of people, while it is positively affected by restrictions on foreign entry. On the other hand, the sectoral R&D intensity and regulatory transparency are not found to be associated in a statistically significant manner to the indices of structural competitiveness.

The findings have significant implications for economic policymaking in the fields of industrial policy and international trade. They complement and extend the relevant literature evaluating the implementation of policies in Greece and the academic literature on the role of institutional factors, as means of boosting the international competitiveness of commodities and services.

In the case of commodity trade, our findings on export diversification and the change in the pattern of competitiveness across sectors indicate a radical shift in the strongly specialised Greek economy. Before the crisis, Greece ranked fourth in the EU in terms of sectoral specialisation (EC, 2009)[16]. Our findings document a structural transformation of international trade that took place during the great recession, leading to trade diversification.

From a structural competitiveness perspective, we document that traditional sectors such as agriculture and textiles, which previously enjoyed relatively high levels of comparative advantage in international markets of commodities, lost their position in global trade. The devastating effects

[16] After Malta, Romania and Bulgaria.

of policies on commodity exports of sectors that historically enjoyed a relatively high comparative advantage implies an increased vulnerability of these sectors to external shocks, institutional bottlenecks and fallacies of policy design.

Commodity sectors of average RCA, such as pharmaceuticals and chemicals, proved to be more resilient. We find that their competitiveness performance improved in a statistically significant manner. This constitutes an indication of structural transformation towards these sectors.

Regarding the third category of commodities examined – comprising telecommunication equipment, transport equipment, automotive products etc. – the regression results are found to be negative, yet not statistically significant. These results reject any hypothesis concerning structural transformation of international trade towards these sectors. This fact should not be surprising, since historically they never had a significant comparative advantage, while their shares in the total exports have been small and relatively constant (Athanasoglou et al. 2010).

These findings are in line with the theory of Ricardo Hausmann and Cesar Hidalgo that posits diversification of external trade during crises (Hausmann & Hidalgo, 2010). It challenges the stream of literature that proposes specialisation in certain sectors with comparative advantage, while calling for a diversification of the export base in order to avoid drastic export shrinkage during crises. Export diversification could turn out to be a lower risk strategy for governments, while paying off, particularly in terms of resilience, during periods of economic shocks.

The research findings relate to the argument on firm size and the structure of the Greek economy, which is primarily based on agricultural (*balassa1*), rather than industrial firms (*balassa2* and *balassa3*). The declining RCA indices in sectors dominated by relatively small firms (such as agriculture) and increasing RCA indices in sectors with larger firms (such as industrial ones) testify the positive link between firm size and the potential to compete in international markets.

This is in line with the related literature on the positive relation between export performance and firm size (Gibson and Pavlou, 2017; Papadogonas et al., 2007). It also confirms the findings of previous research on the increasing impact of regulations on productivity and exports as we move from smaller to larger firm sizes (de la Maisonneuve, 2016).

In line with previous research, our findings relate to the competition and technological intensity of the examined sectors, as well as the importance of regulatory and institutional reform for international competitiveness. After examining the Greek export performance and composition for eleven years (1996-2006), Athanasoglou et al. (2010) find that more than two thirds of the value of national exports constantly comes from low-technology products in traditional sectors. This is consistent with our results showing a dominant role of traditional sectors in export performance, while it seems to be changing following the eruption of the crisis. In terms of regulatory and institutional reform, our findings corroborate that these could be more important than innovation support in improving the structural competitiveness of Greek service sectors. The policy implications of this result highlight the importance of structural reforms in order for any financial support to achieve better results.

2.5. Concluding remarks

This essay evaluates the evolution of structural competitiveness of products and services during the crisis in Greece. It relates the competitiveness challenge to the pursued policies and examines the main policy drivers of this evolution. The findings highlight the structural transformation that occurred during the first years of the crisis with regard to international trade competitiveness of

Greek goods and services. They also stress the importance of public policy for enhancing structural competitiveness in sectors of comparative advantage.

While new sectors have emerged as internationally-oriented and improved their comparative advantage, we find that historically export-leading commodity sectors of the Greek economy have lost their dynamic. Overall, competitiveness shifts have been uneven, at a time when fiscal balance targets have been achieved, and sometimes overshot. This reaffirms the excessive focus of economic policy on the fiscal side, without sufficiently considering the interrelations with the objective of structural competitiveness. As the empirical analysis reveals, not only has the competitiveness deficit not been addressed, but also implemented policies have adversely impacted strategic sectors, which constituted the former growth- and export-drivers of Greece and were previously trading internationally with significant comparative advantage.

The empirical analysis of the effectiveness of policies and institutional bottlenecks revealed a deterioration of structural competitiveness indices in the international trade of commodities. It also shows that, besides fiscal balances, policies have not achieved their primary aim of structural change towards knowledge-intensive sectors. Meanwhile, the important aspect of competitiveness for structural transformation improved unevenly. Although Greek commodity exports have lately been relatively successful and were hit by the crisis less than other components of the national economy, sectors of comparative advantage are shown to have lost their strategic importance and competitiveness in global markets. On the other hand, the analysis suggests that competitiveness improvements in certain sectors have come at the expense of traditionally export leading sectors of the Greek economy. Although it claims that diversification of exports could be the way forward as a lower risk strategy, the paper suggests that the losses in high RCA sectors have been larger than the gains in the lower RCA ones.

The analysis also highlights the importance of openness to competition and free movement of labour for the competitiveness of Greek services. After calculating the respective RCA indices and analysing their sectoral importance, we show empirically that the international competitiveness of services benefits from low barriers to competition and low restrictions to the movement of people. At the same time, we show that sectoral competitiveness has benefited from certain barriers to entry on foreign firms. Findings remain inconclusive concerning the impact of innovation intensity and regulatory transparency on structural competitiveness.

Future research on economic adjustment programs using longer time series may complement the current analysis with the long-term impacts of policies on structural competitiveness. While the empirical part of this research focuses on competitiveness, further studies could investigate the fiscal and financial stability policies, as the two other pillars of IIs policy intervention. In addition, the empirical analysis of service trade restrictiveness will benefit from the ongoing work of the WTO and the World Bank on the development of a new Services Trade Policy Database (STPD)[17]. Given the complexity and the simultaneous impact of many factors on measures of international competitiveness, it is likely that the choice of the variables of the model and their quantification will remain challenging for researchers.

Despite the considerable methodological progress in academic and policy literature, such policies implemented during the great recession can be exhaustively and accurately evaluated based on empirical results only in retrospective. This is because data during and after the adjustment programs are yet to be consolidated, while policy outcomes depend upon a combination of

[17] A WTO Staff Working Paper, representing research in progress, has been written on the topic by Borchert et al. (2019).

simultaneous national and international decisions. Future research could aim to extend the analysis to later years and disentangle the time effects from the policy specific effects. This could be done by regressing the RCA or other indices of competitiveness (such as the GCI of the World Economic Forum) against a number of policy variables, in order to capture potential effects linked to specific policies. Lastly, international trade competitiveness could be linked to the demand from other countries and policies such as the quantitative easing and trade wars, which affect more than one country.

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Annex

Table 2.2 Data availability of trade in services statistics used in the regression

	2015	2016	2017
BOP6 - SC1 - Sea transport	X	X	*(R&D Not available)*
BOP6 - SC2 - Air transport	X	X	*(R&D Not available)*
BOP6 - SC4 - Postal and courier services	X	X	*(R&D Not available)*
BOP6 - SE - Construction	X	X	X
BOP6 - SF - Insurance and pension services	X	X	X
BOP6 - SG - Financial services	X	X	X
BOP6 - SI1 - Telecommunications services	X	X	X
BOP6 - SI2 - Computer services	X	X	X
BOP6 - SK1 - Audiovisual and related services	X	X	X

X: Areas where there is data availability for all variables used in the regression presented in Equation 3 (section 2.3.3).

Table 2.3 Empirical results of the impact of innovation activity and regulatory restrictiveness on the RCA indices of services

Regression Statistics	
Multiple R	0.997708139
R Square	0.995421531
Adjusted R Square	0.991899632
Standard Error	0.117254979
Observations	24

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	10	38.8590956	3.88590956	282.6377078	***1.62539E-13***
Residual	13	0.178733491	0.01374873		
Total	23	39.03782909			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 99.0%*	*Upper 99.0%*
Intercept	8.071586509	0.661370634	12.20433158	1.7062E-08	6.642782122	9.500390896	6.07935573	10.06381729
R&D	2.16228E-09	1.99012E-09	1.086504317	0.296991863	-2.13712E-09	6.46167E-09	-3.83252E-09	8.15707E-09
For_Entry	83.20528526	2.795501571	29.76399159	***2.4037E-13***	77.16597128	89.24459923	74.78446342	91.6261071
Mov_People	-211.3174848	11.25165402	-18.78101516	***8.3857E-11***	-235.6252055	-187.0097641	-245.2105704	-177.4243992
Bar_Comp	-195.8276535	7.59564604	-25.78156651	***1.5108E-12***	-212.2370492	-179.4182579	-218.7078346	-172.9474725
Reg_Trans	4.861387741	6.24039149	0.779019674	0.449917054	-8.620158438	18.34293392	-13.93639277	23.65916825
d1	-0.57648745	0.140242712	-4.110641055	0.001228414	-0.879463409	-0.27351149	-0.998937183	-0.154037717
d2	8.46823807	0.484072419	17.49374214	2.04246E-10	7.422463189	9.51401295	7.010078419	9.926397721
d3	-6.119500655	0.34735554	-17.61739757	1.8702E-10	-6.869916677	-5.369084632	-7.165831356	-5.073169953
d4	0.592816208	0.182334293	3.251260081	0.006312904	0.198906917	0.986725499	0.043575023	1.142057393
d5	10.73855962	0.65935769	16.28639474	4.98245E-10	9.314103933	12.16301531	8.752392381	12.72472686

3. Institutional and policy determinants for rebooting investment in Greece

3.1. Introduction

An effective structural transformation of the Greek economy would require boosting investment to improve long-term productivity. This will also hinge upon the move of production factors from sectors of low productivity to sectors of high productivity, and from sectors with low to sectors with high comparative advantage. Furthermore, boosting investment would require removing regulatory- and investment-related impediments for the initiation of an innovation-led growth. Boosting the international competitiveness of commodities and services is closely related to the implementation of structural reforms, such as regulatory reforms ensuring fair market competition. Besides the streamlining of the regulatory framework, investing in research and development, as well as skilled labour, are also of importance in order to promote sustainable investment.

The results of the previous chapter point to the ongoing structural transformation of international competitiveness of sectors, whereby traditional high-RCA sectors have started losing ground, average-RCA sectors have gained momentum, and low-RCA sectors have essentially stalled in low levels of competitiveness. According to our empirical findings, boosting the trade and structural competitiveness of economic sectors in Greece is associated with institutional and policy reforms spanning a broad range of areas. The present chapter examines supply and demand side factors that relevant literature considers important in supporting such broad-based structural transformation and directing investment towards priority sectors of strategic relevance.

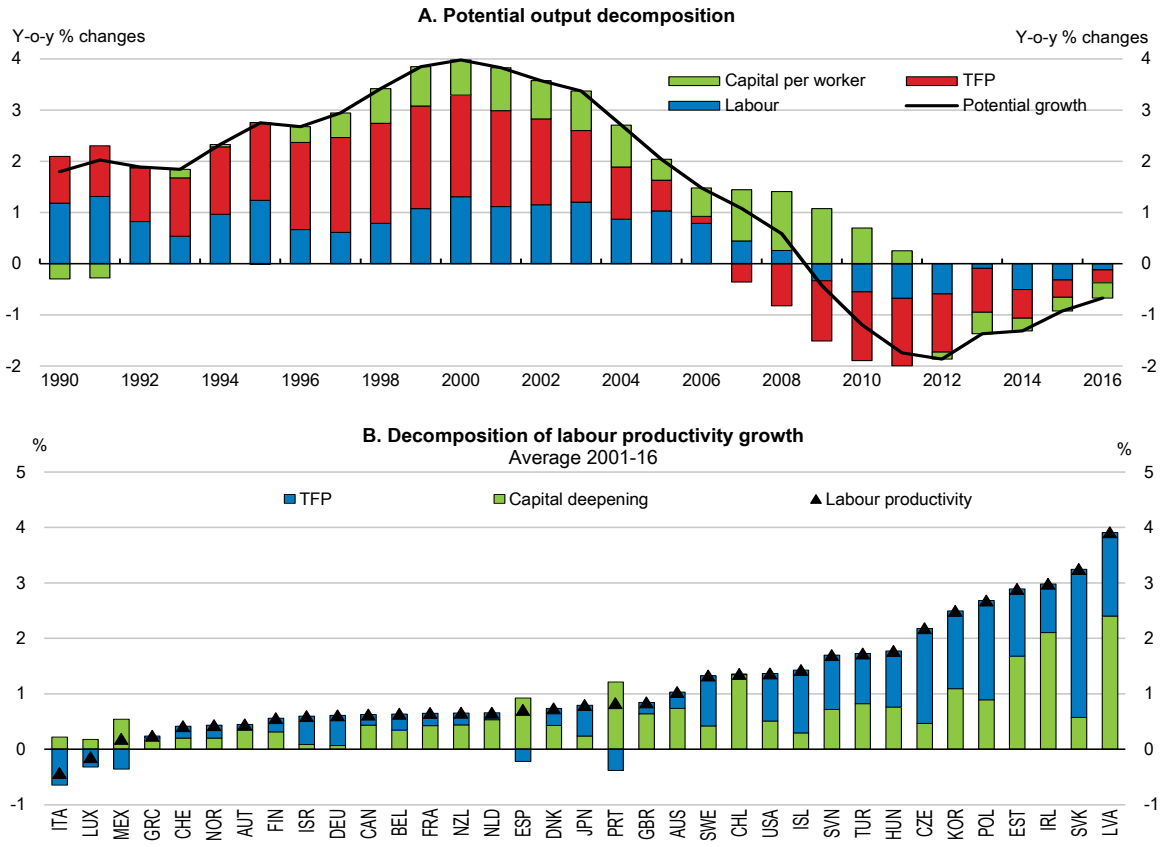
This chapter endeavours an evaluation of the key determinants of investment in Greece in a manner that seeks to render the academic analysis relevant for policymaking and vice-versa. Hence, the essay comprises substantial benchmarking and time series analysis of key policy variables. It also examined their evolution and potential use in designing economic policies that can reverse the loss of investment owed to the great recession. The main contribution of this essay lies in systematically examining the extent to which theoretical models and policy factors, considered relevant by economic literature, have played a role in either encouraging or deterring investment growth before and during the economic crisis.

Investment and productivity growth constitute key channels for the improvement of economic well-being. Since the start of the global financial crisis, the collapse of investment has reduced Greece's stock of productive capital. Along with the decline of total factor productivity (TFP), the fall in the productive capital stock is one of the main factors behind the falling potential output growth. Potential GDP growth rate started declining in the early 2000s, due to diminishing TFP and employment growth (Figure 3.1, panel A). Despite the falling TFP, investment kept increasing until the beginning of the crisis in 2008. This shows that investment was mostly fuelled by positive expectations about future prospects of the economy, rather than the underlying productivity dynamics.

The entry into the EU common currency area in 2000, and the shrinkage of transaction costs for investors looking for opportunities to allocate their capital, highlighted the importance of removing institutional barriers to foreign investment and trade. In the absence of tariff barriers and currency risks, other EU countries implemented significant structural reforms to attract investment capital. Greece, on the contrary, lagged behind in TFP growth and the implementation

of structural reforms, which would drive investment. The collapse of investment in the wake of the crisis was such that the productive stock capital has been shrinking - as the deprecation rate exceeds the investment rate - dragging down potential GDP growth. Weak capital accumulation is also holding back labour productivity growth, hurting in turn living standards (Figure 3.1, panel B).

Figure 3.1 Low investment is dragging down potential output and labour productivity growth



Source: OECD (2017), OECD Economic Outlook: Statistics and Projections (database)

After reviewing the institutional and policy factors affecting investment, as per recent literature and factual evidence, we point out to various ways of promoting investment demand through the adoption of good practices. In line with recent theoretical insights on innovation-led growth

(Mazzucatto, 2018, 2017, 2013), horizontal measures do not suffice to boost investment in sectors of strategic importance for long-term structural transformation. Mission-oriented public policies, such as those prioritising capacity building, education, financing initiatives in specific sectors, are of crucial importance. These are usually based on strategic choices, sectoral and comparative advantage analysis and aim to address broader challenges that require long-term commitment to provide solutions to challenges that are as much social as technological (Foray et al., 2012). Therefore, we focus on both supply side factors for boosting private investment, as well as demand side policies that would support sustainable public and private investment.

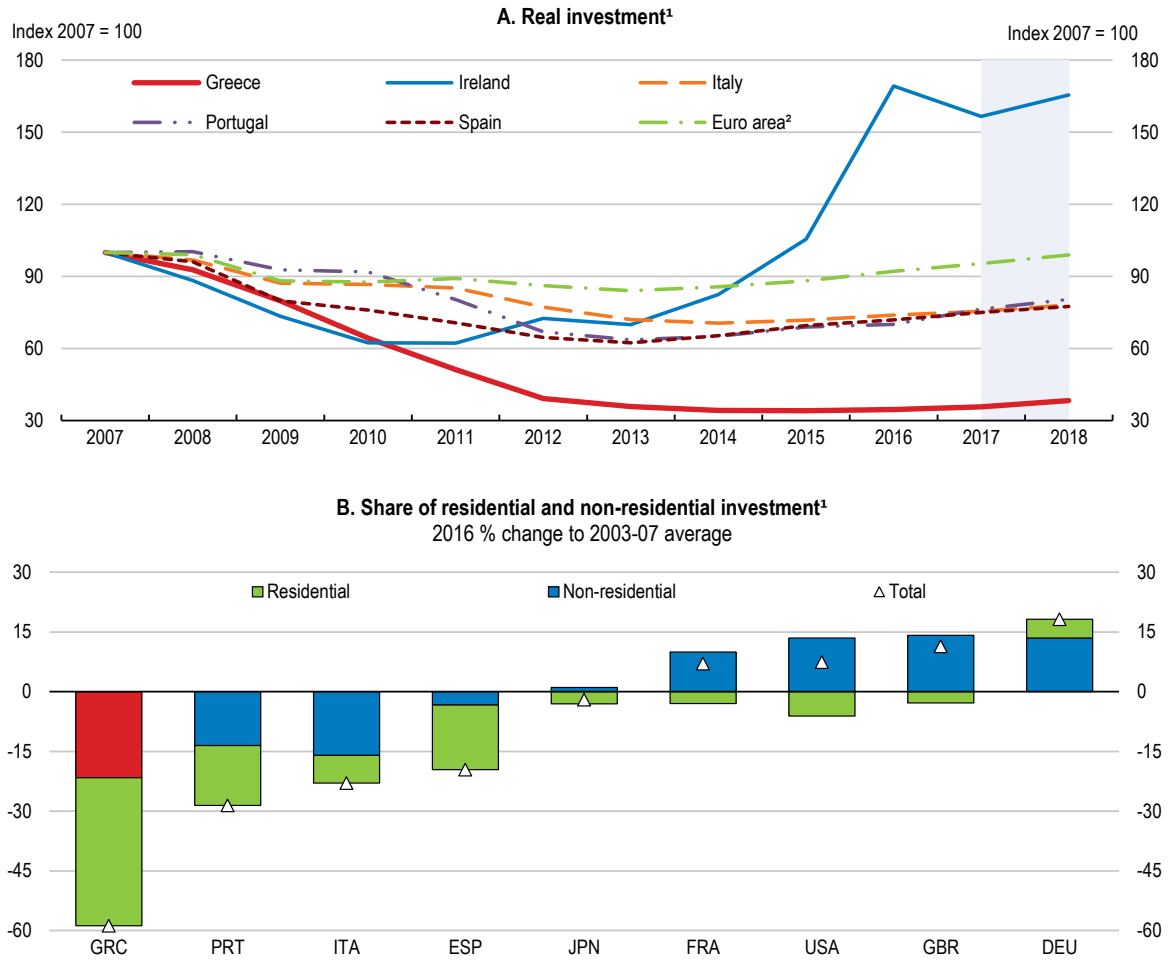
Split in two main lines of narrative, the essay considers the key policy determinants of investment performance in the private and the public sector. It attempts to propose policies that could help rebound stagnant investment. It also endeavours to explain how the deployment of certain policy tools can jointly stimulate investment growth and structural transformation. In doing so, it sheds light on the potential mechanisms that could have impacted the level of investment during the crisis in Greece. Moreover, it explores how policies that improve the business environment, lower product market regulation and enhance regulatory quality, can strengthen investment incentives, attract more FDI, and raise Greece's integration into global value chains.

Besides the business environment, regulatory quality, and product market regulation, further key determinants of investment policy included hereby comprise the streamlining of insolvency procedures, the creation of an innovation ecosystem, the resolution of long-standing financing bottlenecks and the use of long-term strategic planning in order to enhance the quality of public investment. The level and quality of aggregate investment are crucial in supporting the nascent recovery and raising living standards.

3.1.1. The composition of investment in Greece and the EU during the crisis

In Greece, the fall in real investment was larger and more prolonged than in other Euro Area countries. This large fall is attributable to both residential and non-residential investment (Figure 3.2). In 2016, residential and non-residential real investment fell by 90% and 35% respectively, compared to their 2003-2007 respective averages.

Figure 3.2 Investment dropped more than elsewhere

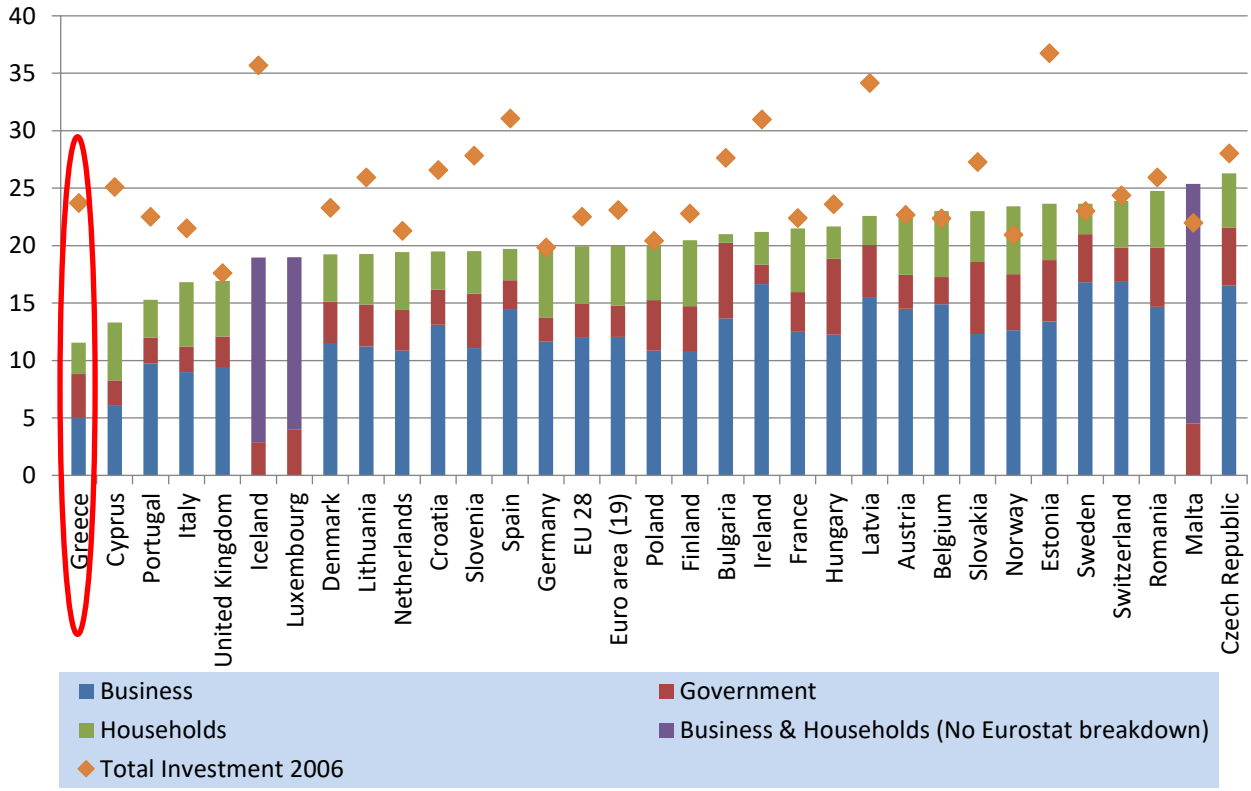


1. Real gross fixed capital formation.
2. Includes Euro area countries which are OECD members.

Source: OECD (2017), OECD Economic Outlook: Statistics and Projections (database)

Compared to other OECD countries, the role of residential investment in dragging down total Greek investment was more pronounced. In 2015, Greece experienced the lowest level of gross fixed capital formation in the EU, with total investment amounting to about 11.55% of GDP, from nearly 24% in the pre-crisis period (Figure 3.3). This was considerably lower than in the EU, where investment accounted on average for 20% of GDP. In Greece, business investment as a share of GDP was 58% below the EU28 average; household investment 46% below average; and public investment 30% above it.

Figure 3.3 Investment by institutional sectors, 2015 (% of GDP) cross-country comparison



Notes: 2006 Data for Luxembourg are not available; Breakdown of non-government investment to business and household investment not available for Iceland, Luxembourg and Malta.

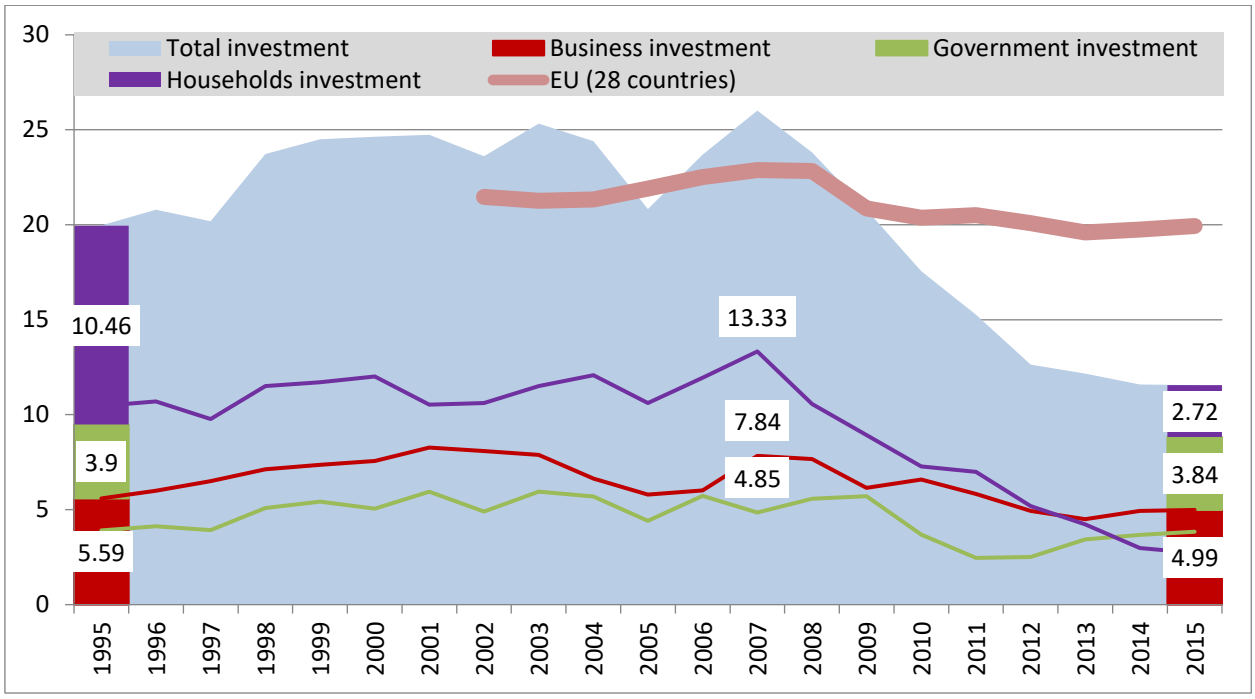
Source: Eurostat

Before the crisis, all three components – business, government and household investment – were contributing to investment growth. The marked drop in residential investment reflected its disproportionate role in the Greek economy. Although Greece did not experience a housing boom in the years immediately preceding the crisis, residential investment (as a share of GDP) was consistently higher than that of most OECD countries for several decades before the crisis. Housing investment accounted for about half of total investment between 1995 and 2007, a much larger share of total investment than in other EU countries. The deep-rooted perception of housing as a safe asset and the dearth of alternative investment opportunities in productive activities have contributed to this phenomenon, lowering the growth of productive capital stock and labour productivity.

Banks and households channelled savings mainly to the real estate. This reflected the expectations of investors concerning the continuous rise in residential prices. During the crisis, and despite its significant fall, business investment has been more resilient compared to government and household investment. As a result of austerity policies, public investment to GDP reached its record decade low in 2011 at 2.46% of GDP. Since then, public investment has risen, partly due to EU funds. In 2015, public investment stood at 3.84% of GDP, accounting for a third of total Greek investment.

Figure 3.4 Total investment and investment by institutional sectors in Greece and EU28

1995-2015 (% of GDP)

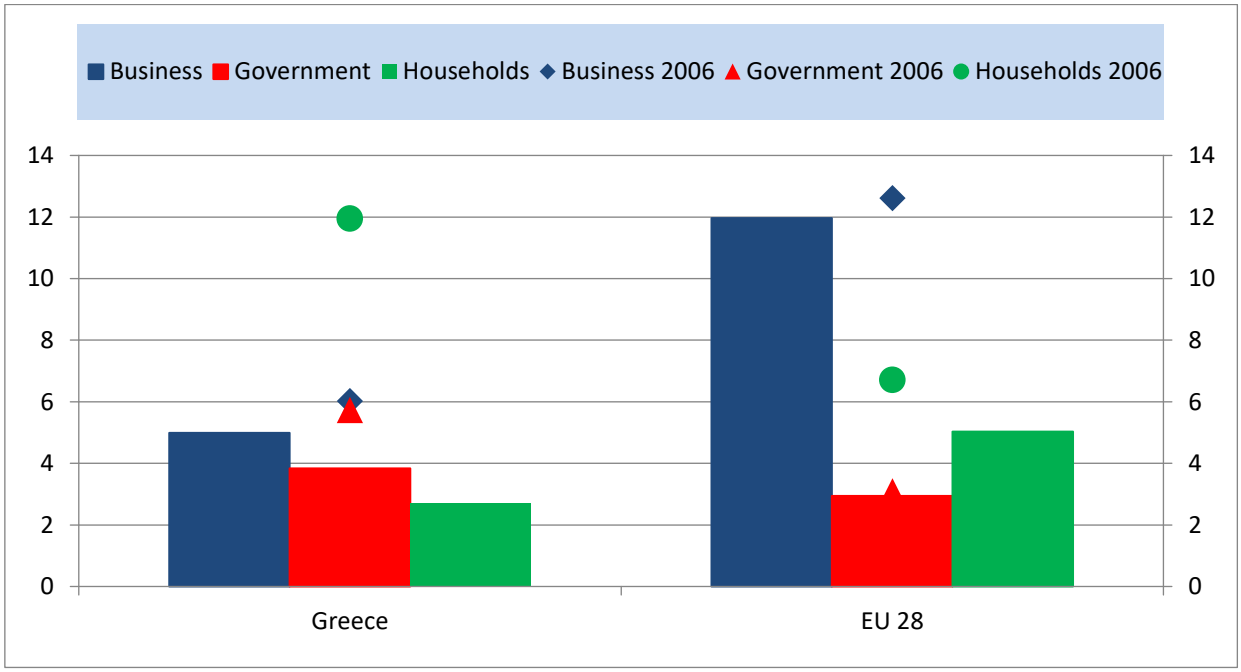


Source: Eurostat

While total investment in Greece fell between 2007 and 2015 by about 14% of GDP, the cut in investment spending was mainly driven by the fall of household investment. In 2007, household investment to GDP was higher than the total of household, business and government investment taken alone in 2015. Therefore, the decrease from 13.33% of household investment to GDP in 2007 to 2.72% of GDP in 2015 reflected the large share of household investment in the composition of national investment expenditure. At the same time, business investment experienced a decrease from 7.84% to 4.99% of GDP, while government investment proved to be somehow more resilient than the other two components, falling from 4.85% to 3.84% of GDP.

During the same decade, European Union developments did not follow the same trend. As seen in the figure below, government investment was in 2015 at almost the same level as in 2006. It actually has picked up and has had an upward trend since 2013. By 2016, total investment to GDP in the European Union exceeded 20% of GDP, reaching the levels of 2012.

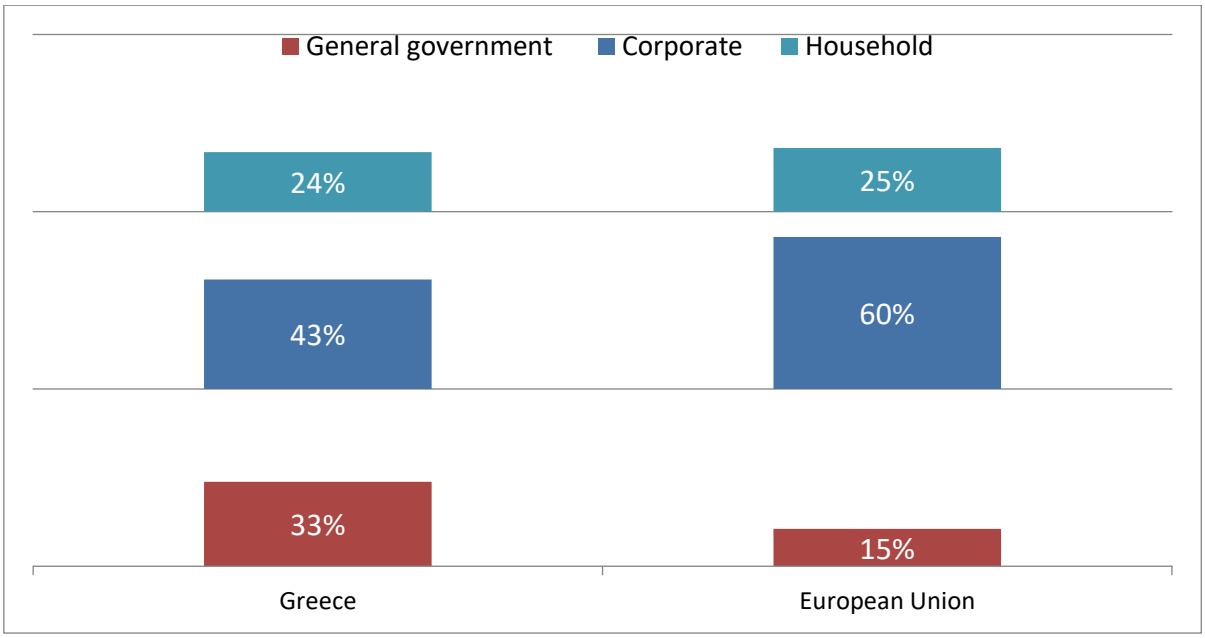
Figure 3.5 Investment by institutional sectors in Greece and the EU28, 2015 (% of GDP)



Source: Eurostat

Household investment captures almost a quarter of total investment both in Greece and the EU. However, the rest is not split the same way between corporate and government investment. Government investment in Greece accounts for more than twice the EU average as a share of gross fixed capital formation. For each euro invested on average by EU governments, the corporate sector invests four euro more. In Greece, the ratio is one to one point three, pointing to a low multiplier effect and a relative shift of resources from private to public investment.

Figure 3.6 Investment of households, the corporate sector and general government



Note: % of GFCF, 2015

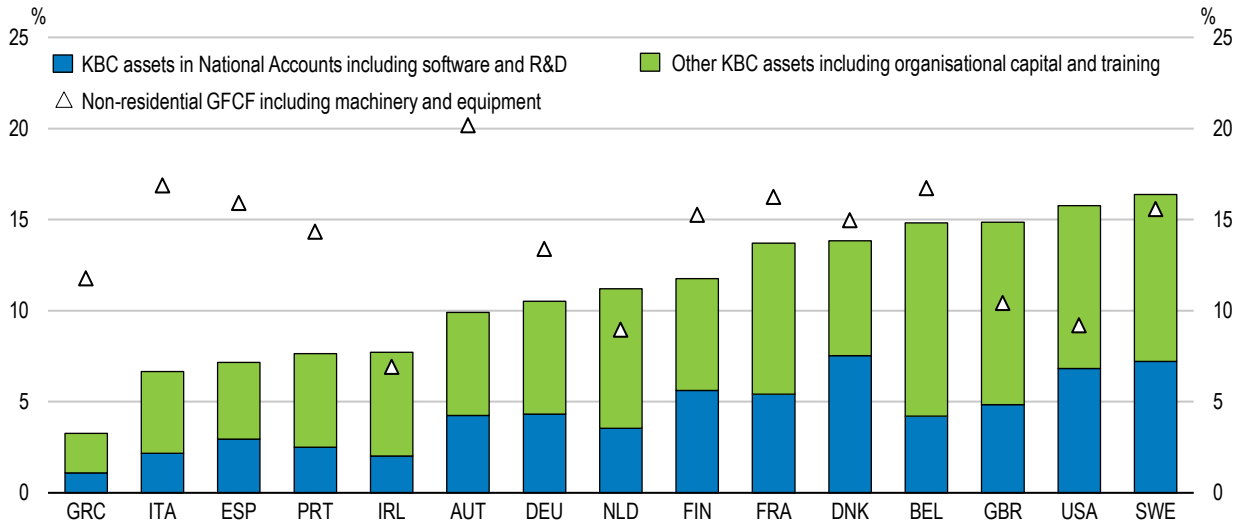
Source: OECD (2017), Investment by sector (indicator)

The missing private sector investment relates to a number of policy variables, which we attempt to analyse and explain in the next sections of this chapter. The effects of austerity policies on disposable income of households drove down their demand for goods and services. This led to downsized firm expectations about future demand, which, in turn, led to lower propensity for corporate investment. Along with the credit squeeze, these interrelated factors gave rise to a vicious cycle of further cuts in corporate investment and weaker economic growth. Moreover, the high level of uncertainty made international investors more risk averse and directed significant investment capital from Greece to other EU economies. Although institutional and regulatory barriers pre-dated the crisis, their role in fostering Greece's investment attractiveness became more prominent in the adverse crisis environment.

Besides the split between public and private investment, the type of corporate investment also played a role in driving investment performance. The composition of production and trade shows that Greece lags in investment in knowledge-based capital (KBC) including software and databases, new product development and organisational capital (Figure 3.7). In OECD countries, KBC accounts for up to a third of labour productivity growth and in some it has outpaced investment in physical capital (Andrews and Criuscolo, 2013; Corrado et al., 2012; Roth and Thum, 2013). Investment in KBC components, such as business processes and organisational capital, significantly contributes to productivity growth in service industries (Dabla-Noris et al., 2015). Also, for a given level of research and development (R&D) expenditure, manufacturing companies investing heavily in software generate more patents (Branstetter et al., 2015).

Figure 3.7 Business investment in fixed and knowledge-based capital (KBC) is low

% of business sectors' gross valued added, 2013



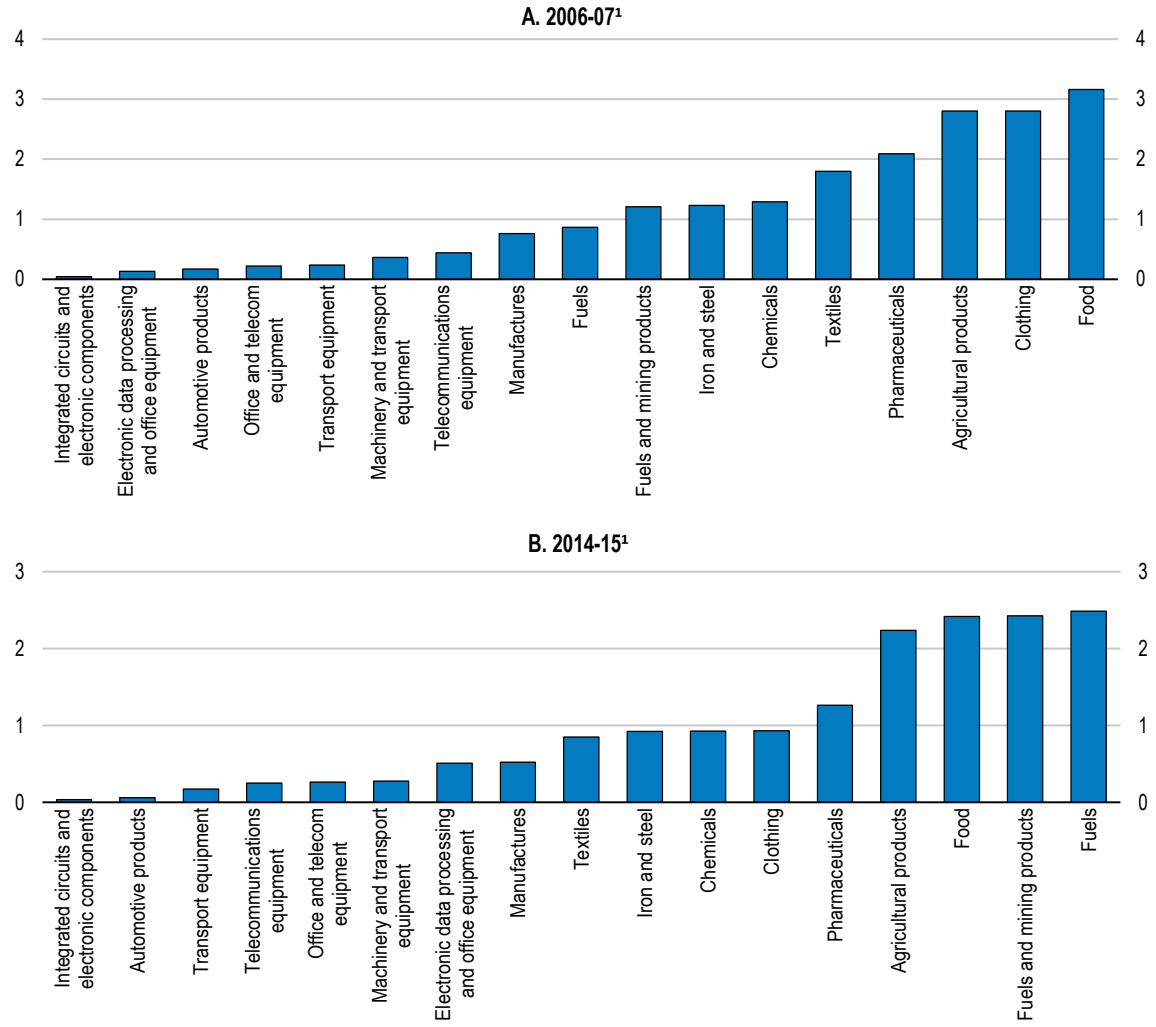
Note: KBC comprises computerised information, like software and databases; innovative property, including research and development (R&D) and new product development in financial services (among other things); and economic competencies, including firms' human and structural resources such as firm-specific training, brand equity, and organisational capital.

Source: OECD (2015), OECD Science, Technology and Industry Scoreboard 2015: Innovation for growth and society

As argued in the previous chapter, investing in R&D could increase the potential of sectors to become more internationally competitive. However, looking at the revealed comparative advantage (RCA) indices before the crisis, as well as in the midst of it, we find that no particular structural transformation towards knowledge-intensive sectors seems to have taken place during this time period (see chapter 2).

The chart below shows the RCA of the main Greek industries (Figure 3.8). An RCA index value larger than one means that the value of the specific commodity exports as a share of the country's total exports is larger than the corresponding ratio for the rest of the world, thus trading with a comparative advantage. The higher the RCA value, the more competitive a sector is with regard to its international trade position. In order to avoid biases of export booms or a temporary decline during a certain year, we use the average of two consequent years, providing a relative measure of comparative advantage before (2006-7) and during the peak years of the crisis (2014-15).

Figure 3.8 Revealed comparative advantage in Greece



1. Unweighted average.

2. A higher value of the index indicates a greater comparative advantage

Source: Authors' calculations based on the European Commission AMECO database

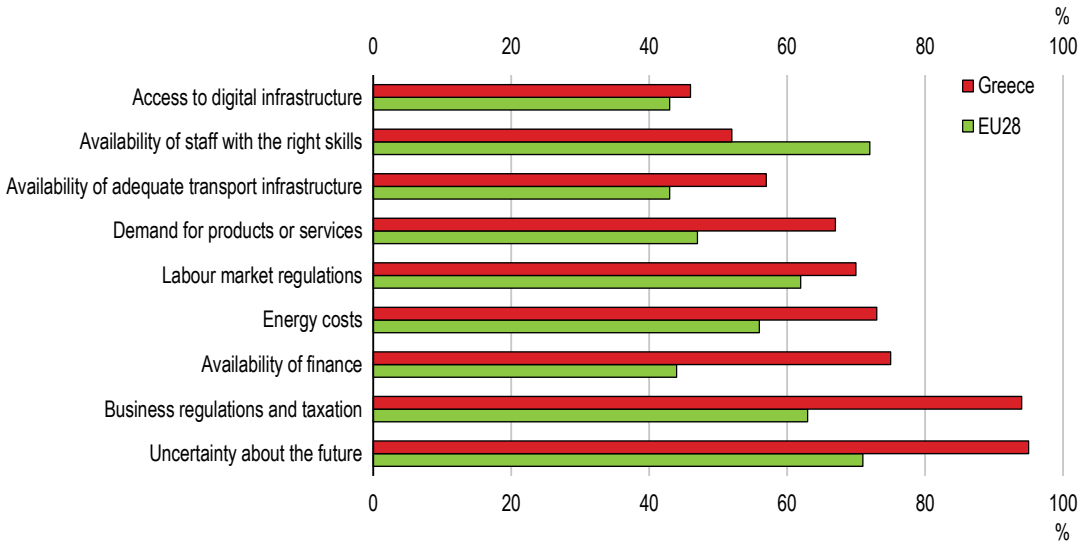
What is observed confirms the need for further structural transformation of the exporting structure of Greece, as argued in chapter 2. While the crisis hit the competitive performance of traditional sectors like food and agriculture, it was not accompanied by a strengthening of the international position of previously lagging sectors and commodities of high knowledge intensity. At the same time, the crisis has provided opportunities for average-RCA sectors, like fuels and mining

products, to strengthen their international trade position. Yet, given the importance of price and terms of trade volatility of the specific industries, as well as their low level of backward and forward linkages, this would not necessarily constitute an indication of positive structural transformation, capable of supporting sustainable investment and economic growth.

Greece faces several barriers to raise investment, particularly in new sectors driving the technological innovation. A European Investment Bank survey (EIB, 2017), reported that the high level of uncertainty, complex business regulation and taxation, lack of finance and energy costs are the most significant obstacles to raise corporate investment (Figure 3.9). Also, Greek firms report inadequate transport infrastructure as an important barrier to investment more often than companies in other EU countries.

Figure 3.9 Obstacles to investment by businesses are high

Share of firms reporting an obstacle to investment activities



Note: Based on the EIB Investment Survey 2017, covering 12500 - from small SMEs with more than 5 employees to large corporates.

Source: EIB (2017), The annual EIB Group Survey on Investment and Investment Finance (EIBIS)

Reviving investment will therefore require policy actions spanning across different areas. This chapter focuses on policies that aim to:

- lower product market regulation and improve regulatory quality, in order to enhance competition, transparency and attract additional foreign direct investment (section 3.3.1);

- attract FDI in order to integrate Greek businesses into the global value chains (section 3.3.2);

- accelerate insolvency procedures in order to speed up the reorganisation of struggling but still viable firms and the liquidation of non-viable ones (section 3.3.3);

- boost innovation and investment in knowledge-based capital (KBC), in order to raise productivity and switch to higher value added products (section 3.3.4);

- overcome problems in the banking sector in order to provide adequate lending to firms to finance investment (section 3.4).

Finally, this chapter focuses on ways to enhance public investment so as to improve the quality of infrastructure, improve public investment management and develop a long-term investment strategy (section 3.5). Before moving to the analysis of key policy determinants of private and public investment, the following section provides a literature review linking these policy variables to various components of investment.

3.2. The role of institutions and policies in investment promotion: Some theoretical insights

Institutions and policies contribute to building a good investment climate providing opportunities for all investors: public or private, large or small, foreign or domestic. As per recent literature, we

examine in this section important areas of investment promotion through policies that support private investment and render public investment more effective. The responsibility for the implementation of such policies spans across a number of institutions within a government (OECD, 2015a). The heterogeneity of investors, the diversity of factors driving investment decisions, and the multiplicity of policy objectives pursued by governments call for a whole-of-government approach, so as to increase policy coherence. Such coherence affects the investment climate, encourages foreign investment, promotes linkages and technology spillovers, raises the quality of the workforce and improves infrastructure.

Institutions and public governance matter as much as policies for the investment climate. Investment involves a judgement about the future. What matters for investors are all the principles embodied in the notion of the rule of law: predictability, transparency, credibility, accountability and fairness.

Public investment can be an important factor to support long-term growth and social welfare, in addition to strengthening the economic recovery. Fiscal consolidation can result in long-term economic losses when expenditure cuts occur in areas where governments provide valuable public goods, such as public investment (Cournède et al., 2013). OECD estimates have indicated that the marginal return on additional public investment in Greece is positive (Fournier and Johansson, 2016). A study by the IMF (2015) also pointed to a large positive effect of public investment, with one euro spent on public investment increasing GDP by EUR 1 to 1.4. Across the OECD, a given increase in public investment is found to lower unemployment twice as much as the same increase in public consumption (OECD, 2017g). Hence, there is room to explore whether public investment could be further leveraged to crowd in private one.

3.2.1. Product market regulation and regulatory quality

Encouraging competition by reducing regulatory barriers is key to strengthening incentives to invest. Ample empirical evidence shows that market competition fosters investment and productivity (Nickell, 1996; Blundell et al., 1999; Aghion et al., 2004). Increased competition also strengthens incentives to innovate and adopt better management practices, as well as incentive to invest in information and communication technologies (ICT) and knowledge-based capital (KBC) (Fuentes Hutfilter et al., 2016). As underlined by the OECD (2016) and Arkolakis et al. (2015), product market reforms would also improve external competitiveness and promote exports by lowering production costs without requiring further downward wage adjustment.

3.2.2. Foreign direct investment and integration into global value chains

Given the low level of savings, foreign direct investment (FDI) can play an important role in reviving investment in Greece. Also, FDI generates benefits that go well beyond the direct additional investment it engenders:

- with the right conditions, FDI can generate technology spillovers and productivity gains to the host country (e.g. Iordanoglou and Matsaganis, 2017; OECD, 2015a; OECD 2010c, Lee, 2005). FDI can contribute to the export performance of the host country, as foreign affiliates tend to be more export-oriented than domestic companies (e.g. Kneller and Pisu, 2004; OECD, 2000; Ahn et al., 2004).
- Finally, FDI is a building block of global value chains (GVCs). GVCs coordinated by multinational enterprises account for 80% of global trade (OECD, WTO & UNCTAD, 2013). Across countries, integration in GVCs is positively associated with skills

development and productivity growth (OECD, 2017g). GVCs enable domestic firms to access world markets through MNEs' supply chains. The size of manufacturing as a share of GDP is positively associated with integration in GVCs, especially through backward engagement (i.e. imports of inputs used to produce final goods or intermediates to be exported) (OECD, WTO & UNCTAD, 2013).

Literature posits that attracting FDI hinges on improvements in the business environment, low product market restrictions, improved quality of infrastructure and institutions, as well as the efficiency of the public administration. These are also some of the main policy determinants of integration in GVCs (OECD, WTO and UNCTAD, 2013).

Attracting FDI in sectors with high relative comparative advantage (RCA) would be especially beneficial for Greece. Empirical research suggests that FDI offers the potential of raising the quality of exports, thereby enhancing RCA (Harding and Javorcik, 2012). Policies aiming at attracting FDI in sectors with a comparative advantage could then accelerate GVCs integration.

Policies have an important role to play in supporting certification and compliance with standards by SMEs. This could be achieved through national platforms that increase awareness of international certification, experience sharing and best practices, and facilitated matching between potential partners. In Mexico, for instance, some first-tier suppliers of Volkswagen have helped second-tier suppliers to improve quality – by helping them to gain quality certification specific to the automotive sector based on ISO 9001 – so as to enter or remain in Volkswagen global value chains. Mexico’s National Network of Productive Associations promotes horizontal and vertical links between SMEs, governments, institutions and intermediate organisations. Also, initiatives

such as group certification for SMEs in geographical regions might be useful, if trust could be gained in effective control mechanisms (OECD, 2008a).

3.2.3. Insolvency procedures and contract enforcement

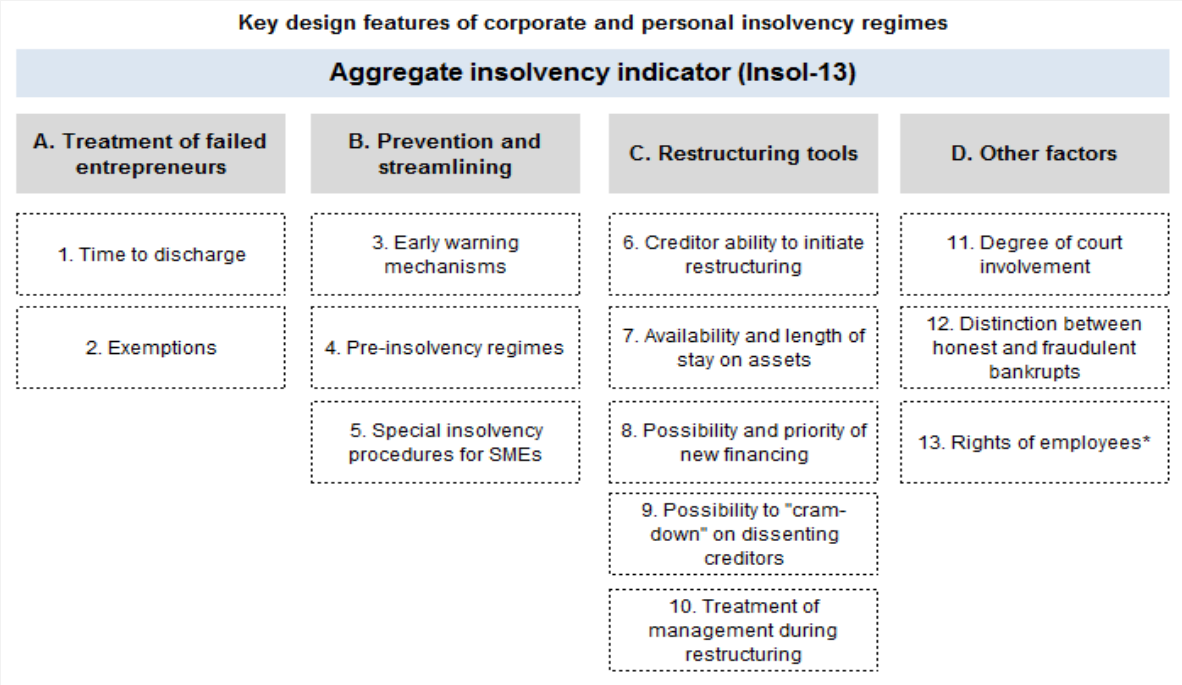
Investment and entrepreneurship rely heavily on the ability of capital to move between profitable market opportunities freely and quickly. The role of insolvency frameworks becomes crucial in restructuring viable companies and liquidating non-viable ones. An efficient insolvency regime should deliver the largest recovery rate for creditors with the least direct loss in the value of the insolvent firm (see Box 3.1). If creditors are not protected or allowed to participate in insolvency proceedings, they will have less incentive to lend in the future, leading to a less developed credit market and, consequently, lower investment (Claessens and Klapper, 2002).

Box 3.1 The OECD questionnaire on insolvency regimes

In April 2016, a questionnaire aimed at collecting specific information about personal and corporate insolvency regimes was circulated by the OECD to 35 OECD member and 11 non-member countries.

The questionnaire was designed to capture 13 key features of insolvency regimes (Figure 3.10). In order to get a better understanding of reforms over time, the OECD also asked countries to indicate the state of play with respect to the different features of insolvency regimes at five year intervals since 1995 (i.e. 1995, 2000, 2005, 2010 and 2016).

Figure 3.10 Components of the OECD insolvency index



Source: Adelet McGowan,M., D. Andres and V. Millot et al. (2017), "*Insolvency Regimes, Zombie Firms and Capital Reallocation*", OECD Economics Department Working Paper, No. 1399, OECD Publishing: Paris.; Adalet McGowan, M. and D. Andrews (2016), "*Insolvency Regimes And Productivity Growth: A Framework For Analysis*", OECD Economics Department Working Paper, No. 1309, OECD Publishing: Paris.

Long and costly insolvency procedures trap capital and other resources in low productivity firms, reducing allocative efficiency and depressing domestic investment. Evidence suggests that a non-trivial share of the collapse in aggregate business investment is attributable to the survival of firms having persistent problems meeting interest payments, the so-called zombie firms (Adalet McGowan et al., 2017). High shares of capital and employment trapped in zombie firms signal high resource misallocation, lowering thus productivity. Moreover, this resource misallocation weakens incentives for non-zombie firms and financial institutions to invest and innovate (congestion effect), while also raising the cost of capital and labour through their artificial scarcity. Empirical evidence from OECD countries indicates that reducing barriers to corporate restructuring can contribute to reducing the share of capital sunk in zombie firms (Adalet McGowan et al., 2017). This is capable of reducing resource misallocation and increasing productivity. Such reforms can also raise investment by non-zombie firms by reducing congestion (Adalet McGowan and Andrews, 2016).

3.2.4. The innovation ecosystem and performance

The use and effective enforcement of intellectual property rights (IPRs) is another important policy measure to encourage innovation. IPR regimes concern not only large and multinational enterprises, but also innovative start-ups and SMEs. Yet, SMEs in OECD countries tend to underutilise IPRs (OECD, 2015a). Evidence from six case studies on major innovations suggests that IPRs contributed, at least partially, to R&D appropriation (WIPO, 2015). IPRs encourage disclosure (unlike trade secrets) by allowing innovators to share technologies on terms they choose. As such, IPRs enable the development of technology markets. International bodies such as the World Trade Organization (WTO) and World Intellectual Property Organisation (WIPO)

require their members to undertake binding commitments to protect IPRs. The OECD has also developed guidelines on specific aspects of IPRs, such as access to research data from public sources and licensing of inventions (OECD, 2007).

Public procurement is another tool that could be used to develop the innovation capacity of countries. Good practices from OECD countries show that public procurement can be also used to foster innovation. For example, by specifying functional rather than technical criteria in calls for tenders, the government could foster competition among firms that wish to provide the product or service in the most cost-effective way. In a recent survey among OECD countries, almost 80% of responding countries reported to have supported innovation through the procurement process, while half of them had developed action plans for innovation procurement (OECD, 2017h).

3.3. Institutional and policy developments to reboot private investment in Greece

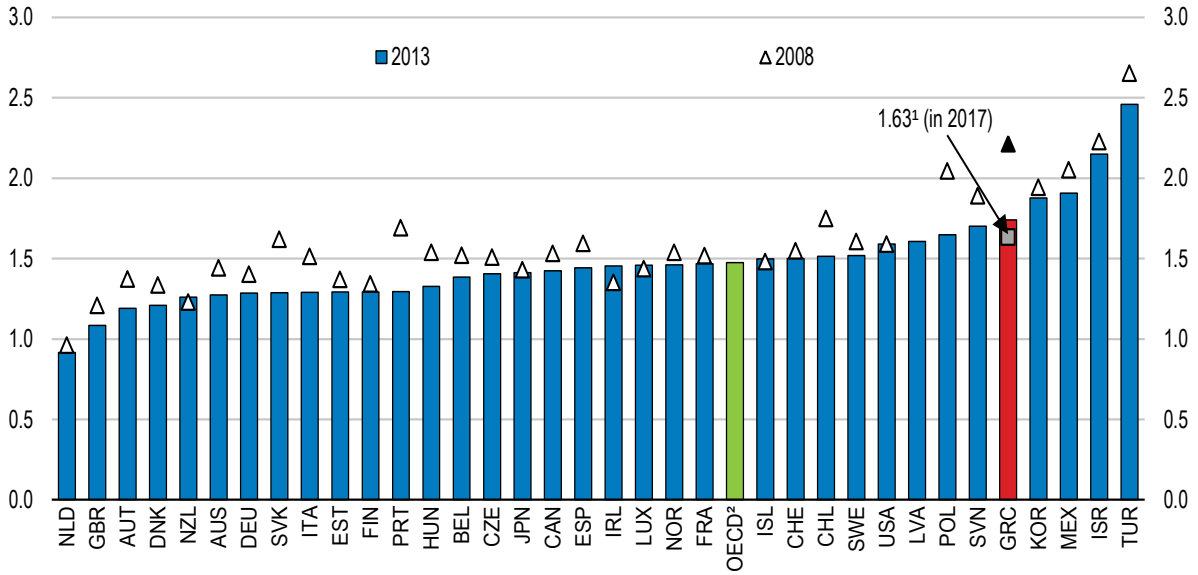
As analysed in section 3.1.1, private investment accounts for the largest part of gross fixed capital formation, about two thirds of it. Private investment includes both corporate and household investment and depends on a number of factors, which we analyse below. According to the OECD (2015a), the role of governments in the field of investment should not be confined to the active role of allocating public resources for public investment, but also to creating the circumstances that would mobilise private investment. Private investment can, for example, be mobilised to support the transition towards the green economy, the development of infrastructure projects, the long-term sustainability of the economy, etc. Therefore, in order to promote a favourite institutional environment, a number of policies analysed below should be jointly considered.

3.3.1. Product market regulation and regulatory quality

Since the start of the crisis, cuts in barriers to entry, trade and investment and reduced state control have made Greece's product markets more open to competition and eased restrictive regulations (Figure 3.11). Between 2008 and 2013, reduced barriers to trade and investment contributed the most to lowering product market regulations. A preliminary and conservative assessment of reforms implemented suggests that product market restrictions eased further between 2013 and 2018 (KEPE, 2017; OECD, 2018). The drop in PMR index might not reflect all the progress made since 2013, as the PMR index covers mostly horizontal regulations, while the implemented product-market reforms mostly concern sector-specific regulations. This is corroborated by the World Bank Doing Business indicator, which improved between 2013 and 2017. Despite such progress, Greece's business environment is among the least friendly among OECD countries, while it still performs poorly in the World Bank rankings.

Figure 3.11 Product market regulation has improved but remains above most OECD countries

Index scale from 0 to 6, from least to most restrictive



1. Preliminary calculation of the PMR reforms since 2013.

Source: OECD (2017), Product Market Regulation Database

Regulatory restrictions in service sectors and professions can be especially damaging. Services in Greece account for about 80% of GDP, higher than the OECD average (about 74%). Also, services account for about 40% of Greece's total exports in gross terms and more than 70% in value added terms. Regulated professions accounted for about 30% of total private sector employment in 2010. Close to 18% of all employees in Greece were working in jobs that required a license, while about 13% of all employees were working in strictly regulated professions. In these professions, regulations impose additional entry and conduct restrictions (Athanassiou et al., 2015).

Since 2010, Greece has undertaken an extensive legislative reform to streamline regulation and ease entry into a large number of regulated professions. The reform has been complex, and its

implementation followed the recommendations of the Hellenic Competition Commission (HCC) (OECD, 2013; KEPE, 2015). This resulted in opening up to competition 75% of the 350 regulated professions in Greece, through various measures (e.g. increase in the allowed number of notaries and reduction in notary fees; elimination of unfair restrictions for access to the engineering profession; relaxation of rules for the establishment of new pharmacies).

An assessment of the reform of 11 regulated professions conducted by the Centre of Planning and Economic Research (KEPE, 2015) suggested that regulation streamlining had a positive effect on employment. Without such reform, the crisis would have caused a larger fall in employment in these regulated professions and the employment recovery would have started later. The reform did not have a clear impact on prices and the quality of services provided (KEPE, 2015).

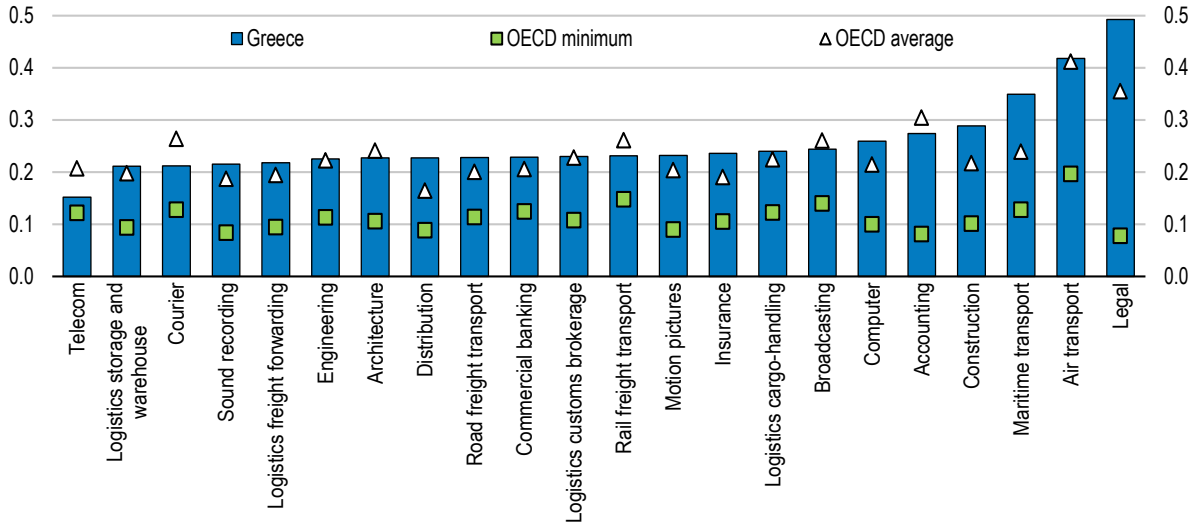
As highlighted by OECD Surveys (OECD, 2013; OECD, 2015), the liberalisation of regulated professions could go further. The OECD Service Trade Restrictiveness (STRI) index, which captures restrictions to international trade in services, shows that in Greece more than half of the 22 sectors considered have higher restrictions than the OECD average (Figure 3.12).

Relative to the OECD average, Greece performs especially well in telecommunications and postal services. Legal, construction and maritime transport services are instead the three sectors with the highest restrictions relative to the OECD average (Figure 3.12). For instance, in legal services, EU nationality is required to obtain a license to practice domestic law. Moreover, only licensed lawyers can own shares in law firms and board members and managers of law firms must be licensed lawyers. In construction services, there are discriminatory measures related to public procurement processes against potential bidders and the State controls two major firms in this sector. In maritime transport services, foreigners cannot own more than 49% of local maritime transport companies, the cabotage market is closed for non-EU registered vessels (as in all EU

countries). Moreover, majority ownership by Greek or EU nationals is a precondition for the registration of vessels under the national flag. Also, certain technical agreements are exempt from competition law while some services are reserved for specific entities at ports (OECD, 2016).

Figure 3.12 Service trade restrictions can be lowered further

OECD Services Trade Restrictiveness Index, scale from 0 to 1 (most restrictive), 2016



1. The index includes regulatory transparency, barriers to competition, other discriminatory measures, restrictions on movement of people and restrictions on foreign entry. It is calculated on the basis of the Service Trade Restrictions Index (STRI) regulatory database over the 35 OECD Members, Brazil, China, Colombia, Costa Rica India, Indonesia, Lithuania, Russia and South Africa. The STRI database records measures on a most-favoured-nations basis. Preferential trade agreements are not taken into account. Air transport and road freight cover only commercial establishment (with accompanying movement of people).

Source: OECD (2017), "*Service Trade Restrictions Index by services sector*" in OECD Industry and Services Statistics (database)

Between 2013 and 2016, the OECD conducted, in cooperation with the Hellenic Competition Commission (HCC), three Competition Assessment Reviews that helped identify barriers to competition in selected sectors and ways to improve the overall regulatory framework. The

reviews covered 14 sectors, accounting for about 30% of GDP and 39% of employment. The Assessments concluded by making 773 specific recommendations. The Hellenic Confederation of Enterprises estimated that 485 recommendations (63%) had been implemented by December 2016 (Figure 3.13). The second review of the third EU adjustment programme identified about 270 out of 356 reforms that should have been adopted by July 2017 (European Commission, 2017). Overall, progress has been uneven across sectors. It was greater in pharmaceuticals, manufacturing and wholesale trade while progress was more limited in media, construction and e-commerce.

The implementation of the recommendations of the three Competition Assessments, in the context of strong domestic ownership, constituted an important step to promote competition, and strengthen incentives to invest. Reducing horizontal product market restrictions has also helped in this direction. Expanding the role of one-stop shops is closely linked to the resources allocated to those and their capabilities to work effectively. The competences of existing one-stop shops have been extended to tax- and insurance-related sectors. In 2016, a new law entered into force aiming at simplifying the procedures to create new companies, also remotely through the e-one-stop shop. One-stop shops have proved to be effective in simplifying export procedures (McLinden, 2013). In cooperation with the European Commission, Greece prepared a study to expand further one-stop shops and digitalise them through electronic platforms. The 2013 investment licensing law has replaced ex-ante licensing with simple notification and ex-post monitoring of compliance, though only for selected sectors and simplified licensing procedures. The “silence is consent” rule could help the institutional framework for investment licencing. Its expansion would allow licences to be automatically issued if the competent authority does not act within the statutory period (OECD, 2018).

Box 3.2 The OECD Competition Assessment Reviews of Greece

The OECD has developed the "Competition Assessment Toolkit" to conduct competition assessments and improve regulatory impact assessment relating to competition issues. One of the main elements of the Competition Assessments is a "Competition Checklist", which asks a set of questions to identify laws and regulations restricting competition.

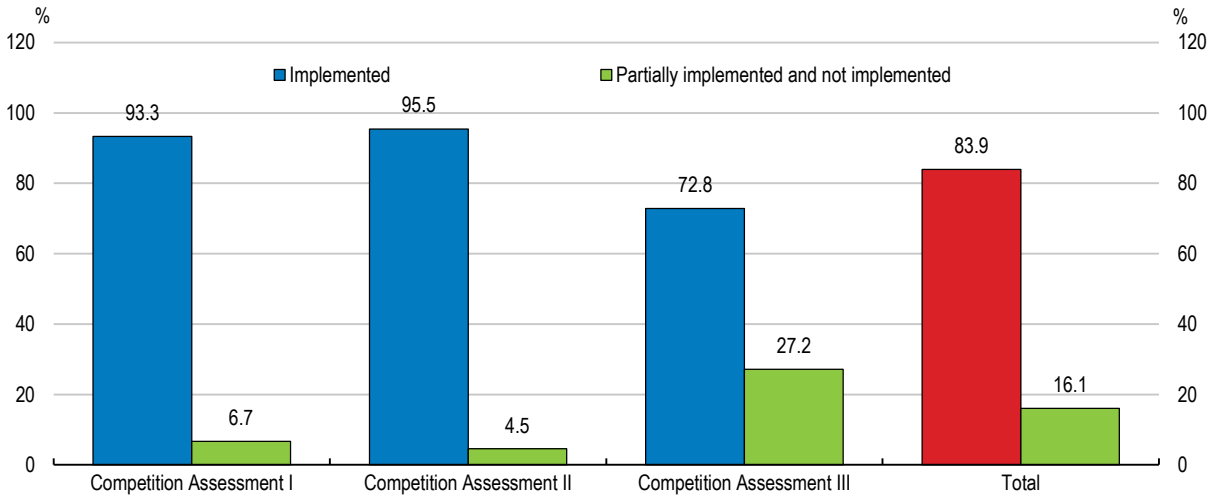
In collaboration with the Hellenic Competition Commission (HCC), the OECD has conducted three competition assessments:

- **2013:** The Greek government asked the OECD to conduct an assessment of laws and regulations curbing competition in the sectors of tourism, retail trade, food processing and construction materials. The review used the OECD Competition Assessment Toolkit to structure the analysis and identify 555 problematic regulations and 329 provisions where changes could be made to foster competition. The HCC reports that about 80% of the recommendations were adopted into law by 2014. The OECD has estimated that implementing about 60 of these recommendations (those for which quantification was possible) would generate benefits (in the form of higher lower prices, expenditure and turnover) of about EUR 5 billion per year, or 2.5% of GDP.
- **2014:** The second competition assessment review identified competition-distorting rules and regulations in the following manufacturing sectors: beverages; textiles, clothing apparel and leather, machinery and equipment, and coke and refined petroleum products. The review made 88 recommendations on specific legal provisions taking into account EU legislation and relevant provisions in comparable countries, notably EU Member States.
- **2016:** The OECD carried out an independent policy assessment concerning 5 sectors: construction, media, wholesale trade, e-commerce and manufacturing sub-sectors, namely pharmaceuticals, chemicals, rubber products, paper and paper products, printing and reproduction of recorded media, which were not examined in the 2013 assessment. The review identified 577 potential restrictions to competition, leading to 356 recommendations. If implemented, these recommendations are estimated to have a positive impact on the Greek economy of around EUR 414 million.

Source: http://www.oecd.org/daf/competition/greece-competition-assessment-reviews.htm

Figure 3.13 Progress on implementing OECD competition assessment toolkit recommendations[1]

2013-16



1. The OECD's Competition Assessment Toolkit aims to help governments to eliminate barriers to competition by providing a method for identifying unnecessary restraints on market activities and developing alternative, less restrictive measures that still achieve government policy objectives.

Source: European Commission (2017), "The ESM Stability Support Programme: Greece, First & Second Reviews July 2017 Background Report", Institutional Paper 064, November 2017

As reported in the 2016 OECD Economic Survey of Greece, recent changes in competition policy and the Hellenic Competition Commission (HCC) have brought the legal framework closer to OECD best practices. The HCC has continued to show dedication and commitment to competitive markets by vigorously enforcing competition laws, despite severe resource constraints. In 2015, the HCC imposed the highest fine ever in Greece on a single undertaking (EUR 31.5 million) for abuse of dominance in the beer market. In 2016, the HCC imposed fines for about EUR 11.5 million, which were all upheld by appeal courts (with only some minor reductions). In 2016, the HCC also imposed for the first-time procedural fines relating to submission of misleading data and obstruction of investigations.

The budget of the HCC is financed through a levy on limited liability companies. The lack of resources owed to the fall of company revenues during the crisis, could have factored in hampering the work of the HCC. Because of the lasting crisis, its budget has declined considerably, from EUR 9.7 million in 2011, to EUR 7.7 million in 2015 and EUR 5.4 million in 2017. In addition, the HCC has to turn over 80% of its yearly savings to the central government. Tight budget constraints have forced staff to reduce transfers to islands for investigations (or concentrate investigations in non-touristic periods). Moreover, scarce resources have weakened advocacy activities as law enforcement is given priority. The 2015 MoU envisaged an increase of the HCC's advocacy unit by twelve additional posts. However, between 2014 and 2016, the staff of the HCC (excluding administrative support and IT experts) declined from 64 to 57 people.

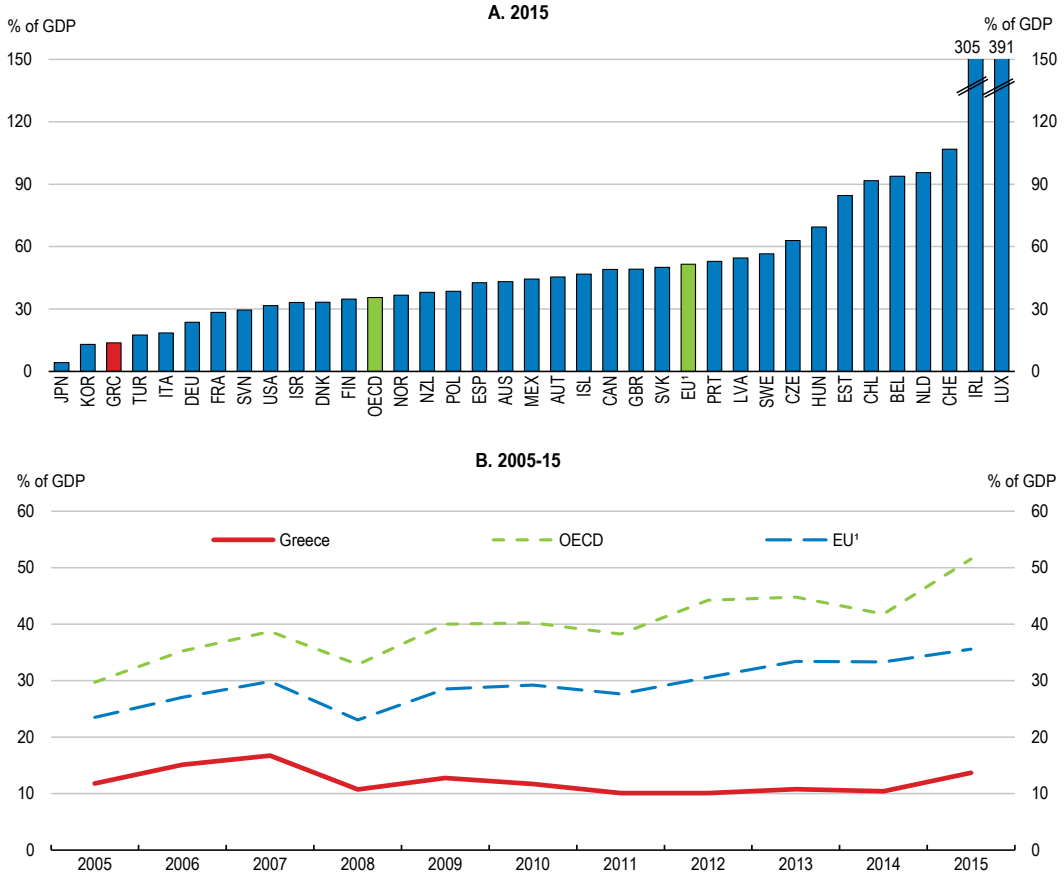
As the economic and fiscal situation improves, the HCC may need to ensure the financial and human resources commensurate to its responsibilities. Eliminating the rule allowing the central government to claw-back 80% of the HCC's yearly savings could allow for a certain financial space. Going forward, regular competition assessments of sectors by the HCC could raise the profile and importance of competition issues in public and political debates and maintain the reform momentum. A good example of institutional reform to deal with the periodical review of competition and market regulation is the approach adopted by the Competition Policy Review Panel (2017) in Canada.

3.3.2. Foreign direct investment and integration into global value chains

Foreign direct investment and integration in GVCs are at low levels. Little FDI attraction and the poor integration in GVCs leads to reduced benefits from international trade. In 2015, the Greek inward FDI stock was 14% of GDP, much lower than the OECD average and peer small open economies, such as Slovenia, Spain, Portugal (Figure 3.14, panel A).

Figure 3.14 Greek inward FDI stock is low but recently it has improved

Inward FDI stock

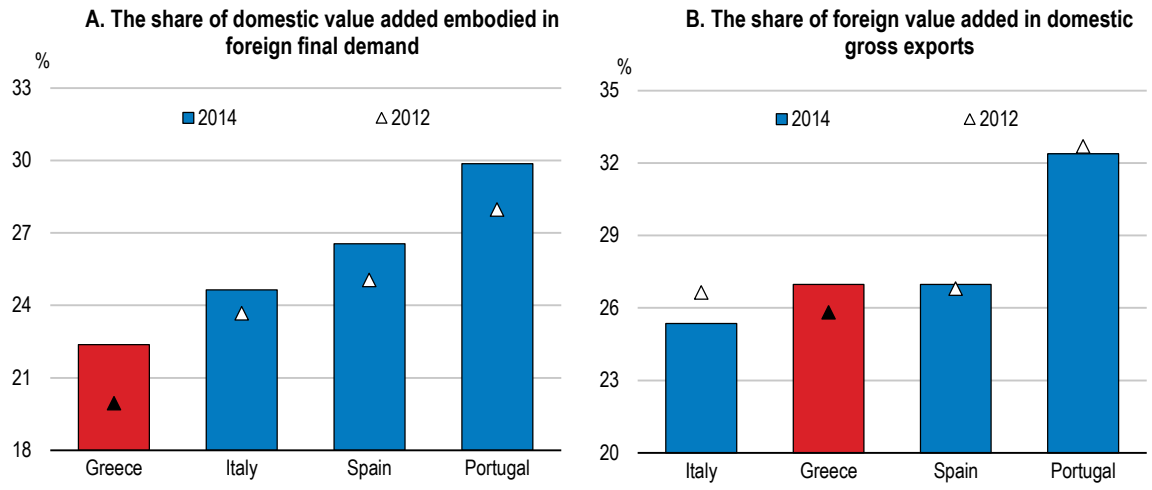


1. EU25 for data between 2004 and 2006, EU27 for data between 2007 and 2012 and EU28 from 2013.

Source: OECD (2017), "FDI statistics according to Benchmark Definition 4th Edition (BMD4): Foreign direct investment: main aggregates", OECD Globalisation Statistics (database)

The low level of FDI stock predates the financial crisis, indicating structural obstacles to attracting FDI. Yet, by 2015 Greek inward FDI stock started to improve (Figure 3.14, panel B). Though improving, the degree of integration in GVCs remains low compared to peer countries (Figure 3.15). This is true especially for the share of domestic value added embodied in foreign final demand, i.e. the exports of value added (Figure 3.15, panel A).

Figure 3.15 There is ample scope to deepen participation in global value chains



Source: OECD (2017), "TiVA Nowcast Estimates" in OECD International Trade and Balance of Payments Statistics (database)

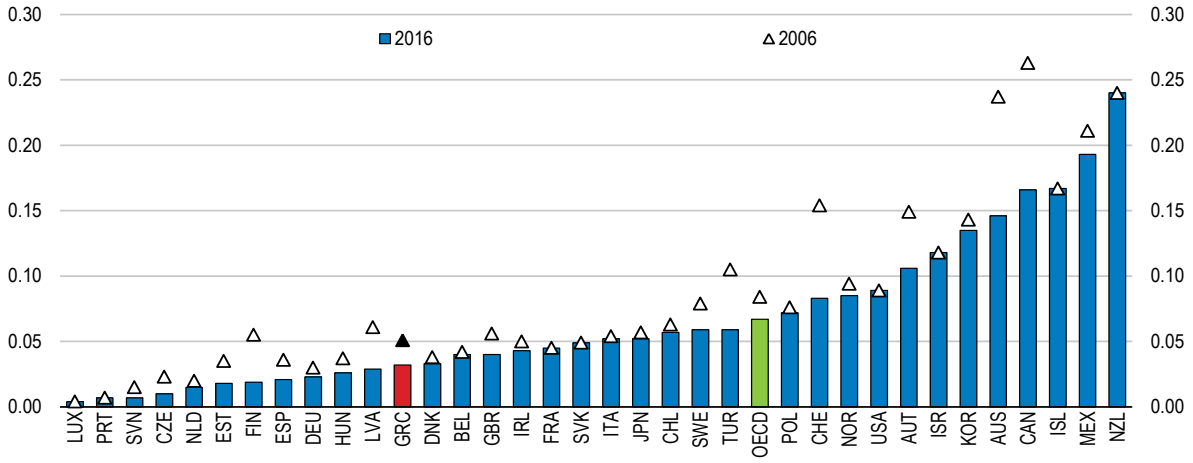
The poor business environment hinders FDI and integration in global value chains

Overall, FDI regulatory restrictions are low compared to other OECD countries. Greece ranks 12th among 35 countries in the OECD's FDI Restrictiveness Index (Figure 3.16). Between 2006 and 2016, Greece lowered FDI restrictions, though most progress took place before 2011. The most significant remaining restrictions concern foreign equity (for mining, quarrying and oil

extraction), and screening and approval mechanisms (for fisheries, air and maritime transport, radio and TV broadcasting, accounting and audit, media, tertiary education and business services).

Figure 3.16 FDI regulatory restrictions are low compared to other OECD countries

FDI regulatory restrictiveness index, scale from 0 (open) to 1 (closed)



Note: It measures statutory restrictions on foreign direct investment and it gauges the restrictiveness of a country's FDI rules by looking at the four main types of restrictions on FDI: foreign equity limitations; discriminatory screening or approval mechanisms; restrictions on the employment of foreigners as key personnel and other operational restrictions. The overall restrictiveness index is the average of sectoral scores.

Source: OECD (2017), OECD FDI Regulatory Restrictiveness Index Database

As highlighted above, the business environment can be further improved by lowering PMR restrictions. Also, according to the 2017-2018 Global Competitiveness Report Greece ranks 130th out of 137 countries on the burden of government regulation, 112th as regards to FDI and technology transfer and 61st on the protection of intellectual property rights (WEF, 2017b). Iordanoglou and Matsaganis (2017) underline the role of bureaucratic obstacles and regulatory bottlenecks against foreign investment at all levels of government in Greece, as a factor holding back FDI. Acting on all these factors will improve Greece's attractiveness as FDI destination.

The ongoing privatisation presents an opportunity to attract FDI in key sectors such as transport, energy and tourism. Some positive results are already apparent from the privatisation of the Piraeus and Thessaloniki ports. According to IOBE (2016), the privatisation of the Piraeus port is expected to result in an increase in GDP by 0.8% in 2025 and could contribute to long-term reduction of public debt by 2.3 percentage points of GDP. Also, construction works and the operation of the port are expected to create more than 31 000 new jobs overall. An early evaluation of the economic effects of Piraeus port privatisation concluded that it led to enhanced efficiency, higher revenues for the state, and increased market share (Johnson, 2018).

Attracting FDI in sectors having a relative comparative advantage (RCA) would be especially beneficial for Greece. Empirical research suggests that FDI offers the potential of raising the quality of exports thereby enhancing RCA (Harding and Javorcik, 2012). Policies aiming at attracting FDI in comparative advantage sectors could then accelerate GVCs integration. The comparative advantage analysis in the beginning of the chapter shows that Greece has a comparative advantage in the food sector, agricultural products, fuels, minerals and pharmaceuticals. Policies to attract FDI in these sectors could entail incentives to participate in international fairs and fast-track approval processes.

Recent legislation to attract FDI and promote strategic investment more broadly includes the 2010 law on "*Acceleration and Transparency of Implementation of Strategic Investments*" (Fast Track Law) and the 2013 law on "*Creation of a Development Friendly Environment for Strategic and Private Investments*". These aim at simplifying licencing procedures and providing limited tax incentives. Enterprise Greece is the agency within the Ministry of Economic and Development

with responsibilities over assessing project proposals and granting them the fast-track status if they meet certain criteria.

The 2016 law, establishing state aid schemes for private investment, introduced a range of financial incentives covering tangible and intangible capital with the aim of attracting FDI in addition to encouraging entrepreneurships, innovative SMEs and innovation clusters. Incentives for major investment projects include a fixed corporate income tax rate for 12 years, tax exemption equal to 10% of eligible expenditure (capped at EUR 5 billion) and fast-track licencing procedures.

Integrating Greek SMEs in GVCs

The Greek economy is largely based on SMEs and micro enterprises. Helping these firms to integrate into GVCs would require addressing financing constraints, ensuring they can meet the required international quality standards (such as ISO 9000 series), as well as adopting responsible business conduct (OECD, WTO and UNCTAD, 2013; OECD and World Bank, 2015). However, compliance with international quality standards and technical regulations can also increase significantly costs for SMEs. The problem is aggravated when these firms have to adhere to an increasing number of private standards set by customers (OECD, 2008b).

3.3.3. Insolvency procedures and contract enforcement

Long and costly insolvency procedures trap capital and other resources in low productivity firms, reducing thus allocative efficiency and depressing domestic investment. Evidence suggests that a non-trivial share of the collapse in aggregate business investment in Greece is attributable to the survival of firms having persistent problems meeting interest payments, the so-called zombie

firms (Adalet McGowan et al., 2017). As of 2013, Greece had the highest share of capital and employment trapped in zombie firms. This was true also in 2007, suggesting persistent problems in restructuring insolvent firms or making them exit the market (Figure 3.17). High shares of capital and employment trapped in zombie firms signal high resource misallocation and lower productivity. Moreover, they weaken incentives for non-zombie firms and financial institutions to invest and innovate (congestion effect), while also raising the cost of capital and labour through their artificial scarcity.

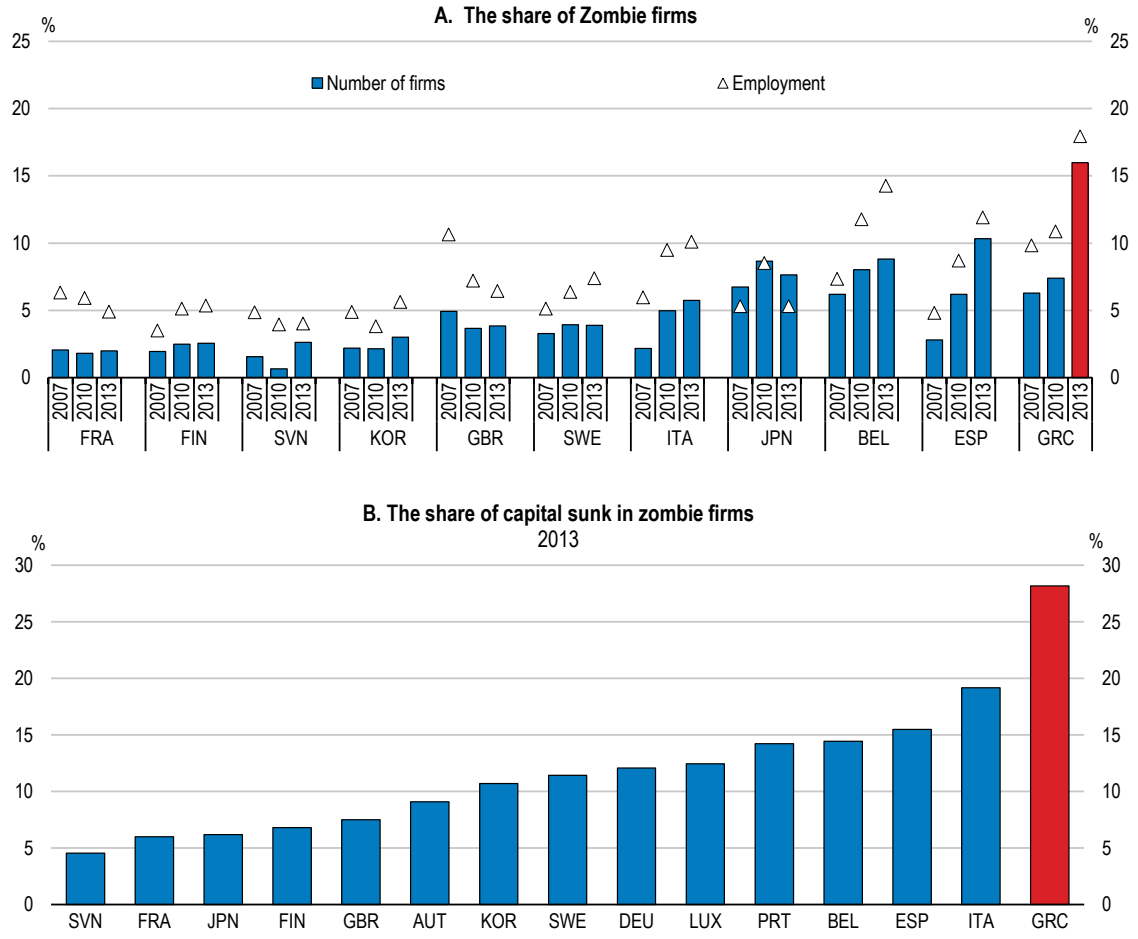
Reducing barriers to corporate restructuring can contribute to significantly reduced share of capital sunk in zombie firms (Adalet McGowan et al., 2017). It can thus help to directly reduce resource misallocation, while increasing productivity. Such reforms can also reduce congestion and raise investment by non-zombie firms. Besides, the market congestion generated by zombie firms can create barriers to entry, thus lowering investment from potential market entrants. Simulations suggest that lowering the share of capital trapped in Greek zombie firms from nearly 30% to 5% would increase investment for a typical non-zombie Greek firm by nearly 5%. According to Adalet McGowan et al. (2017: p. 12), Greece could benefit more than any other country analysed in the sample from a comprehensive insolvency reform.

Greece's Bankruptcy Code governs the legal framework of insolvencies (its main elements are presented in

Table 3.1). As of 2018, there were four types of insolvencies: pre-bankruptcy rehabilitation, bankruptcy-liquidation, bankruptcy-reorganisation, special administration (fast-track liquidation - if the procedure does succeed within 12 months, a standard bankruptcy procedure follows). Numerous changes to the insolvency framework during the crisis have aimed at accelerating bankruptcies, enhancing pre-bankruptcy rehabilitation and plans, as well as facilitating the discharge of entrepreneurs (i.e.: so-called “second chance”) (

Table 3.1; Box 3.3). These changes are consistent with the 2016 EU Directive on Preventive Restructuring, Second Chance and Efficiency Measures and 2014 EC Recommendation on a New Approach to Business Failure and Insolvency.

Figure 3.17 A large share of employment and capital is trapped in zombie firms



Note: Zombie firms are firms aged 10 years or older and with an interest coverage ratio less than 1 over three consecutive years. Capital stock and employment refer to the share of capital and labour sunk in zombie firms. The sample excludes firms that are larger than 100 times the 99th percentile of the size distribution in terms of capital stock or number of employees.

Source: Adalet McGowan, M., D. Andrews and V. Millot (2017), "Insolvency regimes, zombie firms and capital reallocation", OECD Economics Department Working Papers, No. 1399, OECD Publishing, Paris.

Table 3.1 Main elements of Greece's insolvency framework

Law3588/2007	Bankruptcy Code (BC) regulates rehabilitation (pre-bankruptcy), liquidation and re-organisation proceedings; amended several times during the crisis.
Law 3858/2010	Cross-border insolvency proceeding (consistent with EU regulation).
Law 3869/2010	Protection of over-indebted households (or individuals), i.e., those that do not fall under the scope of the BC. Also known as Katseli Law.
Law 4307/2014	Special administration procedure; this is a fast-track liquidation procedure aiming at facilitating the sale of the debtor's business as a going concern, or the sale of individual functional group of assets or individual assets; if the procedure does succeed within 12 months, a standard bankruptcy procedure follows.
Law 4354/2015	Legal framework for handling the sale and management of non-performing loans.
Law 4336/2015	Amends the BC by streamlining the pre-bankruptcy rehabilitation procedures and introduces an early warning system allowing debtors facing the likelihood of insolvency to apply for an early stage pre-bankruptcy rehabilitation process; it also raises the requirements of insolvency administrators by introducing the licensed profession of insolvency professionals.
Law 4446/2016	Extensive modification of the BC to speed up insolvencies through accelerating and simplifying bankruptcy procedures, introduction of "second chance" mechanism, enhancement of pre-bankruptcy rescue mechanisms.
Law 4472/2017	Simplified procedures for bankruptcies of small enterprises; it expedites sales of movable and immovable property of bankrupt companies and faster termination of bankruptcies.
Law 4605/2019	Amending Law 3869/2010 (Katseli Law). It allows individuals in financial difficulty to apply for the restructuring of all of their debts through a single online platform.

Source: Author's and OECD compilation.

Box 3.3 Main recent changes of Greece's insolvency framework

In the last few years, Greece's insolvency framework has undergone substantial changes (particularly through Law 4336/2015, Law 4446/2016 and Law 4605/2019). These can be grouped in three main areas:

1. Speeding up bankruptcies by:

- Limiting the role of courts in insolvency proceedings by transferring many of its duties to insolvency professionals (a newly established licensed profession);
- Abolishing of the creditors' committee, as this has proven to hinder rather than facilitate insolvencies (e.g.: in the previous regime the creditors' committee could successfully oppose any settlement reached by the insolvency administrator with the debtors);
- More flexible procedures in case of "small" bankruptcies (estate less than EUR 100 000);
- Shortening of certain deadlines (e.g.: convocation of the creditors' meeting; delayed submission of a creditor's claim; submission of the reorganisation plan and its acceptance);
- Cancelling the court pre-judgement of the reorganisation plan (previously, courts had to examine the reorganisation plan before creditors voted on it and could in certain cases dismiss the plan).

2. Enhancing pre-bankruptcy rehabilitation plans by:

- Consolidating of three different pre-bankruptcy rehabilitation plans into the pre-pack rehabilitation plan; this is similar to the pre-pack arrangements already present in the United Kingdom and United States; rehabilitation procedures can start only if a pre-agreed rehabilitation is in place so as to avoid courts being overloaded with plans aiming only at strategically delaying bankruptcy and unlikely to succeed; the debtor and creditors (representing 60% of total claims, including 40% of secured claims) must agree on the rehabilitation plan, which needs be ratified by the court; ratification binds all creditors even those that have dissented or did not participate.
- Introducing creditor-driven rehabilitation; creditors (representing 60% of total claims, including 40% of secured claims) can agree on a rehabilitation plan without the

participation of the debtor and submit to the court for ratification, provided that the debtor is unable to meet overdue financial obligations in a general and permanent way (i.e. cessation of payments); the opposition of the debtor does not preclude the ratification of the plan as the court will base its decision mainly on the opinion of the financial expert accompanying the plan;

- Introducing new procedures to deal with non-cooperating shareholders.

3. Facilitating the discharge of entrepreneurs ("second chance") by:

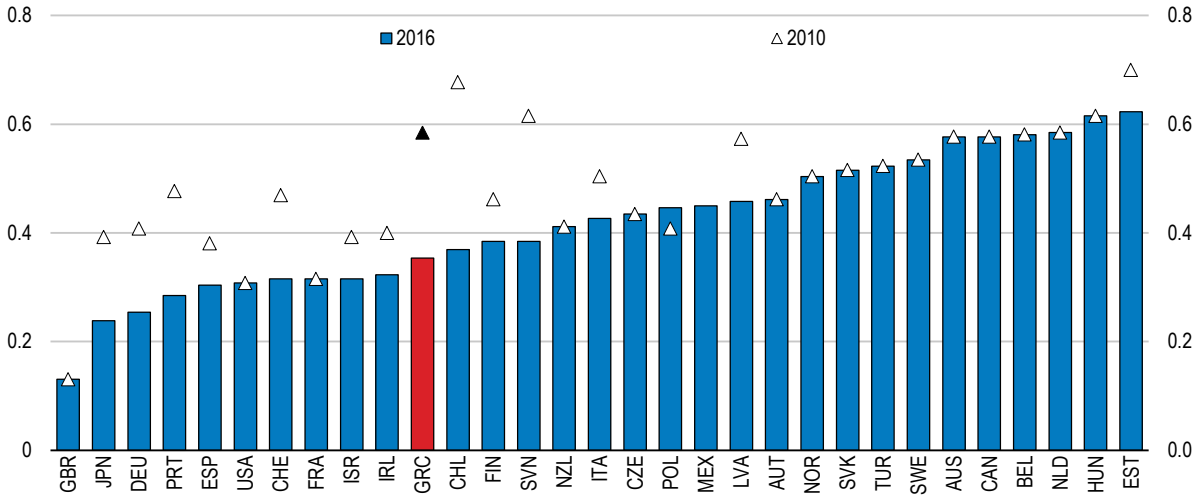
- Shortening the period from ten to two years, starting from the commence of bankruptcy proceedings, after which the entrepreneur can be fully discharged from any of the creditors' claims that have not been fully satisfied; the entrepreneur is discharged any time after bankruptcy ends; entrepreneurs have the right to this discharge only once.

Source: Karatzas, C.M., V. Salaka and A.S. Tsatsi (2017), "*Insolvency Proceedings in Greece after Recent Reforms*", Emerging Markets Restructuring Journal, Vol. 3; "*Insolvency and Directors' duties in Greece: Overview*", available at www.ukpracticalw.thomsonreuters.com, accessed in August 2017; "*Restructuring & Insolvency in Greece*" available at www.lexology.com, accessed in August 2017.

A debtor-friendly law (4472/2017) was passed in 2017 to facilitate out-of-court dispute resolution and speed up the settlement of debt of non-financial corporations and professionals. The process is initiated by the debtor by submitting a proposal for settling her/his debts. Enterprises cannot apply for this mechanism when a single creditor accounts for at least 85% of the total claims. The debt settlement agreement needs to be ratified by the court. If the court decides not to ratify the out-of-court agreement, the agreement is no longer valid and initial claims are restored.

Overall, these changes and the out-of-court business dispute resolution mechanism can strengthen the insolvency framework. The cross-country OECD policy indicator of insolvency regimes showed a marked improvement in the Greek insolvency framework taking place during the crisis. Between 2010 and 2016, the indicator fell to levels below the OECD average (Figure 3.18).

Figure 3.18 Greece's insolvency framework

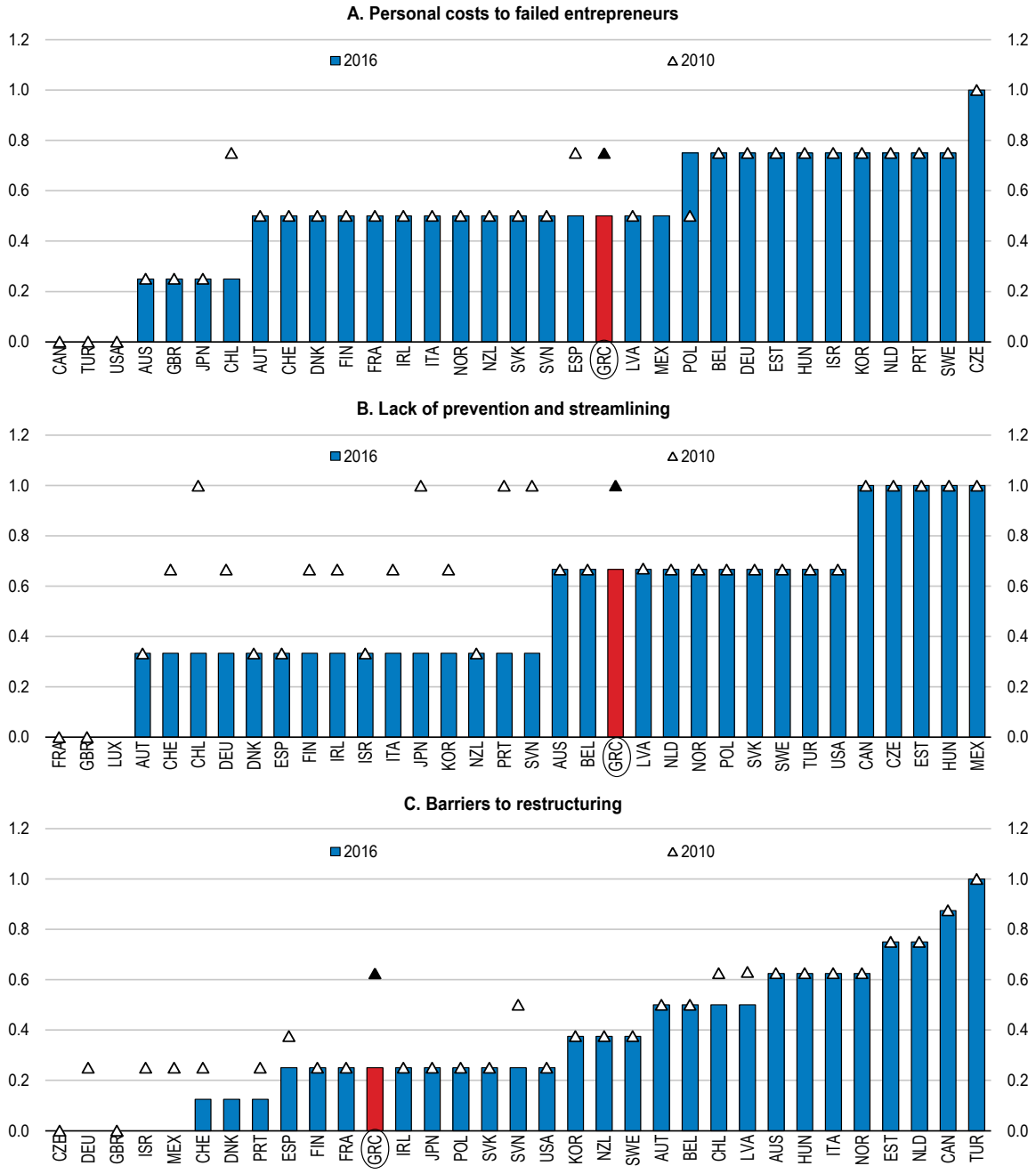


Note: The indicator is a composite that aggregates 13 insolvency indicators across 35 OECD member and 11 non-member countries and 4 dimensions: treatment of failed entrepreneurs; prevention and streamlining; restructuring tools; and other factors.

Source: Adalet McGowan, M., D. Andrews and V. Millot (2017), "Insolvency regimes, zombie firms and capital reallocation", OECD Economics Department Working Papers, No. 1399, OECD Publishing, Paris

Besides Chile, Germany, Japan, Portugal and Slovenia, Greece made significant progress on improving the policy framework of insolvency procedures. The sub-components of the index show progress in all three areas covered by the index: personal costs to failed entrepreneurs, lack of prevention and streamlining, and barriers to restructuring (Figure 3.19). The insolvency framework index of the World Bank corroborates that these improvements decreased Greece's distance to the frontier between 2010 and 2017.

Figure 3.19 Greece's insolvency framework has improved in all areas of OECD's indicator of insolvency regimes

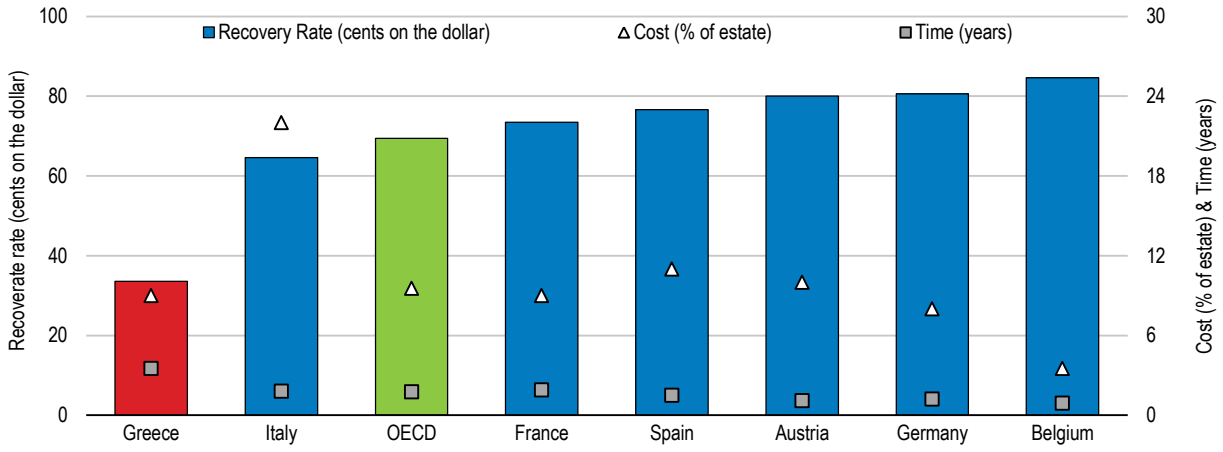


Note: Calculations based on the OECD questionnaire on insolvency regimes.

Source: Adalet McGowan, M., D. Andrews and V. Millot (2017), "*Insolvency regimes, zombie firms and capital reallocation*", OECD Economics Department Working Papers, No. 1399, OECD Publishing, Paris

Despite the progress, insolvency recovery rates remain low. At the same time, insolvency proceedings remain slow compared to most OECD countries (Figure 3.20). For the stylised insolvency case considered by the World Bank's Doing Business index, the average recovery rate in Greece is just 35.6%, about half the level of the OECD average. Also, insolvencies procedures last on average 3.5 years, more than double the time of an average OECD country.

Figure 3.20 Insolvency proceedings in Greece are slow and the asset recovery rate is low



Note: Time for creditors to recover their credit is recorded in calendar years and the period of time is measured from the company's default until the payment of some or all of the money owed to the bank. Potential delaying tactics by the parties, such as the filing of dilatory appeals or requests for extension, are taken into consideration. The cost of the proceedings is recorded as a percentage of the value of the debtor's estate. The cost is calculated on the basis of questionnaire responses and includes court fees and government levies; fees of insolvency administrators, auctioneers, assessors and lawyers; and all other fees and costs. The recovery rate is calculated based on the time, cost and outcomes of insolvency proceedings and is recorded as cents on the dollar recovered by secured creditors. The calculation takes into account whether the business emerges from the proceedings as a going concern or the assets are sold piecemeal. The costs of the proceedings are deducted. The value lost as a result of the time the money remains tied up in insolvency proceedings is also deducted. The recovery rate is the present value of the remaining proceeds.

Note: Reference year of database. The database in 2018 comprised the latest data collection completed in June 2017.

Source: World Bank (2017), Doing Business 2018 (database)

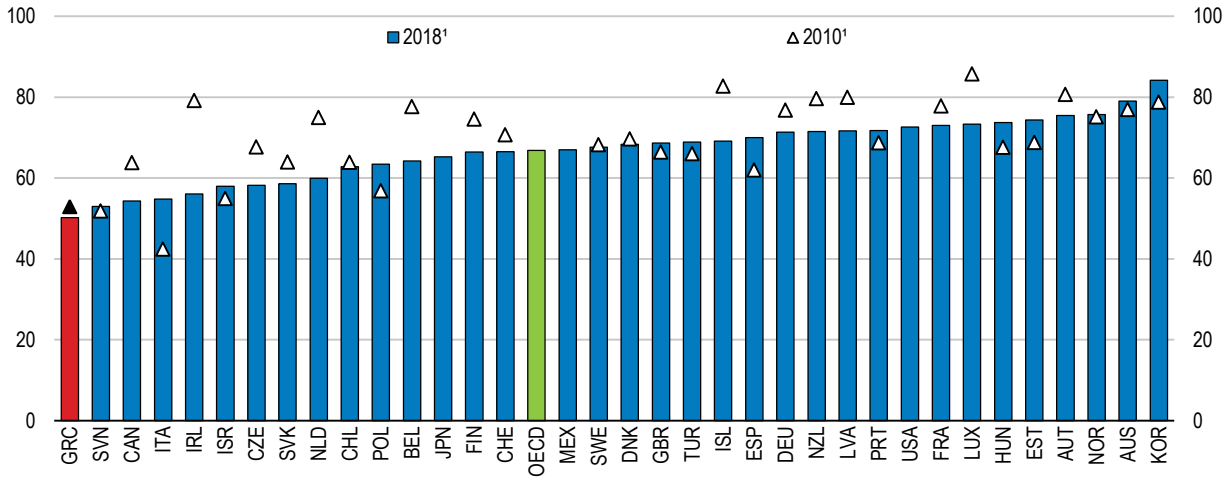
Many of the reforms passed are yet to be fully implemented and may need implementing regulations. The first electronic auction started only in November 2017, although the legislation and a pilot version of the platform had been ready long before. Well-trained insolvency professionals will be necessary for the implementation of the reform. Their training needs to cover not only insolvency law and regulations, but also finance and economics. In such a way, insolvency professionals shall be able to steer liquidation and restructuring processes in an effective and efficient manner. Further progress on establishing an insolvency registry, following international best practices, is envisaged in the National Strategic Reference Framework (NSRF) 2014-2020.

The efficiency of the insolvency regime is closely intertwined with that of the judicial system. This is especially important in Greece, as the new insolvency framework passed in 2016 applies only to proceedings started after 22 December 2016. This means that the large backlog of insolvencies (more than 200 000) accumulated up to then falls outside the remit of the new insolvency regime.

Greece is among the countries with the lengthiest trials and highest litigation rates (OECD, 2013). In addition, the World Bank's Doing Business Indicator also suggests that enforcing contracts is difficult in Greece (Figure 3.21). The relative position of Greece has actually declined between 2010 and 2018.

Figure 3.21 Enforcement of contracts is weak

Index scale from 0 to 100, 100 indicating strongest performance



Note: The distance to frontier score measures the distance of each economy to the best performance observed on each of the indicators across all economies.

1. Reference year of database. The database in 2018 was the latest data collection completed in June 2017.

Source: World Bank (2017), Doing Business 2018 (database)

In countries displaying high litigation rates like the case of Greece, policies need to primarily aim at shortening court cases. The digitalisation of the justice system is an important and, thus far, underutilised tool in Greece. Across countries, the budget devoted to digitalisation is associated with a shorter trial length (Palumbo et al., 2013). The National Strategic Reference Framework 2014-2020 envisages the digitalisation of judicial files and records. Digital technologies can support case-flow management through creation and maintenance of records concerning case processing and schedules. It also includes the structuring management of pre-trial, trial, conferences, and hearings, the flagging of cases for staff and judge attention, the enabling of verbatim records of court proceedings, and the provision of the much-needed management

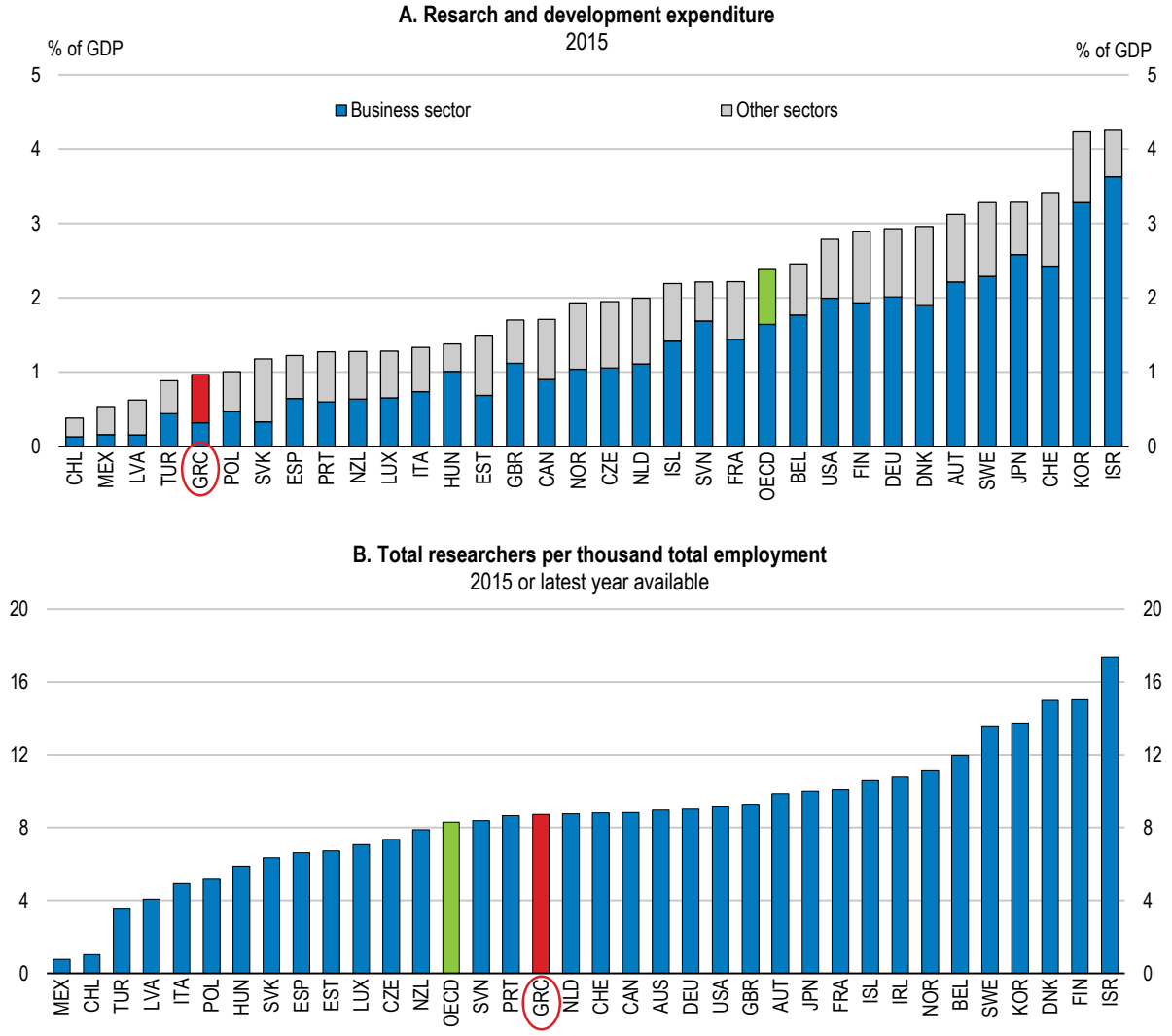
information and statistics. Finland's Insurance Court provides a successful example of applying case-flow management along with an advanced time-frame alarm system enabled by digital technologies (Pekkanen et al., 2015).

3.3.4. The innovation ecosystem and performance

According to the European Innovation Scoreboard, Greece is a moderate innovator. Greece lags behind the OECD average in both business and government spending on R&D activities, which amounted to 0.28% and 0.54% of GDP respectively in 2017. Funding from abroad accounted for 13.2% of gross domestic expenditure on research and development (GERD) in 2014, with the EU being the most important external funder of R&D activities.

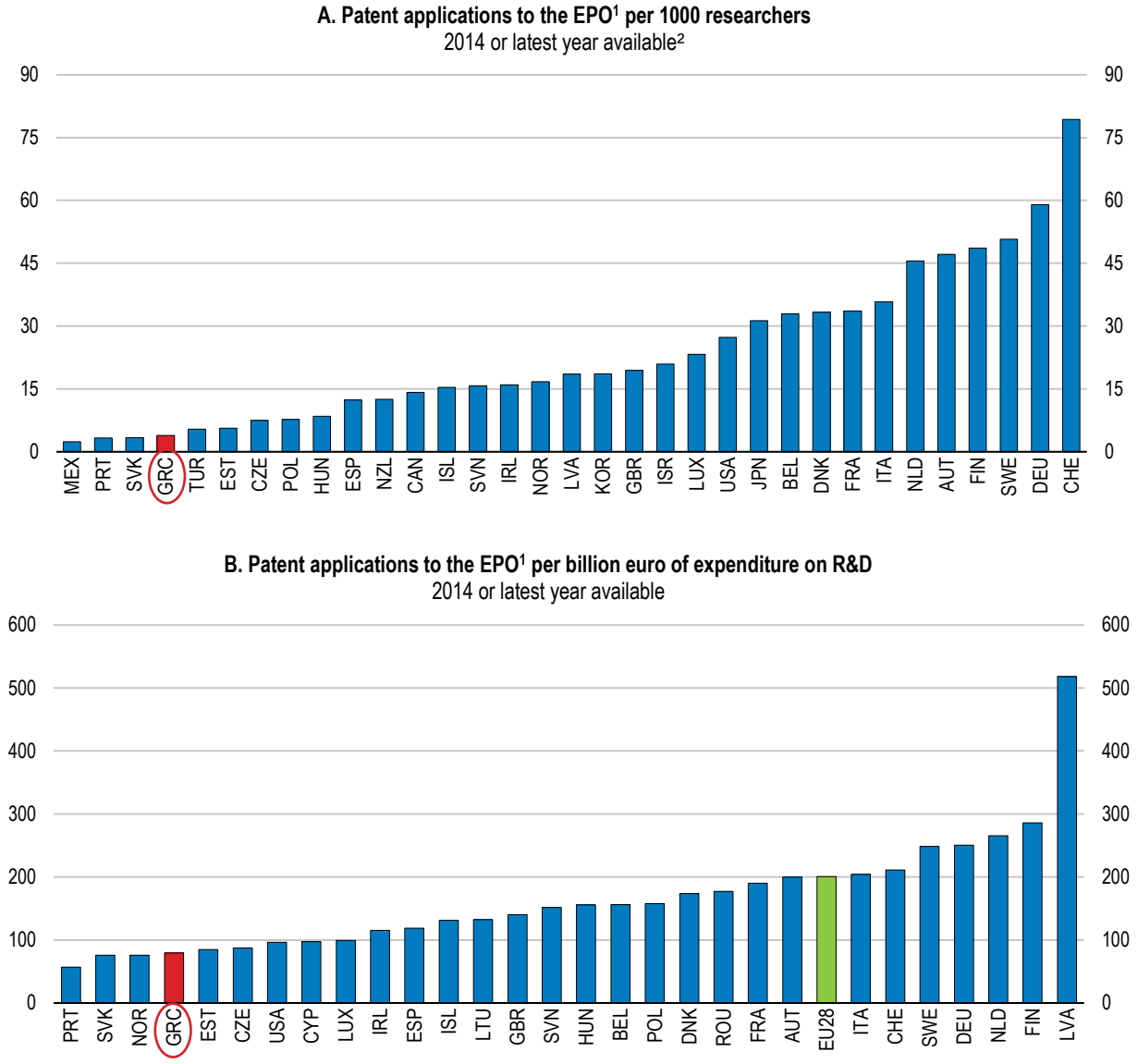
Investment could be also supported by research conducted and financed within the academic institutions, as well as the private sector enterprises. As shown in figures below, the number of researchers in Greece is above the OECD average (Figure 3.22, panel B). Thus, research productivity in terms of number of patents per researcher and per R&D spending is low (Figure 3.23). In terms of business innovation financing, Greece’s SMEs are found to have lower capacity than their European peers to upgrade their technology (NBG, 2016).

Figure 3.22 Research and development expenditure is among the lowest in the OECD



Source: OECD (2016), OECD Main Science and Technology Indicators (database) and OECD (2017), OECD Science, Technology and R&D Statistics (database)

Figure 3.23 Research productivity is low



1. European Patent Office (EPO).

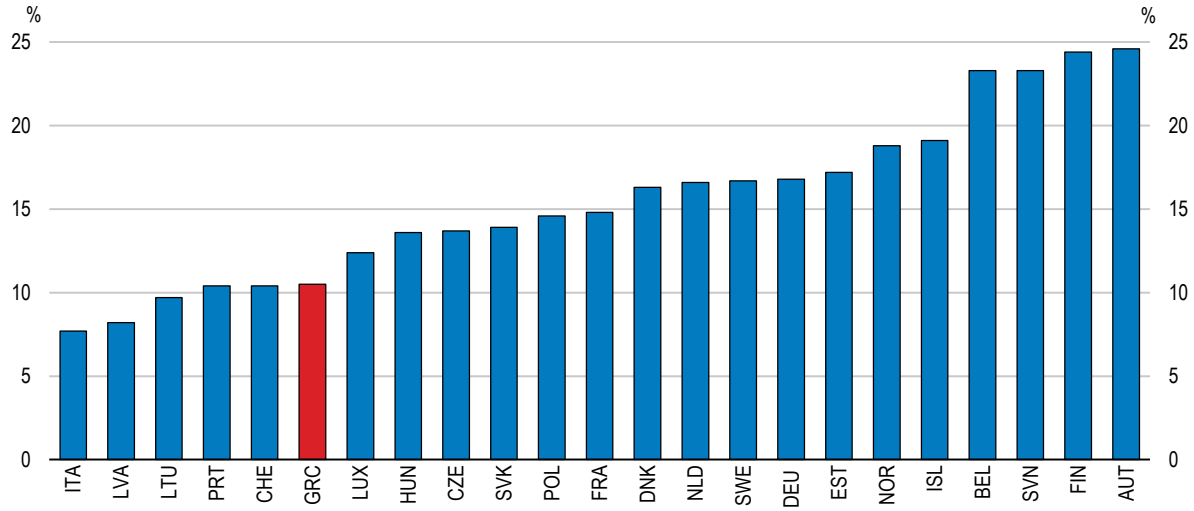
2. 2013 for Latvia, Iceland and the Slovak Republic. 2013 for Canada and Mexico and 2012 for Israel for the number of researchers only, due to lack of the data. For Switzerland, the number of researchers in 2014 is estimated based on available data in 2012 and 2015.

Source: OECD (2017), OECD Main Science and Technology Indicators (database) and Eurostat

Connections between research centres and industry remain a challenge in Greece (Figure 3.24). Co-operation and financing of, mostly, public research centres and universities by the private sector face stiff resistance. In general, systematic data on scientific research are missing. The National Research and Innovation Strategy for Smart Specialisation 2014-20 was introduced in 2014 as the successor of the National Strategic Plan for Research and Development 2007-13. The new strategy aims at the promotion of links between research and industry and accelerates the dissemination and commercialisation of innovation. According to the Strategy, GERD by 2020 is expected to amount to 1.2% of GDP. The 2016 law establishing state aid schemes for private investment provides financial incentives to boost R&D and foster collaboration between industry and R&D centres to these objectives.

Figure 3.24 Co-operation with higher education or research institutions in innovation is low

The share of firms co-operating in research in all product and/or process-innovating firms, 2012-14



Note: International comparability may be limited due to differences in innovation survey methodologies and country-specific response patterns.

Source: Eurostat (2016), Community Innovation Survey (CIS) 2014

The institutional setting of Greece's innovation policies is fragmented. Responsibilities, design and implementation of innovation strategies rest with many institutions and agencies:

- The National Council of Research and Innovation (NCRI) is the highest advisory body of the government for the formulation and implementation of national policies on research, technology and innovation. The NCRI is appointed by and reports directly to the Minister of Education and Religious Affairs.
- The Ministry of Rural Development and Food supervises the National Agricultural Research Foundation (NAGREF), which undertakes research and technology in Greece in agricultural, forest, animal and fish production and other related areas.
- The Hellenic Foundation for Research and Innovation (HFRI), which Greece established in 2016 as a new science and research financing institution. It followed the example of the National Science Foundation (NSF) of the United States or Germany's Deutsche Forschungsgemeinschaft. The results of the research it funds will be collected and documented by the National Documentation Centre (EKT), which is also responsible for documenting all the publicly funded research output produced in Greece.

Overall, the high level of fragmentation lowers transparency and accountability, as research centres are supervised by different ministries. Also, the creation of new agencies, such as the HFRI, does not generally lead to the closing down of old ones. This can lead to overlapping responsibilities and inefficiencies in the management of funds and research programmes. The National Strategic Plan for Research and Development 2014-2020 acknowledges this problem. Simplification of the institutional framework can help identify strengths and weaknesses of research centres and projects, while improving the allocation of funds.

The use and effective enforcement of intellectual property rights (IPRs) is another important policy measure to encourage innovation. The IPRs regimes concern not only large and multinational enterprises but also innovative start-ups and SMEs. Yet, SMEs tend to underutilise IPRs in most OECD countries (OECD, 2015a). This is especially problematic in Greece given the large share of micro-firms and SMEs, which lack resources and capacity to file applications for patents. In this area, important recent progress has involved the creation of the profession of patent attorney. This is expected to considerably extend the pool of professionals who, after having obtained the required accreditation, can represent clients filing for patents. This change is also expected to expedite and improve the quantity and quality of patent applications.

Public procurement is another tool that could be used to develop the innovation capacity of the country. Greece is taking the first steps towards an action plan to support innovation through public procurement. Its Smart Specialisation Strategy 2014-2020 includes a programme on pre-commercial procurement, conducted by the General Secretariat for Research and Technology (GSRT) and the Ministry of Education, Research and Religious Affairs. There is currently no formalised system in place for doing so and there are no quantified targets for procurement for innovation in Greece. Impact assessments, evaluation studies and/or studies of state of play regarding procurement for innovation do exist, but their feedback is usually underutilised for the improvement of the innovation system.

3.4. Financing investment

Bank credit traditionally constitutes the most important source of investment financing in Greece. Besides bank credit and traditional guarantee instruments, capital markets or alternative financing

instruments remains scarce as investment financing sources (Stournaras, 2018). These instruments comprise:

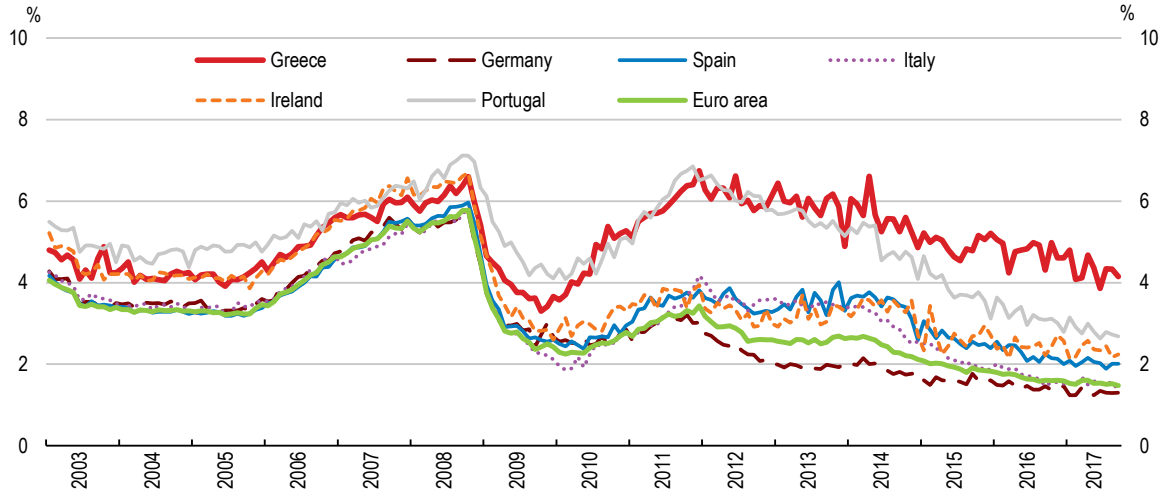
1. equity funding, including venture capital, equity crowdfunding and specialised platforms for public listing of SMEs;
2. hybrid instruments, such as convertible bonds and mezzanine finance, typically involving debt instruments that, subject to a trigger, can be converted to equity;
3. non-bank debt financing, such as corporate bonds, securitised debt and covered bonds.

Market-based financing remains very low both in Greece and the EU, particularly, for small and medium-sized enterprises. At European level, market-based financing accounts for less than 15% of the total financing of small and medium-sized enterprises. SME financing is also very costly compared to the financing cost of larger enterprises. Given that about 25% of all companies and about 75% of owner-managed companies in Europe do not have a credit score, investors lack information on small and medium-sized enterprises (EC, 2015). As a result, bank lending constitutes a key variable for financing investment in Greece.

The price of credit is captured by the lending rates, i.e. interest rates. After peaking in 2011, bank lending rates declined in Greece to pre-crisis levels. Their decline was more moderate than in other Eurozone countries. Due to financing challenges, Greek lending rates remained well above those of other EU countries, while Greek banks' interest rate differential with EU countries remained higher than in the pre-crisis period (Figure 3.25).

Figure 3.25 Bank lending rates in Greece have declined but remain higher than in other Eurozone countries

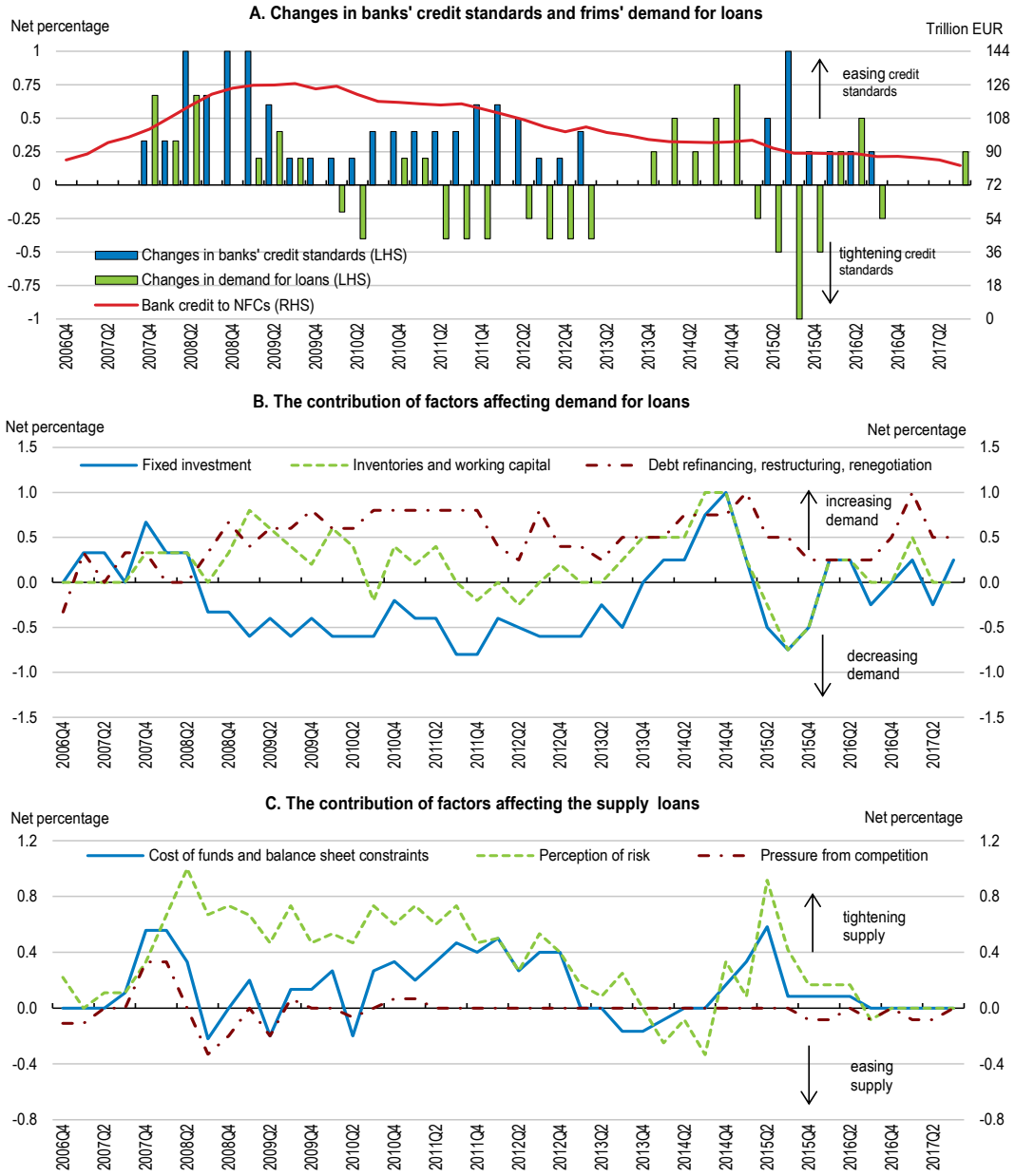
Bank interest rates on loans in EUR – new business, maturity up to 1 year



Source: ECB (2017), "*MFI interest rate statistics*", Statistical Data Warehouse, European Central Bank

Despite the gradual decline in lending rates, bank credit to non-financial corporations kept falling (Figure 3.25 and Figure 3.26, panel A). As of mid-2017, bank credit was at the same level as in 2006 and 30% below the 2009 peak. The 2015 uncertainties relating to the third EU adjustment programme halted the recovery of bank credit that had started in 2014 (Figure 3.26, panel A). On the supply side, banks tightened credit standards as banks' risk perception rose and their risk tolerance declined (Figure 3.26, panel B). At the same time, confidence collapsed derailing the recovery of demand for loans (Figure 3.26, panel A). The demand for loans started to increase again only in late 2016. However, fixed investment projects are still a weak contributor to the demand for loans, which are mainly driven by debt refinancing, restructuring and renegotiation needs and, to a lesser extent, by inventories and working capital (Figure 3.26, panel C).

Figure 3.26 Bank credit's standards remain tight and demand for bank loans subdued



Note: Net percentages for credit standards are defined as the difference between the sum of the percentages of banks responding "tightened considerably" and "tightened somewhat" and the sum of the percentages of banks responding "eased somewhat" and "eased considerably". Net percentages for the questions on demand for loans are defined as the difference between the sum of the percentages of banks responding "increased considerably" and "increased somewhat" and the sum of the percentages of banks responding "decreased somewhat" and "decreased considerably".

Source: ECB Bank Lending Survey

The Greek banking sector has undergone deep reforms to enhance its resilience to shocks and to support sustainable lending to firms and households. Reforms have centred on rationalisation of operations, consolidation, recapitalisation, and more recently improving bank governance. The Hellenic Financial Stability Fund (HFSF) has played a central role in this reform process, having participated in bank recapitalisation and steered the implementation of governance reforms. The HFSF, founded in 2010, is a private legal entity owned by the Ministry of Finance and does not belong to the public sector. Its role is to contribute to the maintenance of the stability of the Greek banking system (HFSF, 2020). According to its statute, the HFSF will wind down in 2022, after reform implementation and after having divested its equity holdings. Banking supervision rests with the Bank of Greece and the Single Supervisory Mechanism.

The restructuring of the banking sector has started yielding results:

- Through consolidation, the share of banking assets held by the largest 5 banks increased from 70% in 2007 to more than 97% in 2016. So far, the Hellenic Competition Commission has not concluded on any negative impact of high concentration in the banking sector. HSFS holds equity in the four systemic banks: 40% of National Bank of Greece, 26% of Piraeus, 11% of Alpha and 2% of Eurobank's equity.
- The cost to income ratio decreased from about 60% in late 2014 to less than 50% in mid-2017, one of the lowest in the EU. In 2016, the number of bank branches per 1 000 people was one-third lower than EU average after having decreased by 40% since 2007. In parallel, the number of bank employees per 1 000 people also declined – through voluntary exit schemes – by nearly 35%, to about 60% the EU average. Greek banks have divested

from many foreign subsidiaries and other non-core activities. While this has certainly resulted in lower personnel cost, improved corporate governance is needed in order to effectively allocate resources within the banking sector. A first step in this direction was taken through the transposition of the EC Directives 2006/46/EC and 2007/63/EC in 2010.

- Following three recapitalisation rounds between 2012 and 2015 of EUR 51.7 billion, banks' capital ratio rose well above regulatory thresholds; in 2017Q1 the Tier1 capital ratio was 17% (Figure 3.27, panel A). The 2015 bank recapitalisation amounted to about EUR 15 billion and followed the ECB's asset quality review and stress tests with higher capital hurdles than in other EU countries.

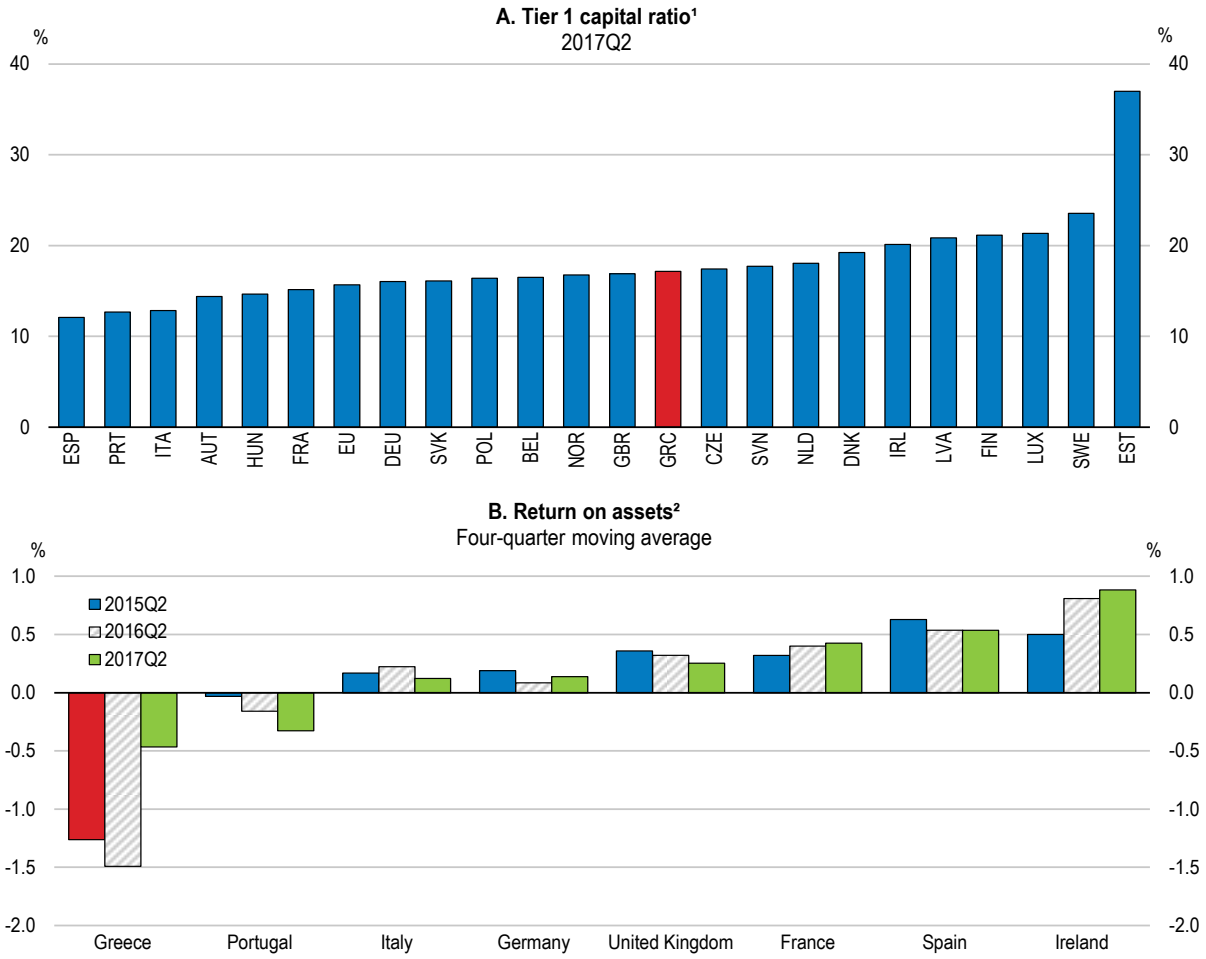
These reforms contributed to increased confidence in the banking sector and the upgrade of the country's investment profile (Moody's, 2016). Yet, the banking sector still faces several challenges.

Challenges in bank financing

Though improving, return on assets of Greek banks remains low compared to other OECD countries (Figure 3.27, panel B), while bank assets are declining. Also, although banks are well capitalised, the quality of bank capital is uncertain, as about half is deferred tax assets (or 7% of total assets) (Moody's, 2017). According to Basel III capital rules, from 2018, deferred tax assets that rely on banks' future profitability will have to be deducted from Common Equity Tier 1 (CET1), which will lower bank capital ratios. Greece has amended the tax code to allow banks to turn deferred tax assets into deferred tax credits (i.e. direct claims on the Greek Government) – so that they need not be deducted from CET1 – and to lengthen the carry-forward period from 5 to 20 years. These changes have received a positive assessment by the ECB (2017). However, the

quality and credibility of such deferred tax credits will ultimately depend on the state of public finances. Transforming deferred tax assets into deferred tax credits might in the long-term aggravate the adverse feedback loop between banks and governments.

Figure 3.27 Capital ratios exceed thresholds but return on assets remains negative



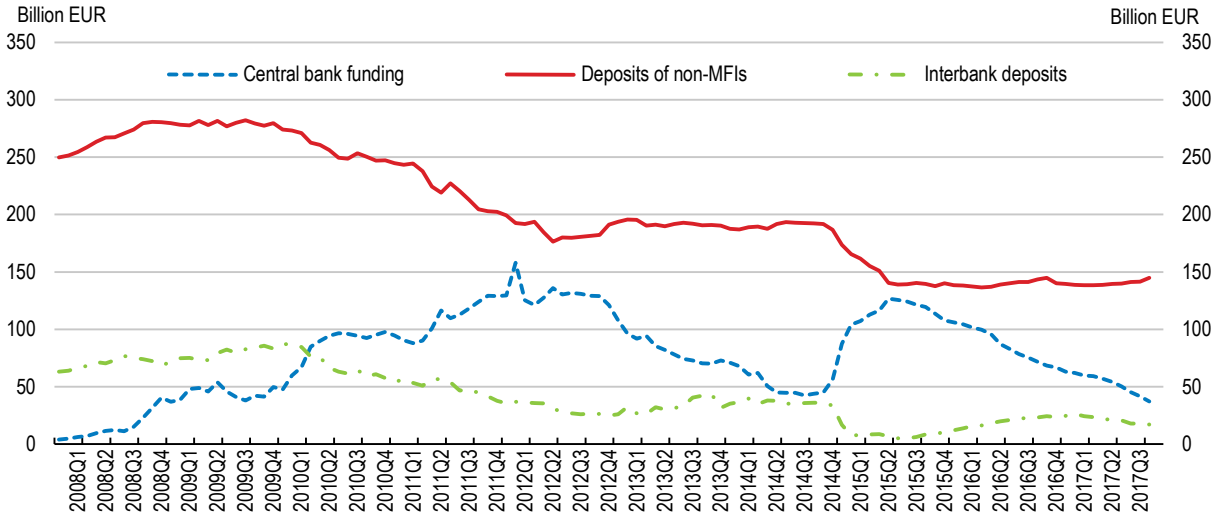
Note: Individual country data includes subsidiaries, which are excluded from EU aggregate. The sample of banks is unbalanced and reviewed annually.

1. % of the total risk exposure amount.
2. The ratio is calculated as dividing profit or loss for the year by total assets.

Source: European Banking Authority (2017),"Risk Dashboard, Data as of Q2 2017"

Though improving, bank credit remains a constraint for lending. The bulk of bank deposits lost during the crisis have yet to return. Bank deposits dropped by 27% from late 2014 to mid-2015, while the cumulative loss since their 2009 peak was about 50% (Figure 3.28). The capital controls imposed in mid-2015 halted the deposit outflows, contributing to tight financial constraints. Similarly, the emergency liquidity assistance (ELA) of Bank of Greece and ECB's financing decreased rapidly, but remained significant in the past few years (Figure 3.28).

Figure 3.28 Bank deposits have levelled off and central bank's funding is decreasing

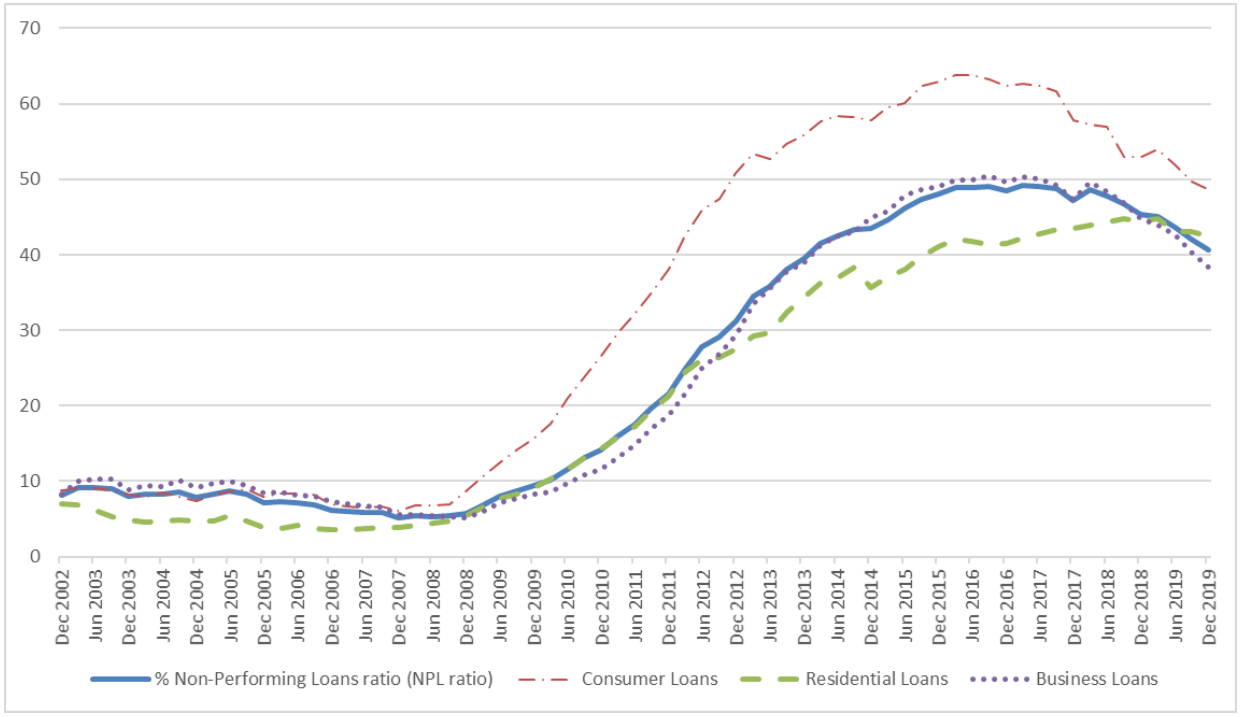


Note: Deposits include deposits and repos of non-monetary and financial institutions (non-MFIs). Central bank funding includes ELA provided by the Bank of Greece and financing provided by the ECB.

Source: Bank of Greece

The large stock of non-performing loans (NPLs) constrains bank credit supply. This is more evident in the case of credit towards risky borrowers, such as high growth and technology SMEs. NPLs are spread across loan types (Figure 3.29). Business loans account for over half of total NPLs. Considering business lending, NPLs are concentrated among SMEs, though the share of loans that are non-performing is larger for sole proprietors (BoG, 2017).

Figure 3.29 Evolution of non-performing loans in Greece, by type of loan



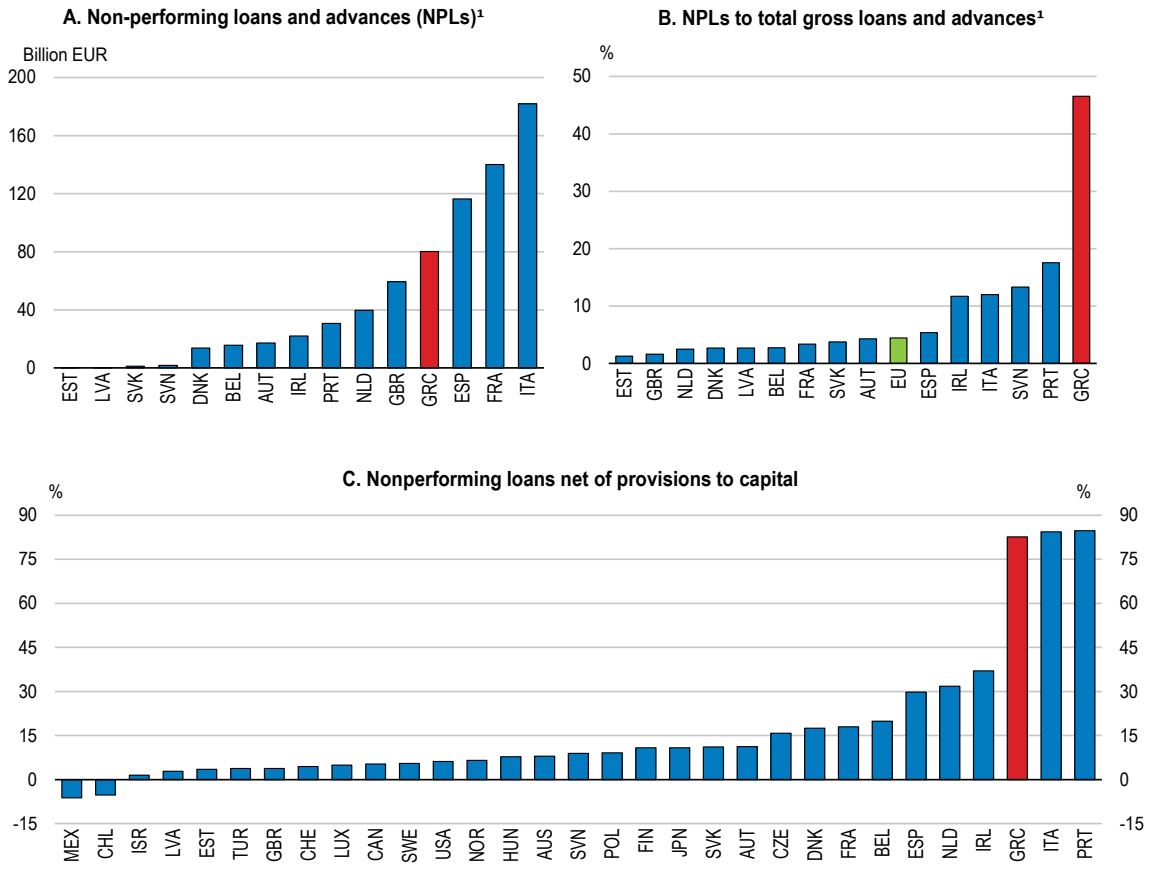
Source: Bank of Greece (2020)

In 2017Q2, the gross value of NPLs (defined as loans and advances that are 90 days or more past due or unlikely to be repaid in full without realising collateral) stood at EUR 80 billion. This translated into about 46% of total loans (Figure 3.30, panels A and B). The size of non-performing exposures (NPEs, which, in addition to loans and advances, include debt securities) is similar to that of NPLs[1], as in Greece the amount of debt securities is not significant compared to loans. Provisions amounted in 2017Q2 to 49% of NPLs gross values, higher than the EU average. Net value of NPLs (gross value minus provisions) amounted to about 80% of banks' capital (Figure 3.30, panel C).

[1] The analysis will refer to either NPEs or NPLs depending on the availability of data.

Figure 3.30 The stock of non-performing loans is large

2017Q2



1. Individual country data includes subsidiaries, which are excluded from EU aggregate. The sample of banks is unbalanced and reviewed annually.

Source: European Banking Authority (2017),"*Risk Dashboard, Data as of Q2 2017*" and IMF (2017), IMF Financial Soundness Indicators Database

The rise in NPEs is partly attributable to the deep and prolonged crisis and the implemented austerity measures. Private debt relative to GDP and the share of loans to non-financial corporations remain low compared to other OECD countries. Yet, the long crisis and the policy measures have eroded the capacity of households and businesses to pay their debts.

Even before the onset of the crisis, the NPL ratio in Greece was 5.2% (in December 2007); higher than the 3% average for the Euro Area (BoG, 2020; HBA, 2017). The IMF 2006 Financial Stability Report (IMF, 2006) had underlined limited capabilities across banks and lack of data for performing effective risk management, provisioning policies not aligned with risk exposures, and high level of NPL compared to other Euro Area countries. This suggested existing corporate governance and deficient risk management issues, which have potentially contributed to credit misallocation.

3.4.1. Bank governance

To reap the full benefits of the banking sector reforms, bank governance is of crucial importance. The HFSF has implemented extensive corporate governance reforms. It has reviewed the four systemic banks' adoption of new corporate governance standards and recommending changes. Reforms have made progress since banks were consolidated and recapitalised in 2015. The HFSF led an in-depth review of the governance and performance of the four systemic banks' boards of directors and their committees, which aimed to establish at the board level a culture of evaluation and a focus on managing NPL. Building on the board assessment already undertaken in 2016, the new review aimed at establishing an evaluation culture and discipline at the board level and evaluating risk- and audit-board committees with particular focus on NPL management.

Further progress on corporate governance is a precondition for HFSF to divest its equity holdings in the banks by 2022. After the conclusion of the in-depth review of the governance framework and performance of the banks' board of directors, the HFSF would need to pursue its

recommendations and continue to align corporate governance standards with international best practices. The HFSF's continued independence and authority could help to fully implement the compulsory corporate governance standards. In the last two years, directors and senior executive turnover at HFSF was high. This may have hampered HFSF's regular reporting and operations.

3.4.2. Non-performing loans

Reducing NPLs is of paramount importance to restore the banking sector to health and revive bank credit. NPEs restrict credit supply through two main channels: lowering profitability and tying up capital as impaired assets carry higher risk weights (Ayirat et al., 2015).

Accelerating their disposal hinges on complementary policies: (i) tightening regulatory policies, (ii) developing a market for distressed debt, and (iii) providing proper tax incentives. Improving insolvency and debt restructuring proceedings is also important and discussed in a separate section (Aiyar et al., 2015a; Liu and Rosenbeg, 2013). Lowering NPLs to pre-crisis levels may take considerable time. The recent experience of Ireland and Spain shows that NPLs start declining only 2 to 3 years after the first decisive actions (EC, 2017a).

Bank regulatory policy

During the crisis, bank supervisor authorities have taken several steps to improve the regulatory framework of NPLs. Initial improvements by the BoG were informed by diagnostic studies commissioned in 2013 and 2015 to a private sector firm. The studies aimed to assess the quality of the loan portfolio of Greek banks, review existing forbearance measures and foreclosure solutions, and assess the capacity of banks to effectively deal with impaired loans (NBG, 2014; Plaskovitis, 2016). The main findings pointed to the predominance of forbearance measures,

limited use of foreclosures, delays in handling denounced loans (i.e. loans where the contract has been terminated), and insufficient portfolio segmentation.

Following this assessment, the BoG issued new and detailed supervisory guidance on NPLs, including a new reporting framework, which goes well beyond the European Banking Authority's guidelines (ECB, 2016; BoG, various issues). In line with the ECB guidance, the European Central Bank has required banks to develop NPL reduction strategies, including quantitative operational targets (Table 3.2) and to establish dedicated units to manage NPLs (ECB, 2017).

The introduction of quantitative NPL disposal targets is an important step forward. Setting and enforcing targets is the approach followed by Ireland and Cyprus after the crisis and Japan in the late 1990s and early 2000s to reduce the large stocks of NPL. According to the current targets of Greek banks, the NPL ratio should drop significantly by 2020 (BoG, 2017). These targets expect most NPL to be cured, i.e. become performing loans, as the economy improves. Write-offs are also expected to play an important role, with limited roles for liquidations, collections and loan sales. In order to ensure realistic NPL disposal targets, the ECFIN argued that supervisors should provide robust, proactive and intrusive supervision to ensure prudent NPL recognition and provisioning as well as strong capital buffers (EC, 2017a).

Table 3.2 Operational targets to reduce NPEs

	Target	Measurement	Rationale
1	NPE	Gross value	Overall target
2	NPL	Gross value	Overall target
3	Cash recoveries (collections, liquidations and sales) from NPEs	As a share of total NPEs	Monitoring collection efforts, collateral sales and liquidations. Targets point to rising cash recoveries (from 3% of NPEs in 2017, to 4.5% in 2018 and 6.1% in 2018) based on increasing liquidation proceeds.
4	Restructured loans (long term modifications)	As a share of NPEs plus forborne restructured loans	Monitoring modification solutions offered to distressed borrowers. Banks are aiming at increasing the share of restructured loans to 27-61% in 2019 from 15-19% in 2016Q2. Restructuring involves long-term modifications of the loan agreement for a period longer than two years. It is expected this will lead to the transition of borrowers into viability status and finally into a cured status.
5	NPEs that are 720 days past due and not denounced	As a share of total NPEs that are 720 days past due either denounced or not denounced	Monitoring the start of legal efforts to resolve NPEs. Banks are aiming at lowering the share of not denounced loans from 6%-26% in 2016Q2 to 1%-7% in 2019 for SMEs and from 12%-34% to 2%-24% for large corporates.
6	Denounced loans for which legal action has been initiated	As a share of total denounced loans	Monitoring legal efforts to resolve NPEs. The target is 87-100% in 2019.
7	NPEs of SMEs for which a viability analysis has been conducted in the last 12 months	As a share of total NPEs of SMEs	Monitoring efforts to offer appropriate restructuring solutions to SMEs. The 2019 target is 80-97% in 2019.
8	NPEs of SMEs and corporates involving multiple banks for which a common restructuring solution has been implemented.	Gross value	Monitoring efforts to implement common restructuring solutions by multiple banks.
9	NPEs of corporates for which a specialist for restructuring companies was hired	Gross value	Monitoring efforts to implement corporate restructuring solutions. The target is for doubling the amount of loans for which such solutions have been proposed between 2016Q2 and 2019.

Source: BoG (various issues), *Report on Operational Targets for Non-Performing Exposures*, available at www.bankofgreece.gr/Pages/en/Publications/ReportNPE.aspx

Whenever debtors are in arrears with multiple creditors – banks and the public sector – better coordination among creditors can help to expedite the resolution of NPLs. Yet, lack of consultation between creditors has prevented the development of broad agreements on debt restructuring. Some improvements have recently been made with the introduction of regular meetings among the four significant Greek banks to discuss cases involving common borrowers. The new out-of-court dispute resolution (discussed below) also allows for a faster restructuring of debt with multiple creditors, including public agencies.

The role of the supervisors (the Bank of Greece and the Single Supervisory Mechanism) is to ensure that, as the disposal process of NPLs gathers pace, banks remain well capitalised. Banks need to be able to realistically project the effect of their NPE disposal plans on their capital, under different economic assumptions. The 2018 banks' stress tests identified potential capital shortfalls before the end of the EU adjustment programme. If necessary, and conditional on progress on the front of banks' governance, the use of funds of the third EU programme to improve bank capital ratios could ensure that banks remain well capitalised at the end of the EU programme and would constitute a pre-condition to facilitate investment financing.

The following section reviews the case for a distressed debt market, which could potentially be a step towards the disposal of non-performing loans.

Developing a market for distressed debt

The lack of a distressed debt market helps to explain the absence of extensive NPL sales during the crisis in Greece. Regulation and lack of competition has severely hindered the development of a loan servicing (i.e. loan administration) industry in Greece. A revised law regulating non-

bank loan service providers was approved only in 2015 (Law 4354/2015) and the BoG issued implementing regulation in 2016. This was the first attempt to foster a secondary market for distressed debt in Greece (Sakkas and Bazinas, 2016). The new law and implementing regulation follow international best practices. They allow for the licensing of loan servicing activities to non-bank entities, lowering thus the cost of entry into this industry (IMF, 2015). The BoG is responsible for issuing licences, based on pre-defined criteria, and revoking them in the case of infringements (e.g. fraud). Licensed service providers will have to abide to the supervisory framework for NPL issued by the BoG. They will be able to operate in three areas: management, transfer (i.e. purchase) and refinancing of loans. Refinancing will require an additional license from the BoG. The possibility of restructuring and refinancing non-performing loans is a key aspect of the reform. It enables licensed servicers to turn around distressed borrowers by offering new loans. This possibility can then help enlarge non-bank sources of finance and improve access to finance by distressed borrowers.

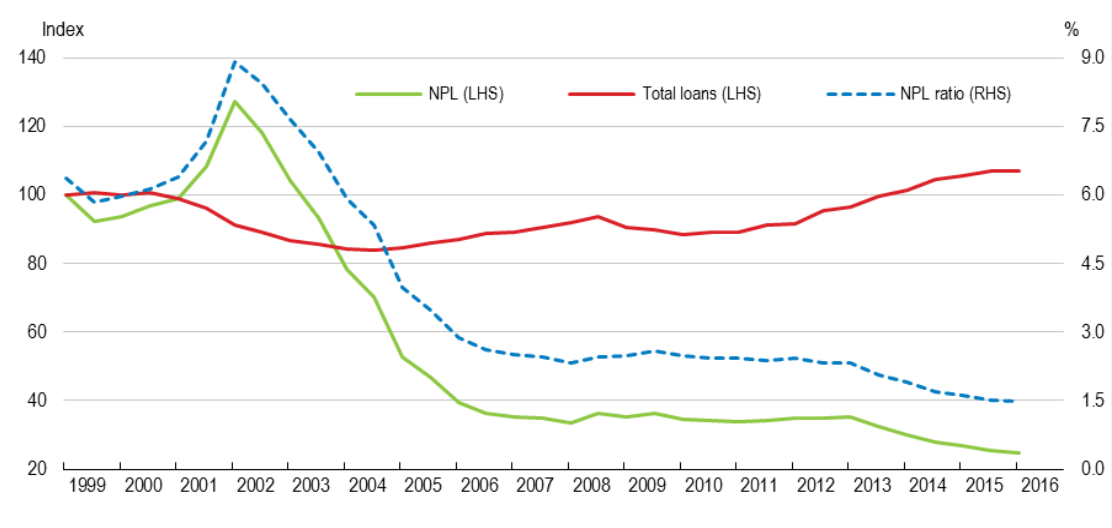
The recent increase in the number of licensed loan services could help to develop a distressed debt market. Given the large number of distressed SME borrowers in Greece, allowing loan service providers to manage or purchase SME loans would accelerate the resolution of distressed debt. The experience of the distressed debt market in the late 90s in Japan constitutes a good example of the right policy mix to manage a large and rising stock of NPLs in a business environment largely dominated by SMEs.

Box 3.4 The distressed debt market in Japan

The collapse of the Japanese financial bubble in 1991 lasted more than 10 years, resulting in plunging asset prices and a rising stock of bank NPLs. During 1998-2002, the government created a market to resolve NPLs. These actions were effective, as in the following years the stock of NPLs first increased, as banks were forced to recognise them; afterwards it diminished drastically (Figure 3.31).

Figure 3.31 Policy measures helped to create a distressed debt market and lower NPL in Japan

Index 1999 Q1 = 100



Source: Thomson Reuters

The first step in resolving bank NPLs was to induce banks to sell the collateral of NPLs, so as to create a distressed debt market. Until the late 1990s, banks had made insufficient provision for NPLs, as the assessment of loan losses was largely left to the judgment of individual banks. In addition, banks did not have adequate incentives to make sufficient provisions, as they were not allowed to deduct them from taxable income.

In 1998, the Financial Reconstruction Law required banks to classify borrowers with payment arrears more precisely than previously. This played an important role in accelerating

NPL disposals. The 1998 Law also created the Resolution and Collection Corporation (RCC), a government-owned agency (owned by the Deposit Insurance Corporation) incorporating two government-owned institutions that had the responsibility of collecting bad loans from failed housing loan companies, banks and credit co-operatives. Its portfolio initially consisted of real estate collateral on defaulted loans. The 1998 Law also gave RCC the power to purchase distressed assets at fair market value, securitise NPLs, restructure companies and participate in debt-equity swaps, thus accelerating the disposal of NPLs.

In 2001, the emergency economic measures further expedited the sale of collateral owned by non-viable SMEs. The measures required major banks to remove NPLs from their books within three years after their recognition. They did so by selling them directly to the market, by pursuing bankruptcy proceedings, or by rehabilitating borrowers through out-of-court workout procedures. Any remaining loans had to be sold to the RCC at fair price. Between 1999 and 2002, the RCC purchased loans worth JPY 55 trillion (USD 495 billion, 10.9% of GDP) at 96% discount. The RCC also improved the transparency of the NPL market by setting standards of disclosure and publishing information on collateral.

In 2002, the government announced the Financial Revitalisation Program with the aim to promote corporate debt restructuring for large firms. Authorities tightened loan assessment standards for large borrowers (using market information such as stock prices, credit ratings and discounted cash flow analysis). This led banks to reclassify part of their portfolios as sub-performing and sell such assets in the distressed debt market.

Overall, these measures resulted in a large increase in write-offs of bank NPLs, an increase in NPL market transactions, and the overall evolution of the Japanese distressed debt market. In the mid-1990s, the market was dominated by foreign funds that were able to achieve very high internal rates of return (30-50%), as banks sold collateral linked to NPL at low prices. As the number of investors (especially Japanese ones) in the distressed debt market rose and the banks started using auctions, prices increased and the internal rate of return of buyers dropped to single digits. Overall, the process was not painless. The number of failed financial institutions rose progressively during the 1990s to reach 56 in 2001.

Source: Ohashi, K. and M. Singh (2004), "*Japan's Distressed Debt Market*", IMF Working Paper, No. WP/04/86, IMF; Callen, T. and J.D. Ostry (2003), Japan's Lost Decade: Policies for Economic Revival, IMF; Gomi, H. (2007), "*Japan Non-Performing Loan Problem and Financial Reconstruction*", Paper presented at the Conference Financial Stability And Financial Sector Supervision: Lessons From The Past Decade and Way Forward, organised by IMF Regional Office for Asia and the Pacific (IMF OAP), Keio University.

Bank regulatory policy also comprises three elements introducing tax incentives for NPL disposal, the expedition of the sales of collateral, and the implementation of the International Financial Reporting Standard (IFRS).

Tax incentives

Tax incentives constitute a means of achieving the disposal of Greek banks' NPLs. Loan servicing legislation introduced some tax-related provisions. Yet, these are partly inconsistent with those provided by the 2003 securitisation law. In addition to providing an efficient and expeditious means for transferring NPL, the 2003 securitisation law offers full exemption from indirect and direct taxes on loans transfers (HFSF, 2016), though they have been underused because of the lack of loan servicers. The more recent loan servicing legislation offers less generous incentives, which are also partly inconsistent with the securitisation law (Watson Farley & Williams, 2016; HFSF, 2016). For instance, loans transfers are subject to VAT. The 2003 securitisation law offered full tax exemption on loans transfers (HFSF, 2016). Instead, the loan servicing legislation offers less generous incentives (Watson Farley & Williams, 2016).

Aligning the tax incentives provided by the loan servicing industry legislation with those of the securitisation law would enhance tax transparency and encourage the disposal of non-performing loans. Clear tax incentives constitute an important tool to support prices of non-performing loans in the secondary market (KPMG, 2016). Making such initiatives temporary through sunset clauses could accelerate their effects and ensure that incentives expire when no longer needed.

Facilitating and expediting the sales of collateral would also help create a distressed debt market. Greece's tax code provided no tax incentives to speed up collateral sales (ECB, 2016). Other

countries have used such incentives in their respective tax codes. The United States, for instance, has a well-developed distressed debt market (Altman, 2012; Aiyar et al., 2015a, 2015b). Following GAAP rules on the treatment of NPLs, US banks are obliged to: 1) suspend the accrual of interest income from NPLs after 90 days past due on payment or if the loan is deemed uncollectable; and 2) write down NPLs to the collateral value after 6 months, with the collateral value based on the current price and no account for any forecast increase in market valuation. As a result, the United States debt market has succeeded in keeping the stock of NPLs low. They peaked at 5% of gross loans in 2009 and have since then declined to below 2%.

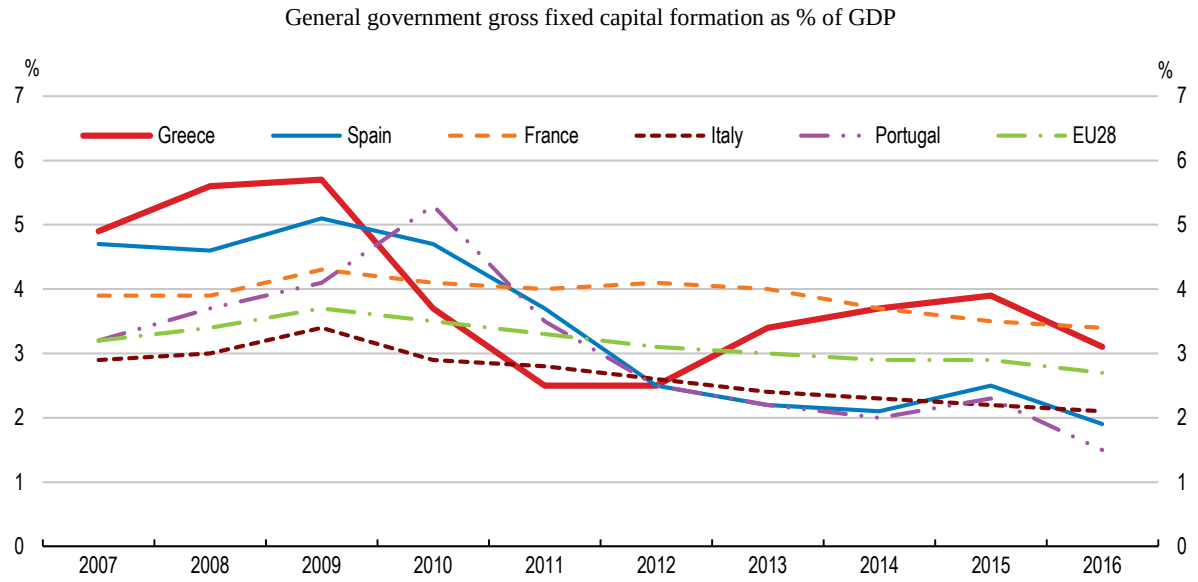
The timely and smooth introduction of the International Financial Reporting Standard rule (IFRS9) could help develop a distressed debt market. IFRS9 will introduce a new approach for the valuation of financial assets and liabilities, including a forward-looking expected loss value of impaired loans. This is radically different from the current, backward looking approach of Greek and EU banks (IAS39). Current rules also allow for the accrual of interest income from NPLs, thus inflating bank profitability and discouraging the write-off of NPLs, while they also do not provide clear guidance on the valuation of collateral.

3.5. Institutional and policy developments to enhance public investment in Greece

Public investment in Greece decreased drastically in the early years of the crisis, as it did in other crisis-hit countries. After 2011, the share of public investment to GDP started to recover. By 2015, it had exceeded the respective levels of Italy, Portugal, Spain and the EU28 average (Figure 3.32). However, resources allocated to the public investment programme continued to shrink, from EUR 6.65 billion in 2013 to EUR 6.29 billion in 2016 and about EUR 6 billion by 2017. Yet, GDP

contraction was more significant. As a result, the ratio of the two, i.e. public investment to GDP, increased between 2011 and 2015.

Figure 3.32 Public investment has fallen

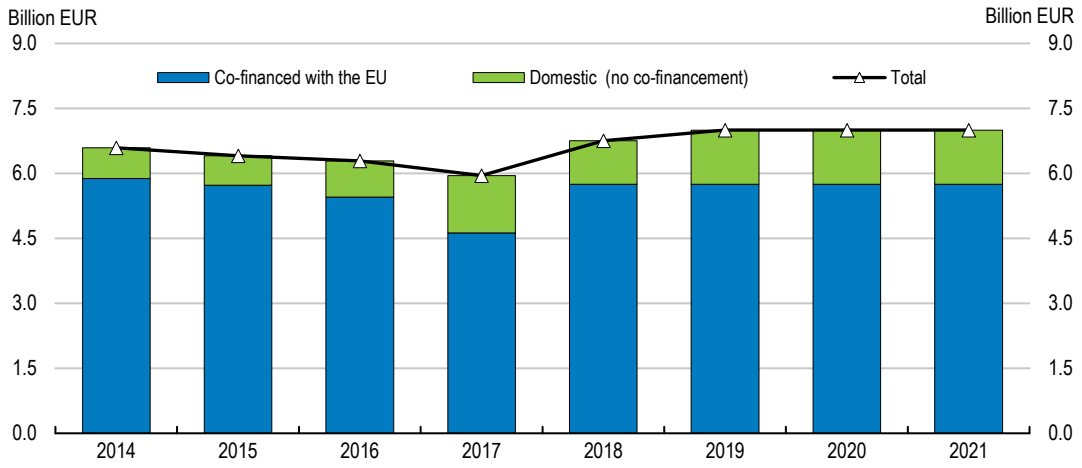


Source: Eurostat (2017), Government statistics (database)

Public investment is largely co-financed by EU funds. Between 2010 and 2017, public investment co-financed by the EU accounted for about 80% of total annual public investment (Figure 3.33). The large share of EU funds protected investment from further severe cuts during the crisis, while it had a stimulus effect. As a result, the share of public investment in total expenditure remained broadly stable between 2013 and 2017, in the range of 11-12% (Figure 3.34).

Figure 3.33 EU co-financing of public investment spending is sizeable

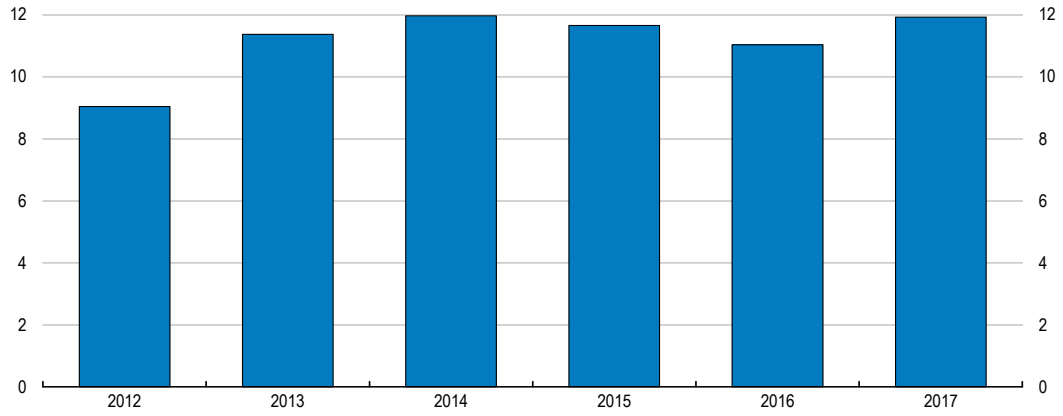
Public Investment Programme (PIP) cash expenditure



Source: Ministry of Finance and State General Accounting Office

Figure 3.34 The share of public investment in total budget expenditure remains stable

Public investment budget expenditure as % of total budget expenditure



Source: Ministry of Finance, State General Accounting Office and Bank of Greece

EU funds for public investment remained significant throughout the years of the crisis. For the 2014-2020 programming period, the European Fund for Structural Investment (EFSI) had allocated EUR 4.3 billion to environment protection and resource efficiency, EUR 2.5 billion to

transport and energy networks, and EUR 0.8 billion to information and communication technology.

In addition to strengthening the ongoing recovery, public investment can be an important factor to raise long-term growth and social welfare. Fiscal consolidation can result in long-term economic losses when expenditure cuts occur in areas of valuable public goods, such as public health and education investment (Cournède et al., 2013). Econometric estimates indicate that the marginal return on additional public investment in Greece is positive (Fournier and Johansson, 2016). An IMF (2015) study also points to a large positive effect of public investment, with one euro spent on public investment increasing GDP by EUR 1 to 1.4. Across OECD countries, a given increase in public investment is found to lower unemployment twice as much as the same increase in public consumption (OECD, 2017b). Hence, there is room to explore whether public investment could be further leveraged to crowd in private one.

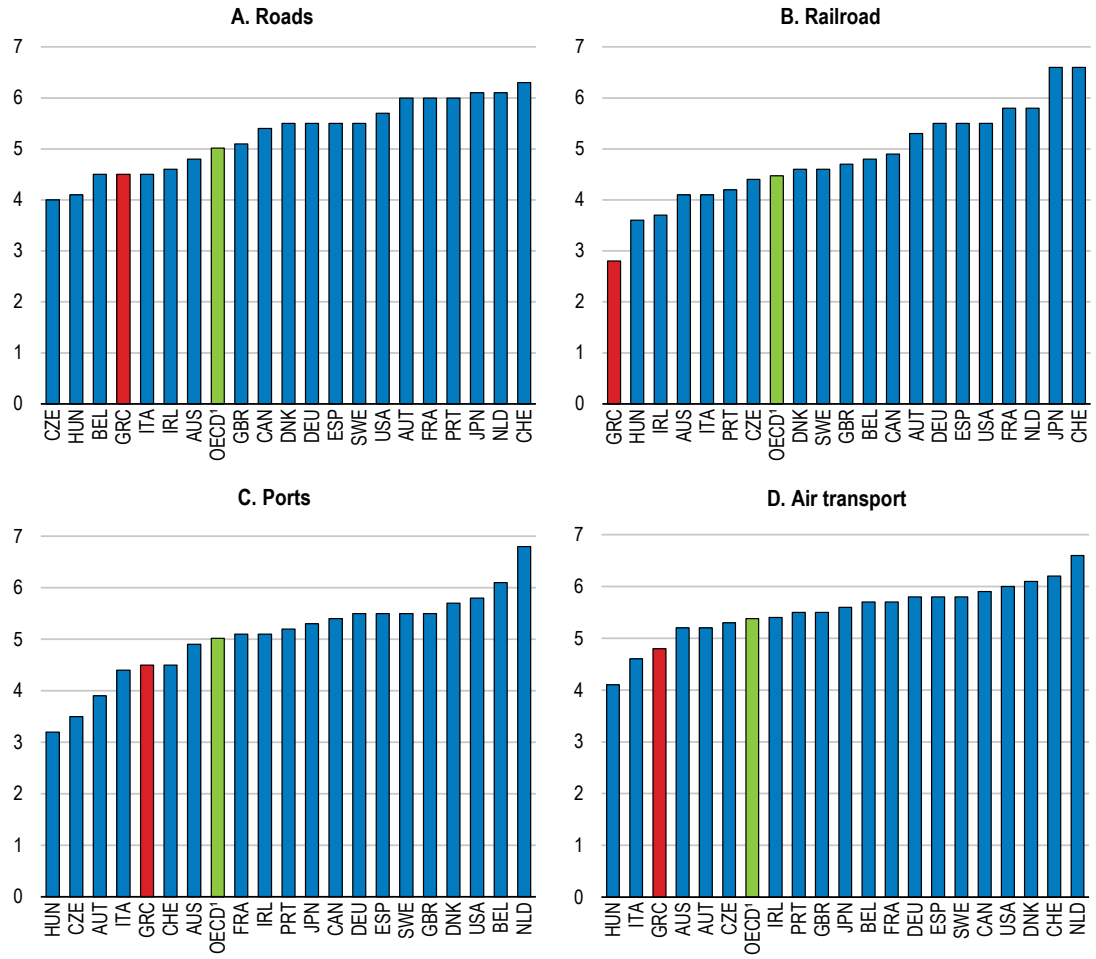
Greece's public investment needs are large as the public capital stock is low. In 2013, it stood at 45% of GDP, against the OECD average of 49%. Also, the perception of Greece's infrastructure quality still lags that of most OECD countries, especially for railways (Figure 3.35). Moreover, poor intermodal connections (especially between ports and railways), cumbersome customs procedures, low competences, and the low quality of logistic services hamper the development of logistics sector (Figure 3.36).

These problems raise trade costs. The export lead time (the time between the placing of an order and the receipt of the goods) in Greece is 3 days for port and airport transportation and 6 days for rail and road transportation, against 2 days on average in high-income OECD countries in 2017.

A similar gap existed for import lead times (World Bank, 2017). Major infrastructure projects are under way to better connect Greece with the road and railway trans-European networks. Completing these projects is key to shortening export and import lead times, and improve the facilitation of trade, which could in turn strengthen incentives to invest.

Figure 3.35. Infrastructure lags other countries

Global Competitiveness Index, scale from 1 to 7 (best), 20017-18

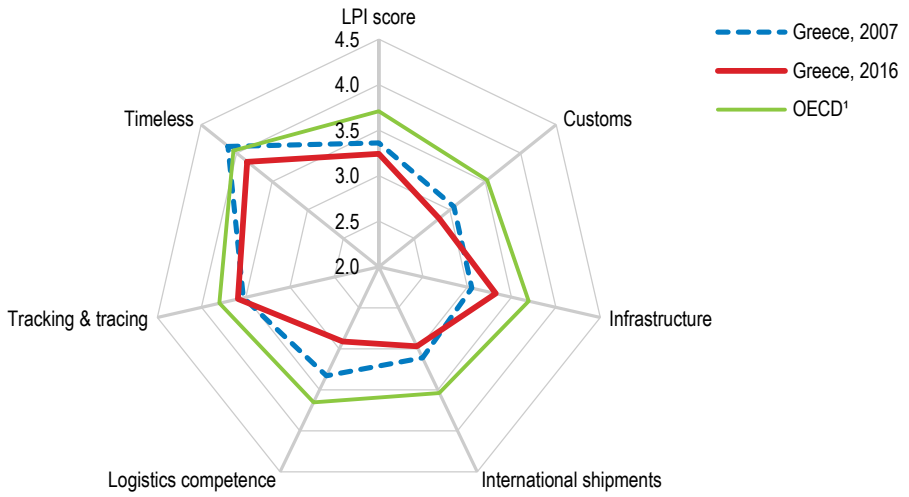


1. Unweighted average.

Source: World Economic Forum, "*The Global Competitiveness Report 2017-2018*"

Figure 3.36 Greece's logistics lag

Logistics Performance Index, scale from 1 to 5 (highest)



1. Unweighted average.

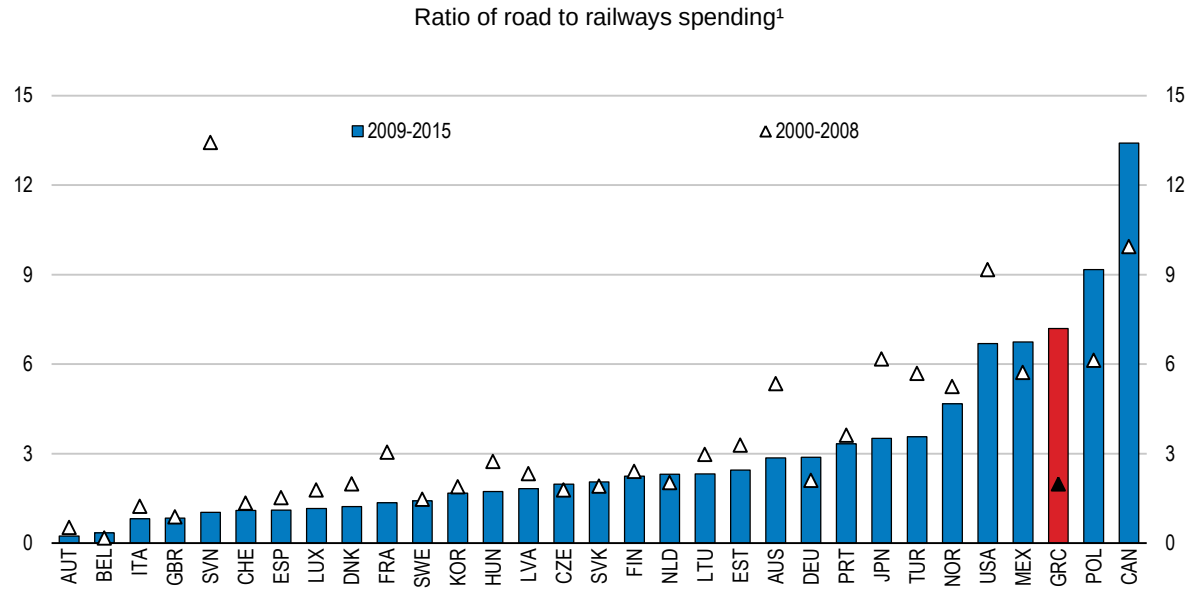
Source: World Bank database

Greece's railway network is severely underdeveloped. The density of railways is less than 2 kilometres per one hundred square kilometres, one of the lowest across OECD countries. The railway density of Greece is closer to that of continental sized countries – such as the United States and Australia – than to similarly sized countries with a well-developed railway network as Belgium (with a rail density of 11) and the Netherlands (8).

Moreover, spending on the railway network declined markedly during the crisis. The average infrastructure spending on railways (as a share of GDP) declined by 71% between the 2000-08 and 2009-15 periods, whereas the average spending on road infrastructure fell by less than 10%. The ratio of infrastructure spending on roads to railways more than tripled after the crisis, the

largest increase across OECD countries (Figure 3.37). In 2013 alone, Greece spent on roads about 23 times more than in rail infrastructure.

Figure 3.37 Railways infrastructure spending was cut much more than spending on roads



1. The average spending on road infrastructure investment per one thousand units of GDP (in current USD) is divided by the average spending on rail infrastructure investment per one thousand units of GDP for 2000-08 and 2009-15.

Source: OECD (2017), "Performance Indicators", OECD Transport Statistics (database)

The quality of Greek port infrastructure hampers international connectivity and the tourist industry. Despite being the 4th most popular cruise ship destination in Europe, Greece ranked only 8th concerning the revenue generated by the sector. Also, cruise ships bring about 10% of Greece's tourists each year. Yet, they only account for 3% of total tourist revenue. The insufficient infrastructure and poor management of Greek ports put Greece at disadvantage compared to other cruise destinations in the Mediterranean region, such as Spain and Italy. For instance, 85% of cruise ships reaching Greece carry less than 1 000 passengers, against only 44% in the Mediterranean region. Improving port infrastructure to allow larger cruise ships to moor in Greek

ports. Enhancing home-porting activities could generate more than EUR 60 million of additional tourist revenue per year and a significant increase in the share of the Mediterranean cruise market (Dianeosis, 2017).

3.5.1. Improving public investment management functions

Given the limited fiscal space, it is imperative to manage available public funds in a timely and effective manner, while exploiting all supporting European-wide initiatives. As of September 2017, Greece ranked third among European countries concerning the use of resources (as a share of GDP), which were allocated through the Juncker Plan. Also, user fees could be better used and more extensively mobilised, as they are often below cost-recovery levels. Lastly, congestion charges are not applied in Greece (PWC, 2017). These instruments could generate additional resources to fund investment and maintenance spending, while encouraging more efficient use of existing infrastructure.

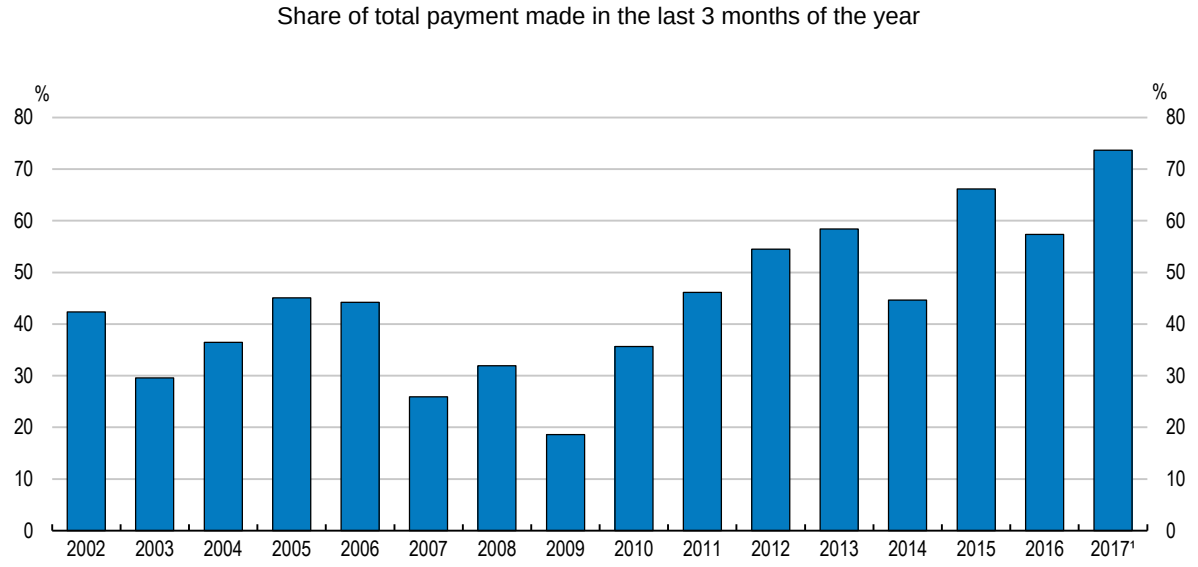
The effective management of public investment would require actions spanning across a broad range of institutional improvements. Burdensome administrative procedures are found to often delay public works and inflate project costs. The incomplete land registry constitutes a major problem, as it results in delays in land acquisition. For instance, delays in issuing permissions in 2016, relating to archaeological reviews, halted works in the Ionian highway and triggered hefty penalty payments from the government to contractors. The highway fully opened only in mid-2017, after several years of delay. A complete registry would help to clearly identify all state non-

financial assets and to develop a strategy that would maximise their social and economic value (Bova et al., 2013).

Shortcomings in the planning stage often lead to modification of contracts during works, as well as higher costs. For instance, none of the 6 Greek road projects audited by the European Court of Auditors were delivered at the original contract price (ECA, 2013). The average cost increase was 36%, the highest among the four countries (Germany, Greece, Poland and Spain) considered. The ECA report found that high capital requirements in Greece have led to large tenders being awarded to only major project management companies. These companies had to register and qualify ex-ante with the Ministry. This was not the case in other countries (ex. Poland and Germany), where all companies can participate in tenders without pre-qualification. It also shows that re-measurement of works and contract updates after their initial signing usually lead to large modifications, delays and higher costs. Among the four audited countries, Greece was found to have the largest average delay of transport projects, 16 months or 57% later than expected, compared with 9 months and 41% on average for the four other countries. This calls for better management and ex ante design of public investment projects, particularly when other parties are also involved.

Also, public investment payments in Greece are largely disbursed towards the end of the year (Figure 3.38). This is partly due to the cycle of projects that are mostly carried out from March to October. However, the large payment spike in December also indicates delays in certifying contracting obligations after the completion of works and the availability of resources.

Figure 3.38 Disbursement of public investment funds is concentrated towards the end of the year



Source: Bank of Greece

There have been recent efforts to improve public investment management functions. For instance, to expedite and enhance the transparency of payments relating to public investment projects, the Information System for the Monitoring of Public Investments Payments and Debts was introduced in early 2015 within the Public Investment Directorate of Ministry of the Economy. Additional actions include the abrogation of single-project bank accounts at the Bank of Greece. Also, a new system of "ring-fenced accounts" ensures that funds are available when needed for the payments of the co-financed part of the projects. A separate mechanism guarantees the immediate allocations of appropriations and their financing and the unhampered payment of projects from the start of the fiscal year. Also, the Public Investments Directorate has strengthened the central coordination of decisions relating to public investment by issuing documents on a timely basis with concrete guidelines and timetables to authorities responsible for public investment projects.

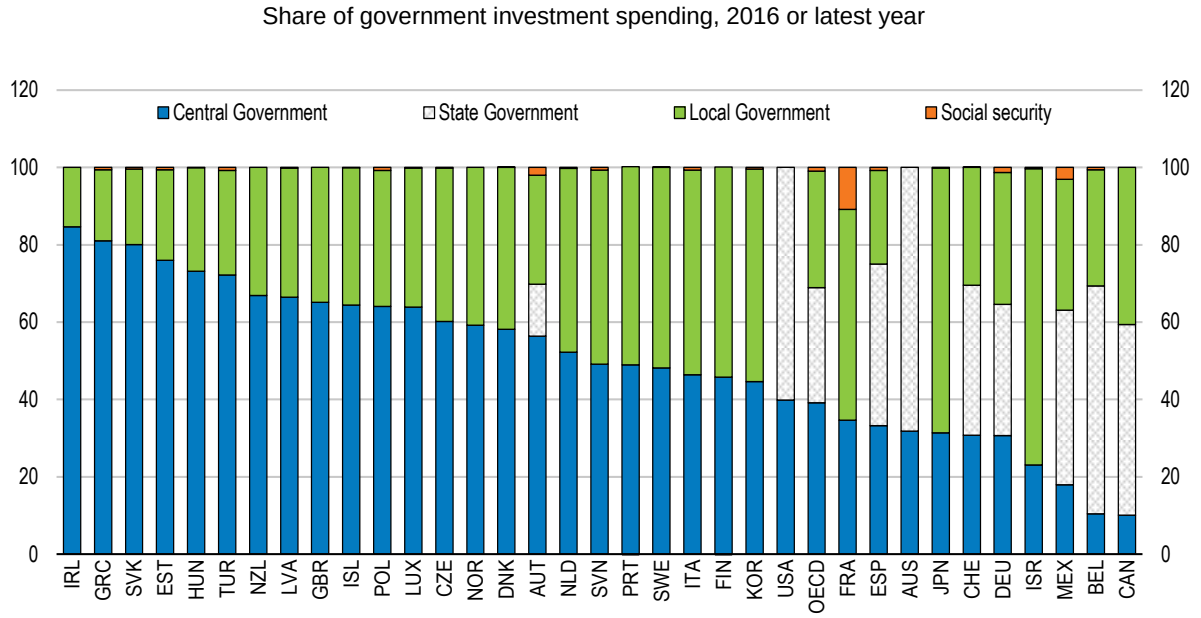
Transparency is also improving, as the new electronic platform (e-pde Information System) provides up-to-date information on all publicly funded projects (OECD, 2018).

A recent econometric analysis covering EU countries shows that higher public sector efficiency significantly increases the positive growth impact of public investment (Papaioannou, 2016). Hence, the above-mentioned initiatives need to be pursued and linked with the ongoing public administration reform, in order to maximise synergies with public investment spending.

3.5.2. Developing a long-term public investment strategy

In Greece, the central government is responsible for more than 80% of public investment (Figure 3.39). However, the absence of a long-term public investment strategy, along with political and policy uncertainty, has compounded the problems relating to poor planning and execution. These factors – along with the crisis – have led to a large backlog of projects. By the end of 2017, there were 69 projects in the area of transport, energy and waste and sewage planned for completion by 2022 for a value of more than EUR 20 billion (PWC, 2017).

Figure 3.39 The central government accounts for most public investments spending



Note: 2015 for Australia, Israel, Japan, Korea, Mexico, New Zealand, Switzerland, Turkey, the United States and the OECD aggregate. Data for Turkey and are not included in the OECD average because of missing time series. Local government is included in state government for Australia and the United States. Australia does not operate government social insurance schemes. Social security funds are included in central government in Ireland, New Zealand, Norway, the United Kingdom and the United States.

Source: OECD (2017), Government at a Glance 2017 and OECD National Accounts Statistics (database)

Developing and regularly updating a long-term strategic public investment plan, involving full consultations with all stakeholders, would help to deliver credible policy commitments. It would build synergies among sectors and projects and help link public investment objectives with wider socio-economic and environmental considerations. Strong political ownership would help overcome short-term budget and political pressures to divert resources dedicated to investment projects to other spending. In parallel, a long-term public investment plan covering the whole transport sector is key to developing intermodal transport, thus turning Greece into the European gateway for Asian goods and facilitating Greece's integration into global value chains.

The development of the National Transport Plan is a positive step towards the integrated strategic planning of transport infrastructure. Other recent positive initiatives in this direction include the design of strategic plans covering digital policy, innovation and smart specialisation, risk prevention and management, and solid waste management. Coordination in the development and implementation of these plans is key for their effectiveness in addressing investment gaps.

To build broad ownership of a long-term investment strategy, consistent, inclusive and transparent consultation with all stakeholders is necessary. Transparent and early engagement of key stakeholders is key to building political ownership of long-term public investment plans. Inclusive consultation also allows any interested members of the public to contribute or comment on proposals, ensuring that all concerned interests are heard. Transparent engagement involves publicly documenting the consulted parties, their input, and releasing the regulator's responses to the main issues (OECD, 2010).

3.6. Policy implications and concluding remarks

This chapter endeavours to investigate how investment, be it public or private, can be influenced by a number of policy and institutional variables. The variables analysed include market regulation, FDI, insolvency procedures, innovation, financial system regulation and governance, and public investment. It shows how each of these factors has supported or hampered investment growth in Greece during the recent years and their contribution to the current situation of underinvestment. It also points to potential ways forward, based on international benchmarking and comparison with good practices from other countries.

It is argued that low investment is dragging down potential output and labour productivity growth, while uncertainty about burdensome regulation and its future changes constitute primary factors deterring Greek and foreign firms from embarking onto new investments. Financial constraints are also an important impeding factor in the investment activity; however, liquidity alone is argued to be a necessary but not sufficient condition for boosting investment.

Findings from the literature and the analysis of primary and secondary sources regarding the binding factors for boosting investment suggest a positive role played by firms' innovative activity and their integration into global value chains. Moreover, institutional factors related to the quality or regulation, insolvency procedures and contract enforcement also significantly impact the propensity of the private sector to embark upon investment activity. These findings are in line with the related EIB and ECB institutional reports on European developments. Despite the availability of cash in bank deposits and the increase of money supply by the ECB through quantitative easing, these reports attribute sluggish investment to institutional and policy factors.

Lastly, it is argued that the rebound of investment crucially depends not only on the legislation of policy measures, but also on the ability of governments to implement them. In this respect, the chapter focuses on the encountered implementation challenges of policies in Greece during the last years, as well as good practices from other countries that have previously experienced similar underinvestment issues. It concludes by proposing ways forward that have been tested in other countries and analyses their policy implications in the Greek environment.

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4. Competition policy and market regulation: A case study from the pharmaceutical sector

4.1. Introduction

Structural change, international trade competitiveness and sustainable levels of investment require sound institutional and regulatory reforms. These constitute key elements of economic policy and important components of an effective competition policy in particular. The latter is increasingly embedded in the design of future-proof regulations that should simultaneously address the need to bolster competitiveness of sectors with comparative advantage and potential, while also minimising any negative externalities. Designing sectoral reforms is thus based on a balance stricken between sector-specific policy objectives related to industrial policy and broader policy objectives related to cross-cutting issues such as inequality, social policy, health policy, etc.

This essay looks at the competition- and incentive-distorting externalities that could arise in specific contexts due to the application of regulations which aim at achieving a given policy goal. We present hereby a conceptual framework to think about and analyse potential competition distortions that arise during the reform design and implementation in the area of pharmaceutical pricing. By focusing on this state-regulated sector, we analyse the implications of the 2016 pharma pricing rules that related the prices of generics and originator pharmaceutical products in Greece. We endeavour to shed some light on the competition policy channels through which certain pricing provisions hamper the achievement of public policy objectives of market regulation, such as the cost containment of pharmaceuticals through increased generics penetration. We provide an estimate of the consumer welfare implications of this reform.

In the theory of public economics and public finance, negative externalities are usually considered as a side effect, which governments may compensate for through subsidies or taxes. These side outcomes do not necessarily incur direct financial costs; they could create market distortions that lead to indirect costs for the affected entities. At the same time, when designing regulatory policies, governments are bound to comply with general principles, such as budgetary compliance, good regulation, and fair competition (OECD, 2014a; OFT, 2007; Autorité de la Concurrence, 2012). While the fiscal impact of reforms could be quantified by budgeting the incurred expenses, the regulatory impact assessments and the assessment of potential impact to market competition are generally less straightforward tasks.

As argued above, there are certain cases when policies could create competition barriers that distort the level playing field for market participants, without it initially being the objective of the policy maker (OECD, 2017a; 2017b). These policies could directly or indirectly result in picking winners, which would then lead to the industrial expansion and transformation of a sector or of an entire economy (Cherif & Hasanov, 2019). This type of industrial policy is sometimes used to justify government intervention in the market for employment boosting or import substitution objectives. However, in other cases, sector-specific regulation that may not adequately take into consideration sector-specific characteristics could result in discriminatory treatment of market participants and economic agents. Recent research suggests that the pursuit of fierce competition with strict accountability could be perfectly in line with principles of industrial policy and could lead to healthy state intervention that fosters the development of sophisticated industries, beyond initial comparative advantage (Cherif & Hasanov, 2019).

This essay studies the effects of the recent pricing reform in the Greek pharmaceutical industry, the objective of which was to ensure compliance with policy prescriptions of international institutions. Benchmarking and comparative analysis conducted by these institutions had highlighted the relatively high pharmaceutical expenditure in Greece and the importance of choosing appropriate policy instruments to curtail it (Kanavos, et al., 2017; Souliotis, Papageorgiou, Politi, & Athanasiadis, 2016; OECD, 2015b). When specific policy recommendations and interventions are not evaluated in the context of a holistic regulatory framework, the prevailing outcome could be to diminish the effectiveness or reverse the intentions of reforms. Our analysis suggests that market regulations in the pharma pricing policy can be competition-distorting, while they may fail to achieve their primary objectives of generics penetration and cost containment.

A contribution of this essay to the literature lies in demonstrating how certain market regulation provisions have created circumstances of limited competition between generic and originator medicines in Greece. It endeavours to provide a theoretical framework to analyse competition effects of pricing provisions and estimate the consumer welfare effects of the specific generics re-pricing provisions introduced in 2016. The relevant literature has so far been limited to researching the budgetary implications of reforms and health coverage. Hence, moving from the fiscal and health policy effects to the competition effects of pharmaceutical pricing constitutes a novelty of this essay. Another novelty of the essay lies in its interdisciplinary approach, which synthesises economic and legal considerations to address the competition-related research questions.

4.2. Literature review

There is a broad literature and numerous studies concerning the benefits of fair competition in the design of policies, particularly at the sectoral level (see, inter alia, Aghion et al., 2005; Arnold, Nicoletti and Scarpetta, 2011; Bourlès et al.; 2013; Ennis & Kim, 2017; Fournier et al., 2015). At the same time, pharmaceutical markets, and especially, the pricing of pharmaceuticals is subject to extensive research both at an international level and in Greece (see, inter alia, Volger, 2012; OECD, 2017b; Espin & Rovira, 2007; OECD, 2008). Yet, the intersection of competition policy and pharmaceutical pricing policies has not been adequately studied. This essay aims to fill this gap.

The following two sub-sections provide a literature review of the two main dimensions of the essay: competition policy and pharmaceutical pricing policy. The first sub-section reviews the benefits of competition policy in the context of industrial policy. It highlights the importance of good and fair regulation for economic variables such as growth, employment, equality, etc. The second sub-section reviews various pricing methods that countries – primarily EU ones – have adopted to price pharmaceuticals, the principles of pricing and certain implications deriving from it.

4.2.1. The benefits of competition

Literature suggests that sustainable development requires countries to switch their priorities from an investment-led to an innovation-led growth model. Sustainable productivity gains are only achieved through an innovation-driven growth. Acemoglu, Aghion, and Zilibotti (2006) posit that

countries get stuck in a "non-convergence trap" when they do not switch from an investment-based strategy to an innovation-based one as they approach the technology frontier. In line with Gerschenkron (1962), the authors suggest that government intervention is needed at the early stages of development in order to boost investment and adopt existing technologies. However, they show that this industrial policy may be costly if continued in the long run and that it could prevent convergence. Moving towards an innovation-based strategy and convergence to the frontier governments would require the adoption of sound competition policy and checks and balances on political interests. These, in turn, would incentivise firms to innovate and converge to the technology frontier.

Sound competition policies have a positive impact on innovation, both at the economy-wide and firm level. Schumpeter (1942) has argued that innovation is primarily a characteristic of large, market-leading firms. Contrary to Schumpeter, the 'inverted-U' relationship identified by the OECD (2014a) supports the claims first developed by Scherer (1967) and reinforced, among others by Aghion et al. (2005). They posit that innovation is boosted as markets become more competitive. Extreme competition, however, could drastically lower profit margins and the ability of firms to embark on innovative investments and R&D, mainly due to their loss aversion. In the academic literature, this is described as the inverted-U competition-innovation relationship.

Enhanced market competition and low product market regulations (PMR) are associated in the academic and policy literature with increased growth prospects. They enable productivity and employment growth and incentivise investment and innovation through knowledge-based capital. The literature also supports the hypotheses attributing a great importance to competition and low PMR in lowering income inequality, supporting the absorption of foreign direct investment (FDI) and boosting international trade. Other important benefits of competition include lower consumer

prices, greater consumer choice and better quality of products and services, greater investment in R&D and faster adoption of innovation.

In addition to the evidence that competition promotes growth, there have been studies focusing on the effects of product market deregulation on productivity. Industries, the structure of which is characterised by fiercer competition, experience faster productivity growth. This has been confirmed in a wide variety of empirical studies, as summarised by the OECD (2014a). Arnold, Nicoletti, and Scarpetta (2011) study firm-level data in 10 countries from 1998 to 2004. They conduct the analysis using the OECD's Product Market Regulation index at industry-level. The authors find that more stringent product market regulation reduces the multifactor productivity (MFP) of firms. Similar results are reported in a previous study of Nicoletti and Scarpetta (2003). In a study of 15 countries and 20 sectors, over the period 1985 to 2007, Bourlès et al. (2013) estimate the effect of regulation of upstream service sectors on productivity growth downstream. They find that anti-competitive regulations have an impact that goes beyond the sector in which they are applied and that this effect becomes more prominent for the sectors which are closer to the productivity frontier. Competition benefits are diffused through the channels of market entry and exit and firm management. The former confirms that increased competition leads to market dominance of more efficient firms over less efficient ones. Competition is also related to better management practices of efficient firms, boosting thus even further the productivity gains.

Innovation and investment in knowledge-based capital (KBC), such as computerised information, IPRs and economic competencies, are also negatively affected by stricter product market regulation (Andrews & Criscuolo, 2013). The authors set out the channels through which this effect takes place. For instance, product market regulation affects innovative efforts, as higher

firm entry rates give rise to new ideas, while putting pressure on incumbents to innovate. In addition, it influences innovation because it enables innovative firms to combine more efficiently the resources needed to market new ideas and products. The paper notes that *"a policy reform that would alleviate regulatory barriers in business services from the OECD average (i.e. France) to the low level in Sweden is associated with a 30% increase in investment in innovative firms"* (Andrews & Criscuolo, 2013).

Another benefit of greater regulatory flexibility in product market regulation is higher employment. Criscuolo, Gal and Menon (2014) study 18 countries over a ten-year period. They find that small firms that are five years old or less contribute on average to about 42% of job creation. As noted in OECD (2015a, p. 86), *"such a disproportionally large role by young firms in job creation suggests that reducing barriers to entrepreneurship can contribute significantly to income equality via employment effects"*.

The impact of lifting anti-competitive regulations on income inequality is uncertain a priori. On the one hand, greater flexibility leads to higher employment; on the other, deregulation is also associated with greater wage dispersion. Using the OECD's summary index of product market regulation in seven non-manufacturing industries, covering energy, telecom and transport sectors, Causa, de Serres and Ruiz (2015) find a negative impact of stringent product market regulation on household disposable income. This result holds both on average and across the income distribution, leading thus to greater inequality. The authors interpret the finding noting that lower regulatory barriers to competition would *"tend to boost household incomes and reduce income inequality, pointing to potential policy synergies between efficiency and equity objectives"*.

Ennis and Kim (2017) investigate the relationship between competition and inequality. The authors calibrate a model to assess the redistributive effects of market power in eight countries.

They find that market power benefits the wealthiest households and that the share of wealth of the top 10% of households deriving from market power is between 10 and 24%. Further work on competition and inequality has found that market power increases the wealth of the richest 10% of the population by 12% to 21% for a range of reasonable assumptions about savings behaviour, while it reduces the income of the poorest 20% of the population by 14% to 19% (Ennis, Gonzaga, & Pike, 2017).

Product market regulation also has an impact on trade and foreign direct investment (FDI). Fournier et al. (2015) find that stringent national regulations, as measured by the economy-wide PMR index, have a negative impact on exports and reduce trade intensity (defined as trade divided by GDP). Heterogeneity in regulation across countries reduces trade intensity too. The benefits of convergence of product market regulation among EU member states would increase trade intensity within the EU by more than 10%. Fournier (2015) studies the impact of heterogeneous product market regulations in OECD countries. He finds that lowering regulatory divergence by one fifth could increase FDI by about 15%. The paper investigates specific components of the PMR index and concludes that command and control regulations and measures protecting incumbents (antitrust exemptions, entry barriers in networks and services) are especially harmful in reducing cross-border investments.

In the case of aligning EU competition policies, the following three principles have been identified as underpinning the key common pillars of competition policy (Gruda & Milo, 2010):

1. Competition protection and promotion constitute issues which concern not only the abuse of dominant position and concentration by private or public companies, but also the obstruction,

limitation or market power distortions caused by the public administration and regulators. Besides their implementation, good competition regimes should also comprise laws that also impose fines and sanctions for non-obedience.

2. Competition advocacy and the incorporation of the principles of competition authority experts have been used as recommendations and regulatory policies in the legal framework of infrastructure networks. In countries with extensive scope of State Owned Enterprises (SOEs) and significant involvement of the state in the economy, and in the absence of adequate regulatory expertise, supporting this practice could increase social welfare.

3. The institutional effectiveness and independence of national competition authorities has been enhanced in all EU countries in order to foster the administrative capacities and transparency of countries. Moreover, institutional independence increases the effectiveness of the appeals process in the courts, which in turn encourages innovative activities.

4.2.2. The pricing of pharmaceuticals and competition policy

Competition in the pharmaceutical sector can be perceived either within the same category of pharmaceutical products or across competing categories. The former is the case of price competition between products of the same category, either originators or generics (i.e. of Cournot type). The latter is the case of competition between originator and generic medicines, generally competing with each other in terms of quantities (i.e. of Bertrand type).

As prices are regulated by state-set rules, and marketing and advertisement are only limited to a few cases[2], the notion of competition in pharmaceutical markets departs significantly from that used in other markets. Yet, a narrow niche of the literature has looked at the various implications of government policies and market regulation for the pharmaceutical market. Other institutional papers and reports have explored the practical applicability and implications of pharma pricing policies in the EU and OECD member countries.

Since pricing and reimbursement rules for medicines are not harmonised at the EU level, the EU regulatory framework allows for substantial cross-country variations. Member States are free to develop their national pricing policies according to various price setting criteria and mechanisms (Vogler, 2012). Despite some EU harmonisation of rules governing the market authorisation procedures of medicinal products circulating in the internal market, price setting falls exclusively within the competence of national member states.

Despite the discrepancies, there are a few common principles that countries need to adhere to when deciding on their pharmaceutical pricing policy. According to the European Commission Working Group on Pricing and Reimbursement of Pharmaceuticals (European Commission, 2008), the implementation of national pricing and reimbursement practices of Member States should aim at achieving three core objectives:

[2] European legislation (EU Directive 2001/83/EC) forbids advertisement of prescription medicines altogether, while further restrictions have been found to be sometimes imposed to OTCs as well. See section 6.4 of OECD (2017b) for examples of restrictive provisions on marketing and promotion of pharmaceuticals in the Greek legislation, particularly related to OTC advertising and scientific events.

- Optimal use of resources to maintain a sustainable financing of healthcare, i.e. rational cost containment;
- Access to medicines for patients, i.e. cost affordability;
- Reward for valuable innovation, i.e. some protection of innovative medicines, particularly through patents and data protection periods.

In designing national pharmaceutical pricing frameworks and the overall approach for balancing these three objectives, Member States shall ensure that any national measure to control the prices of medicinal products or to restrict the range of medicinal products covered by their national health insurance systems complies with the requirements of Directive 89/105/EEC (Transparency Directive)[3]. This harmonised legal framework lays down procedural requirements setting specific time limits (90/180 days) for pricing decisions by national competent authorities and calling for the application of objective and verifiable criteria in pricing and reimbursement procedures.

These three objectives can be conflicting. For example, the reward and incentivisation of innovation may require that states regulate markets in a way that maintains high prices and profits for pharmaceutical companies. This, however, could hamper the access of patients to the drugs they need. At the same time, high prices could also translate into high reimbursement costs for the publicly financed health systems, leading thus to excess burden for public finances. If, on the other hand, prices are too low for companies to invest in R&D, expand their research departments and produce new cures with more cost-effective measures, a fraction of the local demand may not

[3] See art. 1 of Council Directive 89/105/EEC of 21 December 1988 relating to the transparency of measures regulating the pricing of medicinal products for human use and their inclusion in the scope of national health insurance systems (Official Journal L40, 11.02.1989), p.8-11. On 18 March 2013, the Commission adopted the amended Proposal for a Directive of the European Parliament and of the Council to replace the Transparency Directive providing, among others, for shorter timeframes in decision-making procedures, COM(2013)168final/2.

be met. Also, pharmaceutical companies may decide not to serve the market or choose to move to another country. The degree these objectives are jointly attained by a given intervention and the trade-offs between them often constitute a matter of analysis and research (see Espin and Rovira (2007) for a complete analysis of this).

The analysis of the incurred trade-offs is a stream of research towards which this paper aims to contribute. More specifically, the following sections primarily focus on the case of generics penetration through price competition with originator pharmaceutical products. In this respect, the present paper contributes to one of the less studied areas of public health policies, that of the trade-off between pharma pricing policies and competition.

Achieving the goal of patients' access to medicines is often achieved not only through the regulation of prices at affordable levels, but also through policies that foster generics penetration. These policies have been supported by many governments and international institutions. WHO (2012) estimates suggest that private sector savings from generics substitution, i.e. switching from originator brands to their lower price generics, could amount up to 89%.

Another stream of research has shown that market entry of generics competitors and price competition is negatively correlated with the degree of market regulation (Simoens, 2012). Despite the strict national regulatory framework on pharmaceuticals, optimal pricing policies should be designed in such a way that they would still allow for a certain degree of competition. In order to ensure the access of patients to affordable drugs, pricing policies should allow for generic alternatives that lower treatment cost. At the same time, they should stimulate innovation

in the sector through the incentivisation of R&D activities. In terms of pricing policies, this means potentially higher prices for innovative drugs that are under patent protection.

There are different techniques separately or jointly deployed to regulate maximum prices across the EU and the OECD. These include the external reference pricing, internal reference pricing, economic evaluation, cost plus pricing and profit ceilings (OECD, 2008). Espin and Rovira (2007) provide a comprehensive review of the various systems of pharmaceutical pricing applied across Europe. They find that cost-plus and direct product price setting are losing ground, while international price comparisons are gaining ground. They also argue that practices based on economic evaluation (like the Health Technology Assessment, HTA) and profit control are desirable, yet complex and costly in their implementation and assessment.

EU countries are acknowledged to deploy both demand and supply measures in regulating pharmaceutical markets. Those are often related to patents, market authorisation, and pricing and reimbursement frameworks (ECORYS Nederland BV, 2009). Governments may indirectly influence market conditions by creating or changing the incentive structure for different market actors. Espin and Rovira (2007) posit that governments do so by setting up or removing existing constraints to their behaviour, by providing certain goods, such as information, finance or subsidies, etc.

Governments may also use the tools of competition policy to mitigate the negative impact of externalities in pharmaceutical markets and market failures. Most relevant for the application and enforcement of competition policy is the case of market abuse through exploitative excessive pricing. This is mostly the case in markets where prices of pharmaceuticals are not regulated, such as the US one.

Research on the competition aspects of excessive pricing is scarce and relatively new. A recent work analysing the potential anti-competitive aspects of excessive pricing in pharmaceuticals was done by the OECD (2018), while an overview of the EU legal systems on excessive pricing is provided by Jenny (2018). Furthermore, due to the recent debate in the EU about competition distortions in various EU countries and issues of competition enforcement, the European Commission recently published a report providing an analysis of the various aspects of pharmaceutical and health policies that can be improved by the design and implementation of better competition policy (European Commission, 2019). It highlights cases of good enforcement practices and issues to be addressed that concern the particularities of each member country, how competition promotes access to medicines in the EU, how to optimally increase innovation in the sector and how to increase the choice of medicines for patients.

The present paper relates to a number of studies in the literature that evaluate the price and welfare outcomes of pharmaceutical reforms. For example, Granlund (2010) studies the effects of the 2002 generics substitution reform in Sweden. He concluded that the reform lowered average prices of pharmaceuticals between 5% and 14%, with the largest drop being that of brand-name pharmaceuticals facing generic competition. Aggregate annual consumer welfare gains were estimated at SEK 2.7 billion per year (approximately EUR 290 million). Using pharmaceutical price index data from 16 OECD countries, Buzzelli et al. (2006) estimated that substitution reforms lowered pharmaceutical prices by 3%. Watal (2000) and Chaudhuri et al. (2006) estimate the welfare implications of pharmaceutical patents enforcement in India, reporting significant losses.

This essay also extends the work done by international organisations and research institutions concerning competition and pharmaceutical markets in Greece. For example, the OECD has proposed since 2014 a number of recommendations related to the retail trade, manufacturing and wholesale trade of pharmaceuticals (OECD, 2014b; 2014c; 2017b). An important competition-enhancing reform proposed in 2013 concerned the liberalisation of retail channels for vitamins and dietary supplements. Following the adoption of the legislative change in 2014, the Centre of Planning and Economic Research (KEPE) carried out an ex-post assessment of this reform. The assessment found that the post-reform prices in supermarkets were significantly lower than e-pharmacies, which were in turn lower than those of pharmacies (KEPE, 2017). This partially showed the importance of competition even within regulated markets, like the pharmaceutical one.

4.3. Methodology and data

The research conducted for the purposes of this essay consists in a three-step approach:

The initial step aims at identifying provisions that could impede fair competition, i.e. potential barriers to competition, in the 2016 Greek legislation on pharmaceutical pricing. This is achieved by the deployment of the OECD Competition Assessment Checklist methodology and leads to the identification of the competition barrier, which lies in one or a combination of articles (OECD, 2017a). The identification of the barrier is followed by a simple legal analysis of the rationale that underpins the policy objective of the competition-restrictive provisions. Legal analysis is also used to showcase the complexity of the pricing system for both originator and generic pharmaceutical products. In doing so, we aim to understand what the legal framework foresees

for each case, and whether and how specific pricing rules can create controversies that distort competition. At the same time, the paper endeavours to complement the legal analysis with an economic one focusing on the economic characteristics of the sector and its performance in the recent years.

The second step consists in qualitatively assessing the potential impact that the barriers identified in step one could have on consumer welfare, otherwise referred to as harm to competition. In the case of pharmaceuticals, the objective of the policymaker translates into enhancement of generics penetration and access to medicines for patients. This is done through the deployment of a simple microeconomic model to analyse patients' incentives structure in the presence of the legislative barriers. By using the specific barriers identified in the first step, we derive the model solution that determines the prices of the various categories of competing drugs and could shift the choices between originator and generic pharmaceutical products.

The third and final step comprises a quantitative assessment of the welfare outcomes of the examined barrier(s) to competition through a simple model that examines the demand and supply decisions in regulated markets of two pharmaceutical products, an originator and its equivalent generic. The two equilibria, which represent the outcome of the implementation of the examined policy and its suggested alternative, are compared and the formulated policy recommendation is the solution of the stipulated welfare maximisation problem for the final consumers, i.e. the patients that need access to the examined categories of medicines.

The first two of these methodological steps are further developed in section 4.3.1, while the third step of research is further elaborated in section 4.3.1. Section 4.4 provides the core analysis of

both the economic and the legal research. It also explains the channels through which the specific reform and identified legal provisions impact the equilibrium of supply and demand in generics and originator medicines. Results and policy implications are discussed in section 4.5. Section 4.6 concludes.

4.3.1. Theoretical framework

For the identification of specific provisions that may limit or distort competition, this paper deploys the methodology developed and used by the OECD Competition Division for evidence-based policy recommendations in the field of competition. This is based on the OECD Competition Assessment Toolkit, which aims to help governments reduce the level of anti-competitive regulation (OECD, 2017a). It does so by showing how to identify regulations that unduly restrict market activities and by providing guidance on how to design regulations that more actively promote competition[4].

Building upon the OECD methodology, the paper sheds light onto the competition distortions that could be identified in the Greek pharma pricing legislation. Following the identification, we describe the potential impact of the generics re-pricing reform in the existing legislation, as well as the channel through which it may impact competition between generics and originators.

The methodology of the OECD (2017a) Competition Assessment Toolkit posits that detailed competition assessment should be conducted if a piece of legislation answers positively to any of the following questions:

[4] This toolkit examines the following four government restrictions on competition: restrictions on starting new businesses, regulation that affects the ability of businesses to compete, changing incentives of businesses and restricting consumer actions or information.

(A) Limits the number or range of suppliers

This is likely to be the case if the provision:

1. Grants exclusive rights for a supplier to provide goods or services

2. Establishes a licence, permit or authorisation process as a requirement of operation

3. Limits the ability of some types of suppliers to provide a good or service

4. Significantly raises the cost of entry or exit by a supplier

5. Creates a geographical barrier to the ability of companies to supply goods, services or labour, or invest capital

(B) Limits the ability of suppliers to compete

This is likely to be the case if the provision:

1. Limits sellers' ability to set prices for goods or services

2. Limits freedom of suppliers to advertise or market their goods or services

3. Sets standards for product quality that provide an advantage to some suppliers over others, or that are above the level that some well-informed customers would choose

4. Significantly raises costs of production for some suppliers relative to others (especially by treating incumbents differently from new entrants)

(C) Reduces the incentive of suppliers to compete

This may be the case if the provision:

1. Creates a self-regulatory or co-regulatory regime

2. Requires or encourages information on supplier outputs, prices, sales or costs to be published

3. Exempts the activity of a particular industry, or group of suppliers, from the operation of general competition law

(D) Limits the choices and information available to customers

This may be the case if the provision:

1. Limits the ability of consumers to decide from whom they purchase

2. Reduces mobility of customers between suppliers of goods or services by increasing the explicit or implicit costs of changing suppliers

3. Fundamentally changes information required by buyers to shop effectively

For the purposes of the present research, the application of the above-describe competition assessment checklist focuses on pharmaceutical pricing legislation. Hence, a legal analysis was rendered necessary. The legal analysis of the complex pharma pricing system exhibits characteristics of fragmentation and overlapping regulations. We aim at analysing the system of pharma pricing in Greece, as foreseen in the applicable 2016 legislation, while describing more in detail the provisions, which are found to be potentially competition-restrictive. Section 4.4.2 describes the policymaker objectives of reforms and the overall pharma pricing principles. It also develops the legal analysis and shows how the specific reform might go against the initial objectives and principles of the legislative initiative. Moreover, it shows how specific provisions of the reform, namely those related to the re-pricing rules for generics, might impede - instead of fostering - their penetration in the market, while limiting or vanishing any price competition advantage that generics have vis-à-vis originator medicines.

Following the identification of the legal provision that might act as a deterrent to competition between originator and generic medicinal products, the paper proceeds with an estimation of the welfare implications of the reform. The competition level examined concerns that between generic and originator pharmaceutical products, which are considered to be substitute goods. As both are based on the same active substance and undergo bioequivalence tests, the originator medicine and its generics are hereby treated as close competitors in the market. This assumption is in line with the WHO (2012), Granlund (2010) and the EC definition of generic medicinal products in art. 10, par. 2 of the Directive 2001/83/EC of the European Parliament and of the Council of 6 November 2001 on the Community code relating to medicinal products for human use[5].

The calculation of consumer welfare effects is done through a demand and supply analysis. Given the short-term price inelasticity of demand for pharmaceutical products, the demand curve is assumed to be perfectly vertical. The assumption is in line with the relevant literature (Yeung, Basu, Hansen, & Sullivan, 2018; Rattinger, Jain, Ju, & Mullins, 2008; Cox, 2009). This means

[5] Art. 10, par. 2 of the Directive 2001/83/EC defines reference and generic medicinal products as "*For the purposes of this Article: (a) 'reference medicinal product' shall mean a medicinal product authorised under Article 6, in accordance with the provisions of Article 8; (b) 'generic medicinal product' shall mean a medicinal product which has the same qualitative and quantitative composition in active substances and the same pharmaceutical form as the reference medicinal product, and whose bioequivalence with the reference medicinal product has been demonstrated by appropriate bioavailability studies. The different salts, esters, ethers, isomers, mixtures of isomers, complexes or derivatives of an active substance shall be considered to be the same active substance, unless they differ significantly in properties with regard to safety and/or efficacy. In such cases, additional information providing proof of the safety and/or efficacy of the various salts, esters or derivatives of an authorised active substance must be supplied by the applicant. The various immediate-release oral pharmaceutical forms shall be considered to be one and the same pharmaceutical form. Bioavailability studies need not be required of the applicant if he can demonstrate that the generic medicinal product meets the relevant criteria as defined in the appropriate detailed guidelines.*"

that the price change will have little effect on patients buying more or less of the same medicinal product, at least in the short run.

4.3.1. Empirical framework and data

We use granular microdata on pharmaceutical prices published by the National Organisation for Medicines (EOF) of Greece on the 4th of August 2016 (price bulletin). The combination of these detailed prices (by medicine barcode) and the 2015 quantities sold per product obtained from IMS Health allows us to estimate the total expenditure for the entire list of about 9700 drugs authorised and priced by EOF. This approach is in line with the WHO (2012) paper, which performs a cost minimisation analysis to estimate the savings that could be achieved from a switch of private sector purchases from originator brands to lowest-priced generics.

In order to understand the magnitude of the issue, these steps are preceded by an analysis of the key economic variable characterising the sector and its macroeconomic impact in the Greek economy. Wherever possible, we also analyse these in relation to the EU and OECD averages. The results of the analysis exhibit the relative importance of the sector in terms of turnover, value added, employment, and number of enterprises in the economy. The descriptive statistics are presented in section 4.4.1. As the key players in the pharmaceutical market comprise companies operating both in the manufacturing and the wholesale trade of pharmaceuticals, the same section also distinguishes between the two categories when presenting the figures and their evolution in the past few years.

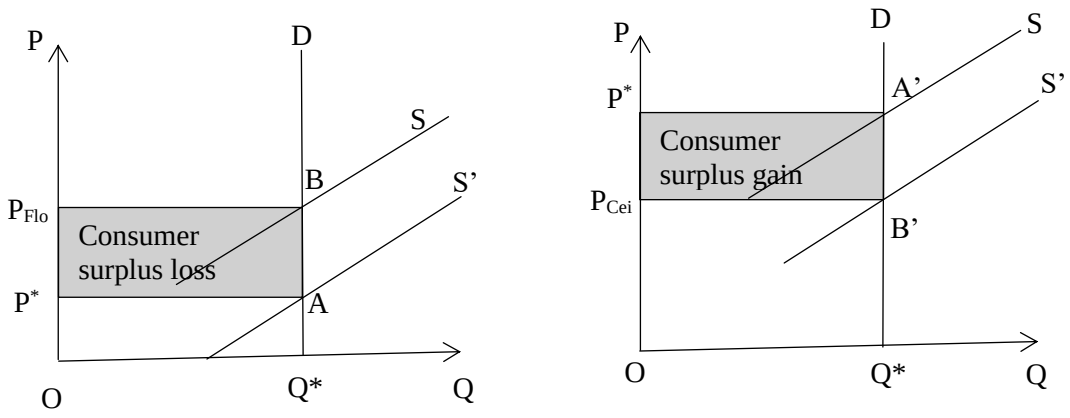
Given the public finance impact that a number of pharmaceutical reforms have, we need to have an understanding of the most important figures describing this impact. Hence, we include in

section 4.4.1 a cross-country comparison on the health and pharmaceutical spending as a share of GDP. The data used for this purpose are taken from the OECD Health Statistics database.

The following empirical framework is used to study the consumer choice and quantify the competition distortions of pharma pricing reform. First, as argued above, we calculate the total expenditure for any given prescribed and priced medicine by using IMS Health quantities (Q) and EOF prices (P). For the drugs the price of which has been impacted by the 2016 pharma re-pricing reforms, we estimate the total expenditure occurred as the product of price times quantity. We then use as counterfactual the hypothetical price that would have prevailed in the market without the specific reform. This is achieved in our analysis by using the general pricing rules of generics, as analysed in section 4.4.2 on the legal analysis. In order to estimate the welfare effects, we use the differential of the two expenditures, as analysed in Figure 4.1.

The figure below shows the two cases of how we estimate the surplus gain or loss for the consumers - in this case patients. For each drug, the vertical D curve shows the total quantity of that medicine prescribed and used. As argued above, this is assumed to be constant and inelastic at quantity level Q*. Regarding prices, we distinguish between two scenarios. In the first case, a specific price regulation sets a lower limit in the price of a medicine. We call this a *price floor* and note it as P_{Flo}. In the second case, a specific price regulation sets an upper limit in the price of a medicine. We call this a *price ceiling* and note it as P_{Cei}.

Figure 4.1 Estimating the consumer welfare effect of the 15% maximum price reduction cap



Both cases of price regulation would cause a deviation from the equilibrium achieved under the general pricing rule of generics. The outcome that would have prevailed without the policy intervention is also shown in the figure above (points A and A*). In this case, the price of a medicine would have been P*, as noted in both graphs. The importance of analysing the hypothetical and the real price of the medicine post-reform lies in the potential competition distortion that pharmaceutical pricing regulation might cause. As shown in the figure above, a price ceiling will create consumer surplus, while a price floor will decrease it, i.e. cause a negative welfare effect. In the following sections we show that in Greece the latter was the case.

The analysis focuses on prescription drugs, as their prices are explicitly regulated. In line with the literature analysed above, we make the simplifying assumption that demand is driven by doctors' prescriptions and is not responsive to prices in the short run. Due to the inelasticity characteristics of prescribed drugs, the demand curve is vertical and the quantity remains unchanged at Q*. The price of over-the-counter (OTC) medicines, which are not taken upon doctors' prescription, is not state-regulated in Greece, as in many EU countries.

In the first case (left graph), imposing a price floor moves the equilibrium from A to B, leading to higher drug price and, hence, to higher expenditure for consumers. In the second case (right

graph), imposing a price ceiling moves the equilibrium from A' to B', leading to lower drug price and, hence, to lower expenditure for consumers. The surface of the shaded area in both graphs equals the differential in the expenditure for the medicine. Summing over the entire sample of medicines affected by the provision, we can estimate the total welfare impact of the reform. In the case of the price floor, regulations incur a consumer welfare loss, while, in the case of a price ceiling they incur a consumer welfare gain. In the former case, the price cannot fall below the P_{Flo} level, while in the latter it cannot increase above the P_{Cei} level.

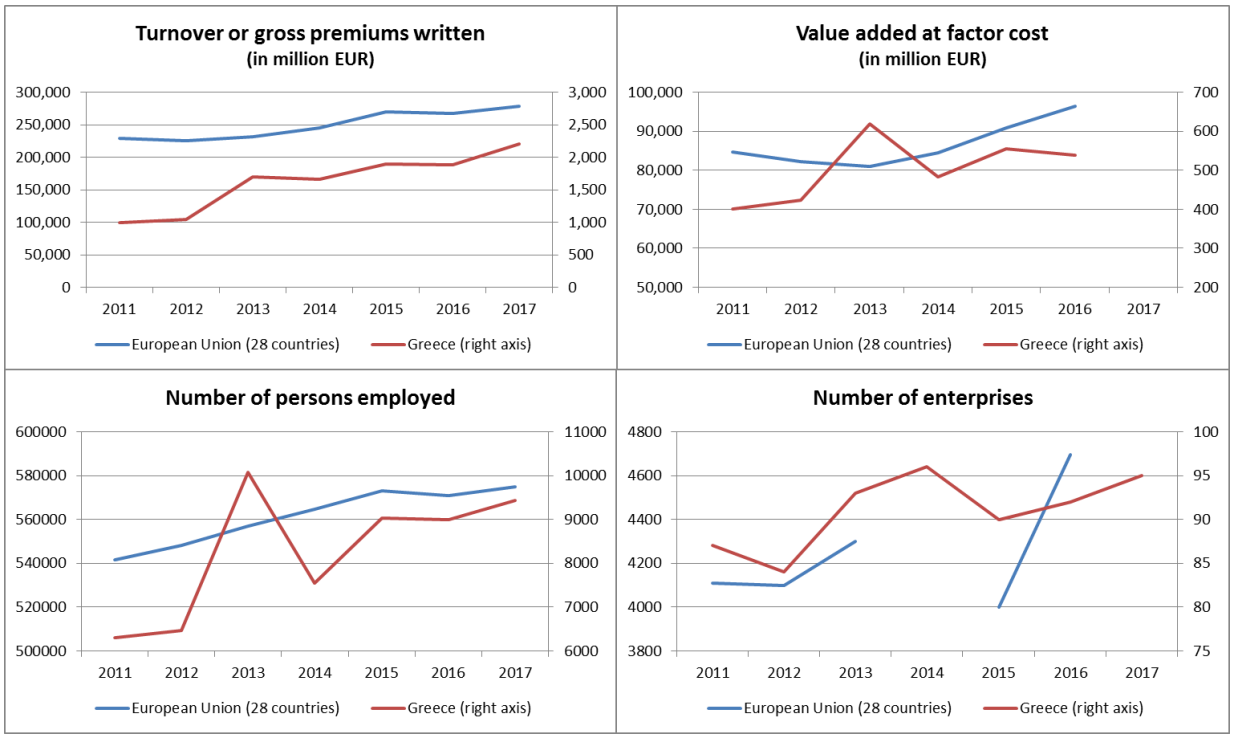
The present essay analyses and distinguishes between the pricing of originator and that of generic medicines. When the provision affects only the prices of one of the two categories, then it is inferred that it constitutes a competition-distorting provision. This implies that the provision provides for a differential treatment between the two categories of substitute pharmaceutical products. In order to evaluate the competition effects of the reform, the paper uses an analysis of the system of equations presented in section 4.4.3. Following the legal analysis of section 4.4.2, we present a series of relations between the prices of medicines, as foreseen in the Ministerial Decision 28408 of 2016. The aim of that section is to show that, in certain cases, the competition advantage of generic medicinal products may completely disappear due to specific provisions of the 2016 reform. The paper concludes by proposing an alternative pharmaceutical pricing policy that simultaneously achieves the two main policy objectives of the reform - cost containment of pharmaceutical products and generics penetration - while leaving the competition advantage undistorted.

4.4. The Greek pharmaceutical market and pricing policy

4.4.1. Sectoral economic characteristics

Despite the economic recession, economic activity in the manufacturing of pharmaceuticals sector has accelerated both in the EU and Greece. Between 2011 and 2017 the turnover or gross premium written increased in the EU28 by 21%. In Greece, Eurostat data show a turnover increase of the sector of more than 120%. Research and official data estimate the overall contribution of the sector in the GDP to be around 4% or about EUR 7.55 billion (SFEE, 2016). Exceeding the EU trend (+14%) for 2011-2017, the value added of pharmaceutical manufacturing increased by more than 34%, with a parallel 150% increase in the number of persons employed to almost 9,500 people.

Figure 4.2 Economic activity in the manufacturing of pharmaceuticals



Source: Eurostat

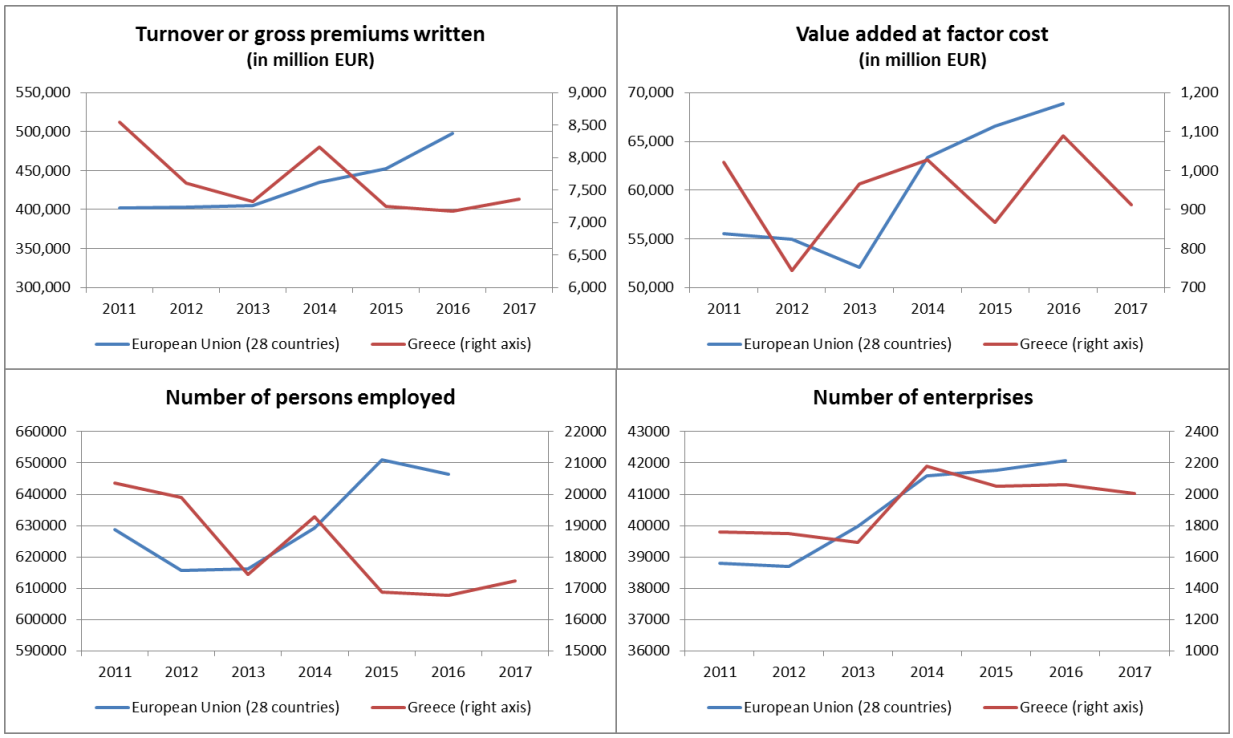
The number of pharmaceutical companies also increased from 87 in 2011 to 96 in 2014, which represents a slow increase compared to the 14% rise in the number of enterprises in the EU28. However, the employment effect of more than 3000 new job positions (50% increase) between 2011 and 2017 has outpaced the respective 6% increase across the EU28. Figure 4.2 shows that the sharpest increase in all four major indicators of economic activity took place in 2013 and 2017.

Mixed effects have been observed between 2011 and 2017 concerning the wholesale trade of pharmaceuticals (Figure 4.3). In 2016, Greece accounted for 1.4% of the EU28 turnover, 1.6% of the value added, 2.6% of the number of persons employed and 4.9% of the number of enterprises of this sector[6]. According to Eurostat, the turnover or gross premium written saw an increase of 24% in the EU28 between 2011 and 2016, whereas in Greece it declined by 16%.

A radical decline in the turnover of pharmaceutical companies took place between 2011 and 2013. As argued by Katseli (2020), policies of increased transparency and a systematisation of the pharmaceutical pricing decisions led to a rationalisation in the pharmaceutical prices. As a result, the Greek state saved in terms of annual pharmaceutical expenditure more than EUR 1.35 billion. Moreover, consumer, hospital and wholesale prices dropped on average by 20%.

[6] 2017 Eurostat data for the EU28 were not available by August 2019.

Figure 4.3 Economic activity in the wholesale trade of pharmaceuticals



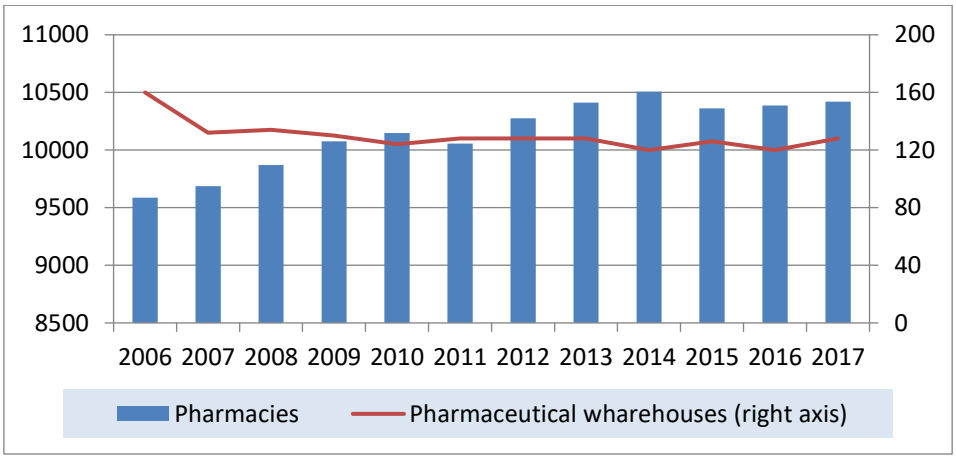
Source: Eurostat

Competition in terms of number of companies increased again after 2013. The number of pharmaceutical wholesale trade companies in Greece increased by 17%, while there was a decrease in the number of persons employed (-18%). The corresponding figures in the EU28 show an 8% increase in the number of enterprises and a 3% rise in employment. These resulted in a 24% increase in the value added of the wholesale trade of pharmaceuticals, and an equivalent increase (24%) in the total value added in the EU28.

Exports of Greek medical products come second in 2016, only to refined petroleum products. Exports cover some 20 per cent of the industry's turnover. In 2015, the Panhellenic Union of Pharmaceutical Companies reported that Greece exports its pharma products to more than 80 countries, including many uprising economies in Asia and the Middle East (Gill, 2017).

Wholesale trade of pharmaceuticals may be performed by Market Authorisation Holders (MAHs) and pharmaceutical warehouses. Retail trade, on the other hand, may be performed by pharmacies for prescription drugs. 128 out of the 2006 enterprises conducting wholesale trade were pharmaceutical warehouses. As seen in Figure 4.4, the number of pharmaceutical warehouses has slightly declined during the last decade, while that of pharmacies increased and then stabilised.

Figure 4.4 Number of pharmacies and pharmaceutical warehouses in Greece

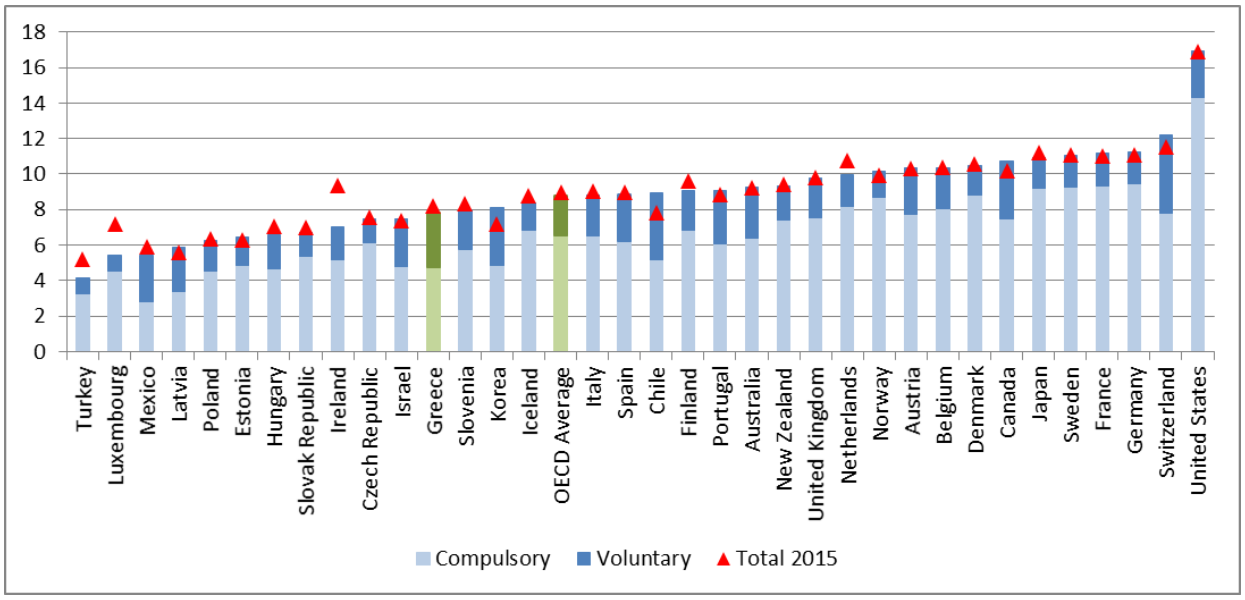


Source: Panhellenic Pharmaceutical Association - ELSTAT business registry

Pharmaceutical expenditure

People and governments devote significant fractions of their budgets to health and pharmaceutical expenditure. In Greece, total health spending remains below the OECD average (Figure 4.5). In 2018, the total of privately and publicly funded health expenditure stood at about 7.8% of GDP, lower than the 8.2% of 2015, and 1% below the OECD 2018 average (8.8% of GDP).

Figure 4.5 Expenditure on health as a share of GDP, 2018 & 2015



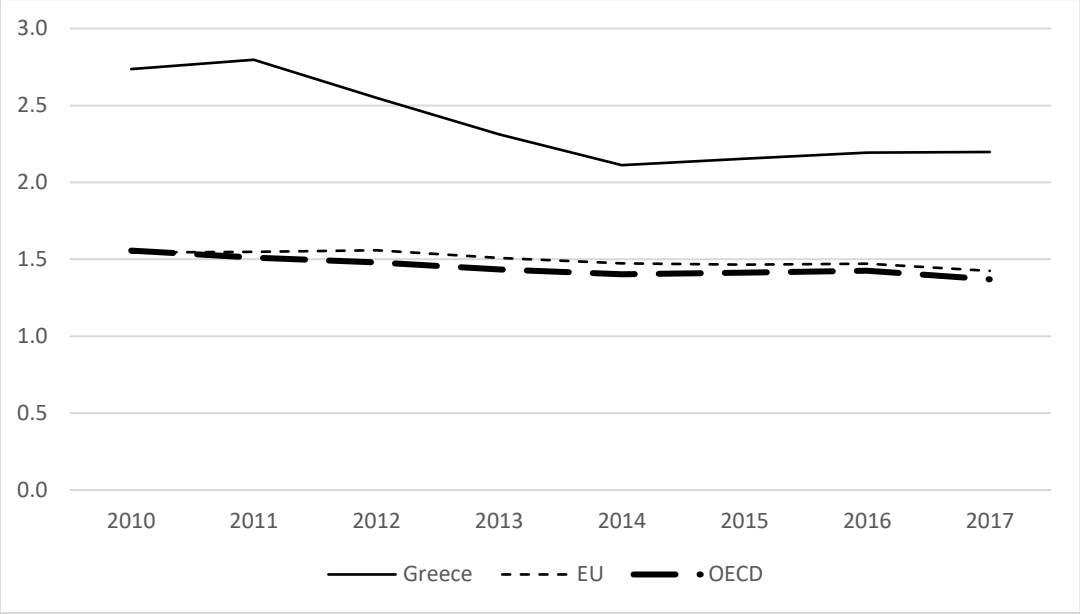
Source: OECD database (https://data.oecd.org/healthres/pharmaceutical-spending.htm)

In terms of social policy, Greece spends relatively little for its citizens' health. In 2018, government compulsory health spending per capita stood at USD 1348.8 per capita. It ranked fifth lowest among OECD countries, with only Chile ($ 1272.1), Latvia ($ 1003.7), Turkey ($ 957.1) and Mexico ($ 858.8) spending less. The ten countries with the highest spending surpass the threshold of USD 4000 per capita annually. Overall, about 60% of total spending came from government and compulsory contributory health care financing schemes, comprising about 4.7% of Greek GDP. This, in turn, constitutes the fifth highest level of private health spending to GDP (3.1%) among OECD member countries, after Switzerland, Chile, Korea and Canada (4.4%, 3.7%, 3.3 and 3.3% respectively).

A fraction of health spending is devoted to pharmaceuticals, while the rest is be devoted to hospitalisation and other related costs. Pharmaceutical spending as a share to GDP stood at 2.2% in 2017. This was the highest in the OECD and the fourth highest in the EU. In other OECD

countries, it ranged from 0.6% in Luxemburg to 2% in the United States, averaging at about 1.4% of GDP (Figure 4.6). Only three EU countries (Latvia, Hungary and Bulgaria) registered higher pharmaceutical expenditure to GDP than Greece. The application of the pricing regime of 2010 and the increased transparency led to a considerable fall of pharmaceutical expenditure from 2.8% of GDP in 2011 to 2.1% of GDP in 2014.

Figure 4.6 Pharmaceutical expenditure as a share of GDP, 2010-2017

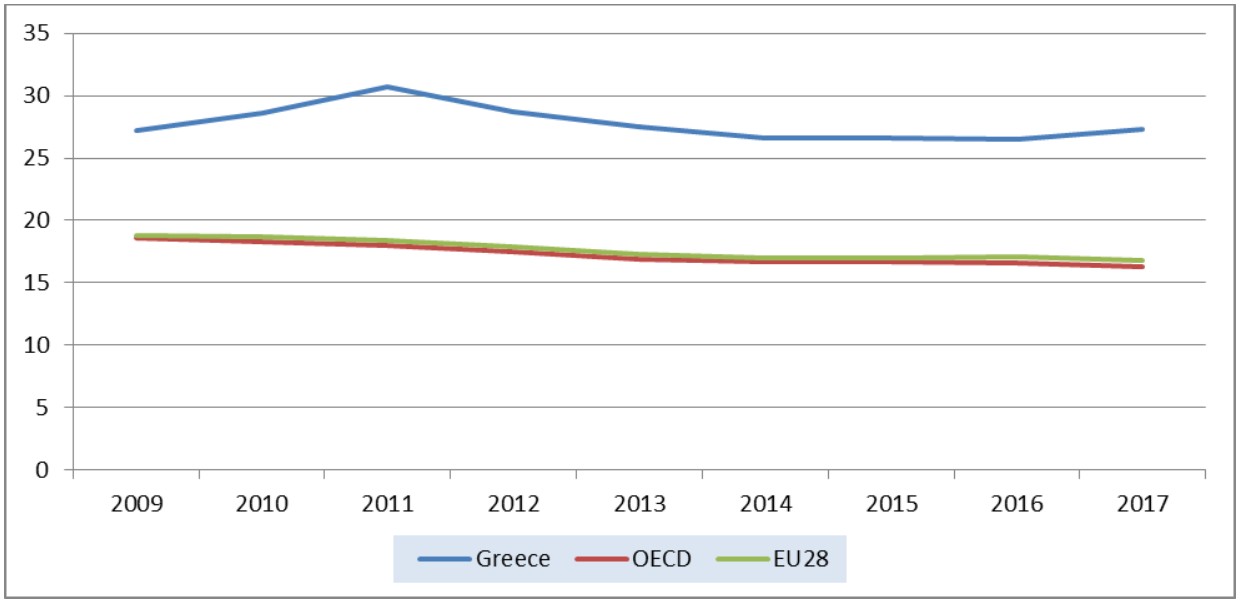


Source: OECD database (https://data.oecd.org/healthres/pharmaceutical-spending.htm)

Despite the decline in total and public health expenditure, the share of pharmaceutical expenditure in total health spending in Greece was relatively high in 2017. In this respect, Greece ranked third among OECD member countries, with only Hungary and Latvia surpassing it. Having reached its peak in 2011 (30.7% of total health expenditure) and started a downward trend since then, pharmaceutical expenditure accounted in 2017 for 27.3% of the total health expenditure. Yet, this remained almost double the equivalent figure of the OECD (16.3%) and EU averages (16.8%),

implying a relatively high fraction of health expenditure devoted to pharmaceuticals (Figure 4.7). Again, the application of the 2010 pricing regime and the increased transparency led to a drop in the pharmaceutical spending as a share of total health spending between 2011 and 2014.

Figure 4.7 Pharmaceutical spending as a share of total health spending



Source: OECD database and author's calculations (https://data.oecd.org/healthres/pharmaceutical-spending.htm)

4.4.2. Greece's legal framework and pharma pricing policy

Pharmaceutical expenditure and the issue of generics penetration have featured prominently in the policy agenda in Greece, with adopted measures including, inter alia, external reference pricing, generic substitution and international non-proprietary name (INN) prescribing. The significant and frequent changes in legislation during the crisis resulted both in the reduction of health expenditure and the shift of a big share of the burden from the public to the private sector (OECD, 2017b).

This section sheds light on the pricing and repricing procedures of pharmaceuticals in Greece and endeavours to codify the provisions used by the pricing legislation for the case of the competition analysis between generics and originators. Data and pricing rules refer to the situation in Greece as of August 2016.

Under Greek legislation, the prices of all prescribed medicinal products are explicitly regulated. The National Organisation of Medicines (EOF) prepares and issues semi-annually the drugs price bulletin, which sets the prices of all medicines[7]. The maximum manufacturer's price (ex-factory price) level is fixed by EOF. However, market authorisation holders are free to ask for a price lower than the maximum price set.

In the past, the practice of pharmaceutical pricing in Greece had often departed from the legal framework foreseen in legislation. Despite the external reference pricing framework foreseen by article 17 of Law 96/1973, Greece used to price drugs between 1997 and 2010 based on a small number of reference countries (Katseli, 2020). Reference prices were often provided by pharmaceutical companies to state authorities in charge of pricing, while the administrative procedure of pricing lacked adequate transparency. Given that no repricing procedure was taking place until 2010, Greece was one of the most expensive countries in this regard. Actually, by 2009, Greece was ranked as the third most expensive among EU countries concerning the prices of originator pharmaceutical products.

Substantial structural transformation of the sector was due to the enhanced transparency that Law 3840/2010 provided for. As a result of the implementation of this Law, Greece published for the

[7] Starting from 2018, the government decided to have only one re-pricing per year.

first time in August 2010 the complete list of pharmaceuticals' prices on the website of the General Secretary of Commerce. Moreover, it made the pricing methodology publicly available. This transparency and organisation reform led to annual savings in the pharmaceutical expenditure between 2009 and 2011 of about EUR 1.35 billion. More than 60% of the savings was owed to the rationalisation of prices (Katseli, 2020).

By 2016, Greece applied a combination of techniques in setting limits in pharmaceutical prices. In the context of the national legal framework in force as of August 2016, external price referencing[8] was applied to define the prices of originator[9] pharmaceutical products. Generics[10] entering the market received a price by reference to the originator product (generic price linkage[11]). The most important legal texts regulating prices of pharmaceuticals and the re-pricing procedures were the Legislative Decree 96/1973, Law 3918/2011, Law 4336/2015, 4337/2015 and Ministerial Decision 28408/2016.

[8] External price referencing or external price benchmarking is defined as the practice of comparing pharmaceutical prices across countries (OECD, 2008).

[9] Originator medicines are defined as the first version of a medicine developed and patented by an originator pharmaceutical company which has exclusive rights to marketing the product in the European Union for 20 years. An original product has a unique trade name for marketing purposes, the so called brand name (WHO, 2013).

[10] Generics are defined as pharmaceutical products which display the same qualitative and quantitative composition in active substances as well as the same pharmaceutical form as a reference medicine (originator pharmaceutical product) and whose bioequivalence with the reference medicinal product has been demonstrated by appropriate bioavailability studies. Generics can be classified in branded generics (generics with a specific 'invented' trade name) and unbranded generics which use the International Non-proprietary name and the name of the company. See Directive 2001/83, article 10, paragraph 2(b) and WHO Glossary of Pharmaceutical Terms (WHO, 2013).

[11] This is an internal reference pricing technique to regulate the price of generics entrance. Through this practice, the generic is priced at market entry at a discount by reference to the price of the original product (OECD, 2008).

Pursuant to the national pharmaceutical pricing framework, the expiration of the ten-year, or possibly eleven-year, data protection period[12] constituted the triggering point for a price change of the originator pharmaceutical products - the so-called for pricing purposes, reference products. During the data protection period, the maximum manufacturer's price (ex-factory) of the reference products was defined as the average of the three EU lowest prices for the same pharmaceutical product as to the active substance, pharmaco-technical form, strength and packaging. After the expiration of the data protection period, on condition that the first respective generic was placed in the Greek market, the ex-factory price of the reference product automatically decreased, either by 50% of the last price received within the data protection period or at the average of the three EU lowest prices, depending each time on which one was the lowest.

With regard to generic medicinal products, their price was defined at 65% of the price of the respective reference medicinal products after the expiration of their data protection period.[13] Initially, the generic linkage to a reference product circulating in the Greek market was attempted and at a second stage the National Organisation for Medicines sought to establish a relation with a reference product already marketed in the EU member states. The competition advantage of the generic vis-à-vis the originator pharmaceutical product lied in the price difference of 35%,

[12] The data protection period is provided for by article 11, par. 1 of the Joint Ministerial Decision ΔΥΓ3α/Γ.Π.32221/2013 transposing Directive 2001/83. According to Article 10 of the Directive, generic products must not be placed on the market until ten years have elapsed from the initial authorisation of the reference product. This ten year period may be extended to eleven if the conditions of the fourth subparagraph of Article 10(1) are fulfilled. The period of eight years from initial authorisation of the reference product refers to the so-called data exclusivity period of the reference product after which applications for generic products can be submitted and lead to the granting of a market authorisation. The period of ten years from initial authorisation of the reference product provides a period of so-called market protection after which generic products can be placed on the market.

[13] See Article 8, par.1 of Ministerial Decision 28408/2016.

established by law. Maintaining this price differential is key for the penetration of generics in the market and the ultimate goal of cost containment.

Lacking the possibility of a health technology assessment (HTA), Greece chiefly priced pharmaceuticals based on their prices in other EU member states, i.e. through external reference pricing. In broad terms, the pharma pricing framework can be split between first pricing and re-pricing decisions of EOF for three categories of products: patented medicines, off-patent reference products and generics[14]. The chosen rule aimed to set a price which equalled the average of the three lowest prices found for the same medicine in the EU member states. There were, however, several exceptions. If, for example, a medicine filed its first pricing request as "exclusively produced in Greece", with a file of clinical trials and R&D expenses, then its price would be the minimum between the sum of the two costs (clinical trials and R&D) and the price of a reference product in the same Anatomical Therapeutic Chemical (ATC) Classification System.

The Ministerial Decision 28408/2016 also foresaw that the price of a re-priced generic could not be lower than 85% of its own previous price. At the same time, generics were priced at the 65% of the re-priced off-patents. This implies that a sharp decrease in the price of the originator of more than 15% would not be followed by an equivalent drop in the price of the generic, maintaining thus the regulated competition advantage. Both medicines' prices are set equal at the former if the off-patent re-pricing rule leads to prices lower than those of the equivalent generics. This is a case where the competition advantage of generics vis-à-vis originator pharmaceutical products would decrease or completely disappear.

[14] See Ministerial Decision 28408/2016 for a full list of categories and exceptions.

The pricing rules foresaw all possible cases, while also providing for exceptions. A number of pricing rules were jointly used to determine the margins and price differences between competitors. For as long as pharmaceutical products are protected by their patent and within the data protection period[15], there is no generic competition of originators. Once the patent of originator medicinal products expires, generics may enter the market and compete them. The price of generics is generally linked to that of their reference originator products – once it becomes off-patent – and equals 65% of the price of the latter.

In the above-mentioned way of pricing, the competition margin between generics and their reference medicinal products is generally set at 35%. Both generics and off-patents are allowed to request lower prices in order to increase or lower the competition differential. However, in practice, pharmaceutical products rarely request lower prices than the proposed EOF prices, which serve as price anchors.

There is one case though when the Ministerial Decision 28408/2016 foresaw a cap in the price reduction that could take place in the repricing of generics that is found to have distorted competition between them and the originator medicinal products, the patent of which has expired. According to the bi-annual price revision procedure laid down in Article 8, paragraphs 2 and 3 of the Ministerial Decision 28408/2016, any price revision of generic medicinal products could not result in a price drop exceeding 15% of its previous wholesale price. In case the revision of a generic price resulted in a price higher than the price of the respective reference product whose

[15] The European legislation foresees a ten-year patent protection for originator drugs, during which no generic medicine can circulate in the market. This can be extended through a supplementary protection certificate (SPC).

protection period had expired[16], then the price of the reference product shall be defined as equal to the revised generic price. In addition, price reviews resulting in reductions shall apply solely to medicinal products with a retail price over €7.8, as well as to medicinal products with a Daily Treatment Cost exceeding €0.26 and up to that level.[17]

As stated in the provision itself, these specific pricing rules were introduced in the context of domestic regulations that promote the use of less expensive treatments and protect public health, in order not to jeopardise the supplies of medicines following price-revision in the Greek market. As regulators seek to balance an array of objectives not limited to cost-containment, it seems that this safety net of 15% maximum reduction aimed at preventing severe reductions of generics' prices. This is in line with the implementation of the national policy to provide incentives to the generics pharmaceutical industry and increase generics' penetration in the market.

In principle, the provision on the maximum price drop can lead to equal prices of generics and originators, completely eliminating thus any price competition between them. At the same time, it can keep prices above the level set by the external reference pricing rule, which links the prices of medicines in Greece to the three lowest ones of the EU. In this way, the provision may give rise to increased expenditure for medicines. This would entail, in turn, a loss in consumer surplus. The economic analysis of the competition, price and welfare effects is further elaborated in the following section.

[16] The European legislation foresees a ten-year patent protection for originator drugs, during which no generic medicine can circulate in the market. This can be extended through a supplementary protection certificate (SPC).

[17] For generics with a retail price exceeding EUR 12, dynamic pricing shall be implemented. More specifically, for each increase in sales corresponding to EUR 250,000 in wholesale prices in the year before the publication of the Price Bulletin, the prices defined shall be reduced, so that dynamic pricing is effected by 1% and up to 15%. (See Article 8, par.4 of Ministerial Decision 28408/2016).

4.4.3. Competition and welfare effects of generics re-pricing

The figures below compare the share of generics among OECD countries and showcase that their price in Greece is a relatively high compared to reference pharmaceutical products. This means that generics have a small price advantage compared to their off-patent reference products. In the following sections, we try to show this through a model of medicine prices which maps the legislation in place in 2016. For the calculation of the ratio of average prices, we have used the OECD Health Statistics 2015 data on the share of generics in terms of value (V_G) and in terms of volume (Q_G) in each country. We also note, for the purpose of this exercise, the average generics price by $\overline{P}_G$, the average price of any pharmaceutical product $\overline{P}_T$, and the value of all pharmaceutical products V_T.

Values are decomposed into quantity and price variables for the purposes of calculations. By deliberately simplifying, we decompose the V_G and V_T terms as follows:

$$V_G = Q_G * \bar{P}_G$$

$$V_T = Q_T * \bar{P}_T$$

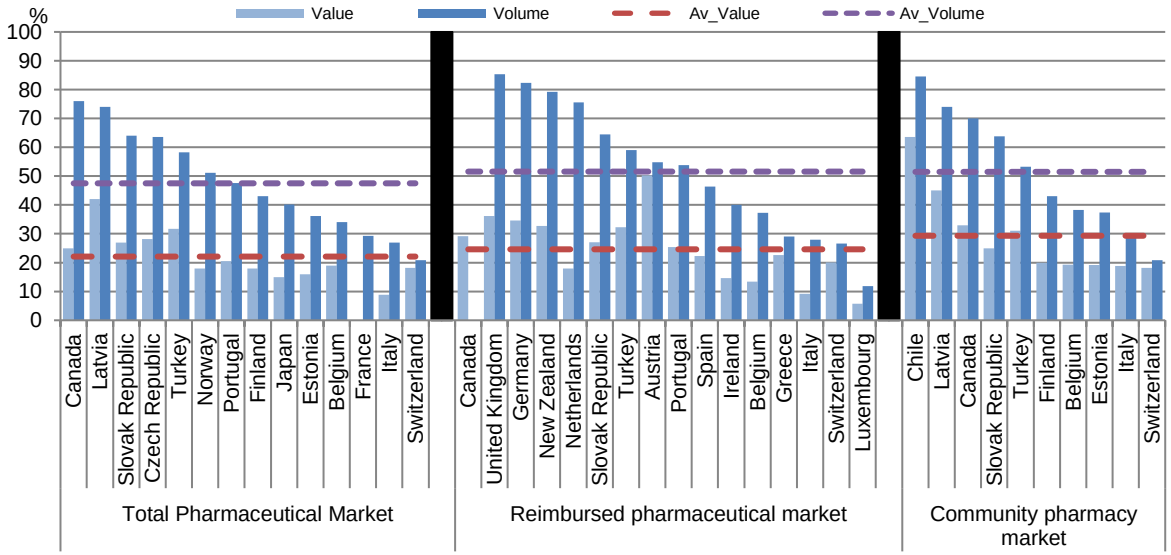
In order to estimate whether generics' prices in Greece are relatively high or low compared to off-patent medicines, we construct an index measuring the percentage difference between the average price of generics and average price of all pharmaceuticals (Equation 1). The difference $\overline{P}_T - \overline{P}_G$ will be in its numerator and the $\overline{P}_T$ in its denominator. We call this index the price advantage of generics (PA_G). By manipulating, we multiply and divide the numerator of the PA_G by Q_G and the denominator of the PA_G by Q_T. As shown in the following equation, PA_G can be expressed in

terms of the ratio between the value share of generics (V_G/V_T) and the volume share of generics (Q_G/Q_T). We can obtain the value of both these shares from the OECD Health Statistics.

$$PA_G = \frac{\bar{P}_T - \bar{P}_G}{\bar{P}_T} = 1 - \frac{\bar{P}_G}{\bar{P}_T} = 1 - \frac{\frac{Q_G * \bar{P}_G}{Q_G}}{\frac{Q_T * \bar{P}_T}{Q_T}} = 1 - \frac{\frac{V_G}{Q_G}}{\frac{V_T}{Q_T}} = 1 - \frac{\frac{V_G}{V_T}}{\frac{Q_G}{Q_T}} \quad (1)$$

To illustrate the components of Equation 1, Figure 4.8 presents the descriptive statistics for 2015 concerning the value and volume shares of generics in the OECD. Penetration of generics in the OECD averaged at about 23.7% of the total value of pharmaceuticals, ranging from 5.6% in Luxembourg to 58.7% in Chile. In terms of volume, generics penetration in the OECD averaged at about 49.5%, ranging from 11.3% in Luxembourg to 86% in the United States. Generics in Greece accounted in 2015 for 22.6% of the value and 23.9% of the volume sold, rendering Greece among the countries with the lowest penetration of generics both in terms of value and volume.

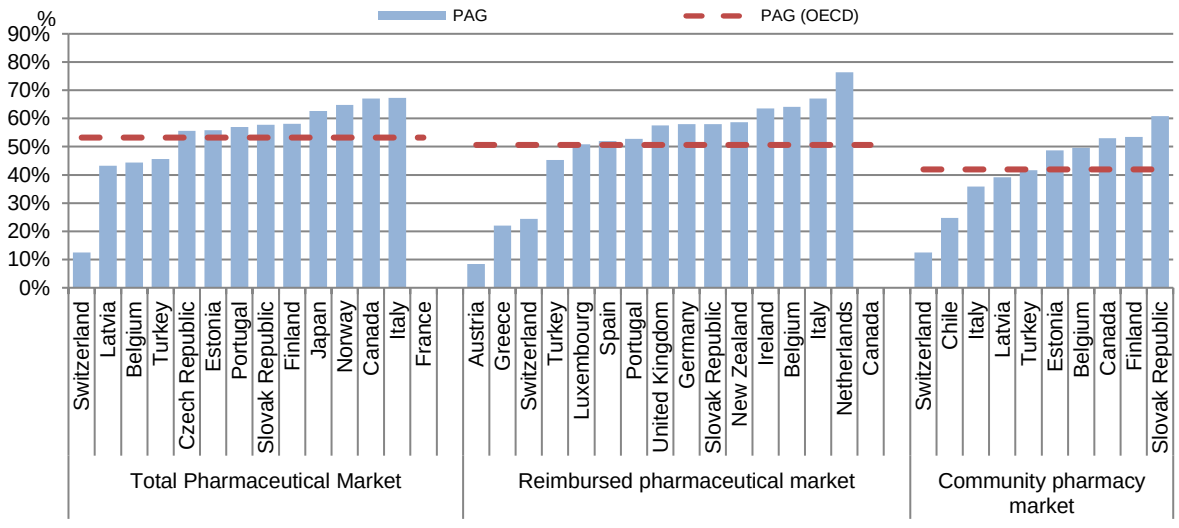
Figure 4.8 Share of generics in the total pharmaceutical market, 2018 (or nearest year)



Source: OECD Health Statistics

As next step, we estimate the price advantage of generics (PA_G), as shown in Equation 1. Results are presented in Figure 4.9. They show Greece ranking among the last countries concerning the price ratio of generics versus all pharmaceuticals. Moreover, we find that the PA of generics in Greece's reimbursed pharmaceutical market is considerably below the OECD average (about 50%). Only Austria is found to be lower. This means that competition between generics and originators in terms of prices is low on average compared to the other OECD countries. The figure below also suggests that the average actual PA of generics in Greece is even lower than the 35%, which is foreseen by law. This means that there could be exceptions from the law that allowed prices of generics to be closer to those of off-patent drugs. In the following sections, we argue and show that this was the case indeed, as competition distortive provisions have impeded the maintenance of the pre-defined – by law – price advantage of generics (35%).

Figure 4.9 Price advantage of generics, 2015 (or nearest year)



Note: 1. Reimbursed pharmaceutical market; 2. Community pharmacy market

Source: Author's calculations based on OECD Health Statistics 2015, (OECD, 2015b)

The following sections examine in detail how the 2016 policy reform on pharmaceutical pricing has created circumstances for limited price advantage of generics. We show that the findings concerning the low price advantage of generics is related to specific provisions of the pricing regulation, which might impede or distort competition between generics and originators. The legal analysis of the pharma pricing policy in section 4.4.2 showed that a distortion in the pricing of generics is due to the controversial clauses that simultaneously foresee:

1. A potential drop in the price of the off-patent reference product: The re-pricing of off-patent reference products links its post re-pricing price equal to the average of the three lowest prices found in the EU.
2. A standard generic price linkage rule: Set by law at the 65% of the off-patent reference product.
3. A cap in the price reduction of generics: The price of a generic cannot be lower than the 85% of its previous price.
4. A potential equalisation of the price of the generic and the off-patent product: If the 65% of the new price of the off-patent reference product (rule 2 above) turns out to be lower than the 85% of the previous price of the generic (rule 3 above), then the latter shall apply. In this case, both prices shall be equal.

In the light of these often-conflicting rules, we split the analysis in three scenarios, depending on the price drop in the EU and the subsequent depreciation of the off-patent product. The points of interest for our analysis would be those where the rule of external reference pricing leads to a decrease in the price of the off-patent reference product: 1) up to the 85% of its previous price; 2) between 85% and 55.25% of its previous price, and; 3) below 55.25% of its previous price. The

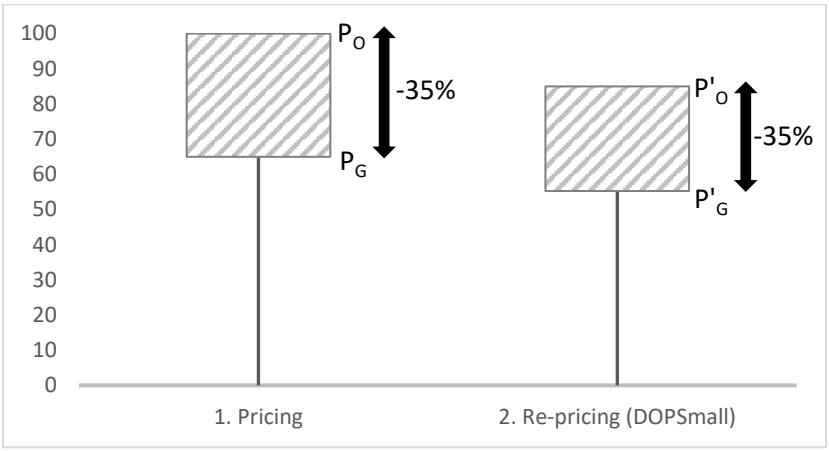
55.25% is calculated as the product of 0.65*0.85, where the 65% term refers to the initial price of its generic compared to the off-patent, i.e. the 35% price advantage of the generic, and the 85% to the minimum price the generic is allowed to receive after its repricing (15% maximum price drop). As the price of the off-patent is not allowed to fall below the price of its generic product, the 55.25% would be the resulting minimum price for the off-patent as well.

Scenario analysis

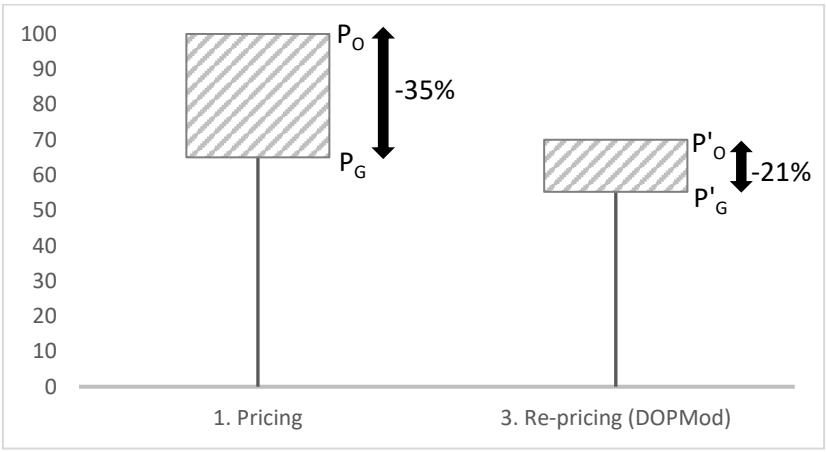
The three scenarios of the off-patent price drop may be linked to innovation activity in the sector and the pharmaco-technical categories. For example, depending on whether there has been a great innovation lowering the cost and price of the off-patent medicine, its price may fall accordingly. Figure 4.10 provides a schematic analysis of the three scenarios below. In line with the previous sections, we define the competition advantage of a generic medicinal product as the difference between the price of the off-patent reference product and its generic, expressed as a share of the price of the former. If generics are priced X% below the price of the originator, then competition advantage equals X%.

Figure 4.10 Scenarios of generics and off-patent repricing procedure

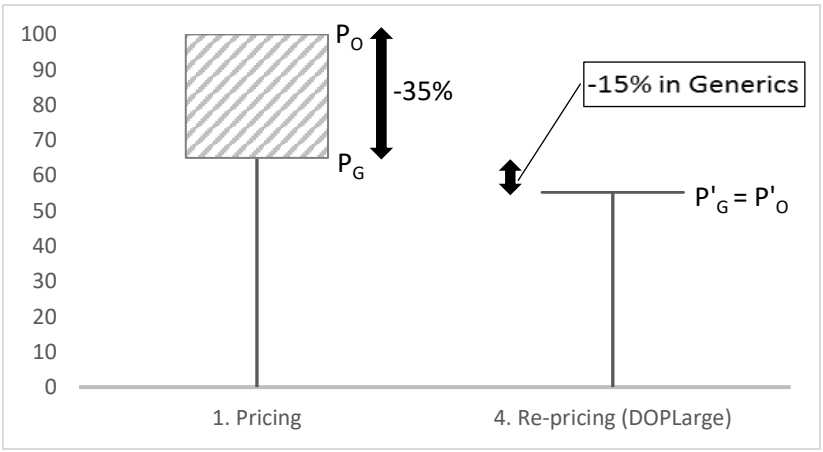
A. Small Off-patent depreciation ($\Delta P_O > -15\%*P_O$)



B. Moderate Off-patent depreciation ($-44.75\%*P_O < \Delta P_O < -15\%*P_O$)



C. Large Off-patent depreciation ($\Delta P_O < -44.75\%*P_O$)



Scenario 1: Small off-patent depreciation

In the first panel of Figure 4.10, we analyse the case of drugs re-pricing in the scenario of small depreciation of the off-patent medicine, which we define as a price drop (ΔP_O) between 0 and 15% in the average of the three lowest prices in the EU. In that case, the generics re-pricing rule would be just a proportionate readjustment of the price of the generic as 65% of the new price of the off-patent reference product. The price drop limit clause would not apply. Taking the case of a 15% price drop in the off-patent price (the same logic would apply for any other value of the depreciation between 0 and 15%), the competition advantage of the generic product vis-à-vis its reference product, would be calculated based on the following prices:

$$P'_O = 0.85 * P_O \quad (2)$$

$$P'_G = 0.65 * P'_O = 0.65 * 0.85 * P_O = 0.5525 * P_O \quad (3)$$

In that case, we calculate the Competition Advantage of generics before and after the re-pricing as follows:

1. Before: $\frac{P_O - P_G}{P_O} = 1 - \frac{P_G}{P_O} = 1 - \frac{0.65 * P_O}{P_O} = 1 - 0.65 = 0.35 = 35\%$ (4)

2. After: $\frac{P'_O - P'_G}{P'_O} = 1 - \frac{P'_G}{P'_O} = 1 - \frac{0.5525 * P_O}{0.85 * P_O} = 1 - 0.65 = 0.35 = 35\%$ (5)

We show thus that the pricing rule maintains in this case the same competition advantage as the general pricing framework, which is set at 35%. Hence, we prove that there exists no competition distortion in this scenario.

Scenario 2: Moderate off-patent depreciation

In the second panel of Figure 4.10, we analyse the case of drugs re-pricing in the scenario of moderate depreciation of the off-patent medicine, which we define as a price drop (ΔP_O) between 15% and 44.75% in the average of the three lowest prices in the EU. In the figure, we use for illustration and calculations purposes the case when the price drop of the off-patent reference product equals 30%. In this case, the generics re-pricing rule would not be just a proportionate readjustment of the price of the generic. Due to the application of the clause of a maximum 15% price drop, the new price of the generic would no longer equal 65% of the new price of the off-patent reference product. The competition advantage of the generic product vis-à-vis its reference product, would be calculated based on the following prices:

$$P'_O = 0.7 * P_O \qquad (6)$$

$$P'_G = max\,(0.65 * P'_O; 0.85 * P_G) = max\,(0.65 * 0.7 * P_O; 0.85 * P_G) =$$

$$max\,(0.65 * 0.7 * P_O; 0.85 * 0.65 * P_O) = 0.85 * 0.65 * P_O = 0.5525 * P_O \qquad (7)$$

In that case, we calculate the Competition Advantage of generics before and after the re-pricing as follows:

1. Before: $\frac{P_O - P_G}{P_O} = 1 - \frac{P_G}{P_O} = 1 - \frac{0.65 * P_O}{P_O} = 1 - 0.65 = 0.35 = 35\%$ (8)

2. After: $\frac{P'_O - P'_G}{P'_O} = 1 - \frac{P'_G}{P'_O} = 1 - \frac{0.5525 * P_O}{0.7 * P_O} = 1 - 0.79 = 0.21 = 21\%$ (9)

In this case, we have shown that the pricing rule leads to a smaller competition advantage than the 35% set by the general pricing framework. The non-distortion of the competition advantage

of generics would have required an equivalent price drop in the value of generics. In that case, following the general price-setting rule, their price would have equalled:

$$P'_G = 0.65 * P'_O = 0.65 * 0.7 * P_O = 0.455 * P_O = 0.455 * \frac{P_G}{0.65} = 0.7 * P_G \qquad (10)$$

This would have led to a price drop of generics equal to that of the off-patent, and the competition advantage would have remained unchanged at 35%.

Scenario 3: Large off-patent depreciation

In the third panel of Figure 4.10, we analyse the case of drugs re-pricing in the scenario of large depreciation of the off-patent medicine, which we define as a price drop (ΔP_O) of more than 44.75% in the average of the three lowest prices in the EU. In the figure, we use for illustration and calculations purposes the case when the price drop of the off-patent reference product equals 70%. In that case, the generics re-pricing rule would not be just a proportionate readjustment of the price of the generic. Due to the application of the clause of a maximum 15% price drop, the new price of the generic would no longer equal 65% of the new price of the off-patent reference product. The competition advantage of the generic product vis-à-vis its reference product, would be calculated based on the following prices:

$$P'_O = 0.3 * P_O \qquad (11)$$

$$\begin{aligned} P'_G &= max\,(0.65 * P'_O; 0.85 * P_G) = max\,(0.65 * 0.3 * P_O; 0.85 * P_G) \\ &= max\,(0.65 * 0.3 * P_O; 0.85 * 0.65 * P_O) = 0.85 * 0.65 * P_O \\ &= 0.5525 * P_O \qquad (12) \end{aligned}$$

Given that the pricing rule leads to a new price of the originator, which is below that of the generic, the rule stipulates an upward price increase for the off-patent and equalisation with that of the generic.

$$P'_O = 0.5525 * P_O = P'_G \qquad (13)$$

In that case, we calculate the Competition Advantage of generics before and after the re-pricing as follows:

3. Before: $\frac{P_O - P_G}{P_O} = 1 - \frac{P_G}{P_O} = 1 - \frac{0.65 * P_O}{P_O} = 1 - 0.65 = 0.35 = 35\%$ (14)

4. After: $\frac{P'_O - P'_G}{P'_O} = 1 - \frac{P'_G}{P'_O} = 1 - \frac{0.5525 * P_O}{0.5525 * P_O} = 1 - 1 = 0 = 0\%$ (15)

In this case, we have shown that the pricing rule leads to a smaller competition advantage than the 35% set by the general pricing framework, actually a complete nullification of it. The non-distortion of the competition advantage of generics would have required an equivalent price drop in the value of generics. In that case, following the general price-setting rule, their price would have been:

$$P'_G = 0.65 * P'_O = 0.65 * 0.3 * P_O = 0.195 * P_O = 0.195 * \frac{P_G}{0.65} = 0.3 * P_G$$

(16)

This would have led to a price drop of generics equal to that of the off-patent, and the competition advantage would have remained unchanged at 35%.

Generalisation of the model

The following section generalises the above-described scenarios in a model. Lemma 1 below shows the main source of the competition distortion identified in the three scenarios above. It derives analytically the optimal pricing policy to ensure competition neutrality. Lemma 2 shows that the new equilibrium of the outlined optimal pricing policy achieves the objective of industrial development without lowering further the minimum price of generics achieved under the previous pharmaceutical pricing reform.

As a first step, we present the following system of equations describing the relation between the price variables in the case when the price drop limit is imposed the way foreseen by the 2016 Greek pharmaceuticals legislation (as analysed in section 4.4.2). Here, we allow the price of the generic to fall by no more than a certain percentage, namely the price drop limit b. Hence, it would equal either $(1 - a)$ times the new price of the off-patent reference product P'_O, or $(1 - b)$ times its previous price P_G, depending on which one is larger. Moreover, the originator, which would normally take a price equal to the average of the three lowest prices found in the EU for the same product, $Average(P'_X, P'_Y, P'_Z)$, is in this reform not allowed to fall below the lower price of the repriced generic. We relate in our equation the average of the three lowest prices found in the EU for the same product as $(1 - i)$ times its previous price P_O. Formally, we have the following system of equations:

$$P_G = (1 - a) * P_O \qquad (17)$$

$$P'_O = \max\left[(1 - i) * P_O; P'_G\right] \qquad (18)$$

$$P'_G = \max\left[(1-a) * P'_O; (1-b) * P_G\right] \qquad (19)$$

In this model, the competition advantage of generics is not anymore guaranteed. Before the reform, it equals:

$$\frac{P_O - P_G}{P_O} = 1 - \frac{P_G}{P_O} = 1 - \frac{(1-a) * P_O}{P_O} = a \qquad (20)$$

After the reform, the prices of generic and off-patent pharmaceutical products depend on the values of the parameters. In order to solve for the new prices of generics and off-patent reference products, we use Equations 18 and 19, distinguish into the following cases, and replace the prices of generics and off-patent reference products in the equation of each other. Then, we get:

$$P'_G = \begin{cases} (1-a) * P'_O, & if \quad (1-a) * P'_O \geq (1-b) * P_G \\ (1-b) * P_G, & if \quad (1-a) * P'_O \leq (1-b) * P_G \end{cases} \qquad (21)$$

By rearranging the conditions, we get:

$$P'_G = \begin{cases} (1-a) * P'_O, & if \quad P'_O \geq \frac{(1-b) * P_G}{1-a} \\ (1-b) * P_G, & if \quad P'_O \leq \frac{(1-b) * P_G}{1-a} \end{cases} \qquad (22)$$

At the same time, the new price of the off-patent would be:

$$P'_O = \begin{cases} (1-i) * P_O, & if \quad (1-i) * P_O \geq P'_G \\ P'_G, & if \quad (1-i) * P_O \leq P'_G \end{cases} \qquad (23)$$

The competition advantage would disappear completely in the last case, when the degree of innovation in the off-patent product leads into a drop of its price below that of the repriced generic. The latter, in its turn, cannot fall below the threshold allowed by the price-drop cap b. Formally, the reform leads into no competition advantage of generics if:

$$(1 - i) * P_O \leq (1 - b) * P_G \qquad (24)$$

By replacing the initial price of generics, which is linked to the initial price of the off-patent, we get:

$$(1 - i) * P_O \leq (1 - b) * (1 - a) * P_O \qquad (25)$$

Or otherwise, by dividing both sides by P_O,

$$(1 - i) \leq (1 - b) * (1 - a) \qquad (26)$$

In these equations, the internationally determined degree of innovation and price drop i is an exogenous variable, while the prices of generic and off-patent products, P_O and P_G, are independent and given variables. The initial competition advantage of generics, a, is also deterministic and known. The only variable to be determined by the policy measure is the maximum allowed price drop of generics, b. Solving for b, we get:

$$b \leq 1 - \frac{(1 - i)}{(1 - a)} \qquad (27)$$

Firstly, in the case when the external pricing rule of the off-patent leads to a drop below the minimum level allowed by the repriced generics lower bound $(1 - b) * P_G$, but the condition that generics prices cannot be above those of off-patent products applies, i.e. $(1 - i) * P_O < (1 - b) * P_G$, then the prices and the competition advantage become:

$$P'_O = (1 - i) * P_O \qquad (28)$$

$$P'_G = \max[(1-a) * P'_O; (1-b) * P_G]$$

$$= \max[(1-a) * (1-i) * P_O; (1-b) * (1-a) * P_O]$$

$$= \max\left[(1-a) * (1-i) * P_O; \frac{(1-i)}{(1-a)} * (1-a) * P_O\right]$$

$$= \max[(1-a) * (1-i) * P_O; (1-i) * P_O]$$

$$= (1-i) * P_O * \max[(1-a); 1] = (1-i) * P_O = P'_O \quad (29)$$

According to Equation 26, the competition advantage of generics would completely vanish for any value of the parameter b which is below this threshold. If b is set equal to or below $1 - \frac{(1-i)}{(1-a)}$, then the competition advantage of generics after the reform becomes:

$$\frac{P'_O - P'_G}{P'_O} = 1 - \frac{P'_G}{P'_O} = 0 \quad (30)$$

In this case, $i > 1 - \frac{(1-b)}{(1-a)}$.

Secondly, in the case when $i \leq b$, then the prices of the off-patent and the generic would become:

$$P'_O = (1-i) * P_O \quad (31)$$

$$P'_G = \max[(1-a) * P'_O; (1-b) * P_G] = \max[(1-a) * (1-i) * P_O; (1-b) * (1-a) * P_O] = (1-a) * (1-i) * P_O = (1-a) * P'_O \quad (32)$$

According to Equation 26, the competition advantage of generics would then become:

$$\frac{P'_O - P'_G}{P'_O} = 1 - \frac{(1-a) * P'_O}{P'_O} = a \quad (33)$$

This equals the initial competition advantage of generics before the repricing, meaning that the reform has no competition-distorting impact when the parameter b of price drop limit for generics is larger than the parameter i of the internationally determined off-patent price drop.

Lastly, in the case when $b \leq i \leq 1 - \frac{(1-b)}{(1-a)}$, then the prices of the off-patent and the generic medicines would become:

$$P'_O = (1 - i) * P_O \qquad (34)$$

$$P'_G = \max[(1 - a) * P'_O; (1 - b) * P_G] = \max[(1 - a) * (1 - i) * P_O; (1 - b) * (1 - a) * P_O] = (1 - a) * (1 - b) * P_O = (1 - b) * P_G \qquad (35)$$

According to Equation 26, the competition advantage of generics would then become:

$$\frac{P'_O - P'_G}{P'_O} = 1 - \frac{(1 - a) * (1 - b) * P_O}{(1 - i) * P_O} = 1 - \frac{(1 - a) * (1 - b)}{(1 - i)} \qquad (36)$$

This is smaller than the initial competition advantage of generics before the repricing (a), as $(1 - b) \geq (1 - i)$. This means that the reform leaves some competition advantage for generics, but lower than that of the second case above and the competition advantage pre-reform.

Alternative scenario

This section offers an alternative pricing rule that would limit the price drop, as intended by the policy objective, while leaving the competition advantage unchanged.

Lemma 1: Imposing the price limit in the price of the originator rather than that of the generic would have left the competition advantage of the latter unchanged.

An alternative for the maintenance of the 35% competition advantage could have been the setting of any limit in the price drop in the price of the off-patent product, instead of that of the generic. In this scenario, the price linkage would have remained unchanged, as the price of the generic is linked to that of the off-patent medicine and competition between the two would have remained undistorted. It should be noted that the objective of the policymaker, which consists in ensuring the presence of products in the market through a sufficiently high price, would be adhered to.

Proof:

In order to show the validity of Lemma 1, we proceed by creating a model of price linkage and impose a policy shock, which would reform the pricing rule through a limit in the price drop of the off-patent reference pharmaceutical product.

$$P_G = (1 - a) * P_O \qquad (37)$$

$$P''_O = \max\left[(1 - b) * P_O; (1 - i) * P_O\right] \qquad (38)$$

The exogenous variable in this system of equations is the initial price of the off-patent product, which is determined by the three lowest found for the same product in the EU. In this case, the coefficient a would denote the initial price advantage in the pricing linkage between generics and their off-patent reference products. In order to ensure that the competition advantage this price gives to generics is not distorted, the new policy rule should ensure that a remains unchanged, i.e. that:

$$P''_G = (1 - a) * P''_O \qquad (39)$$

or

$$\frac{P''_G}{P''_O} = \frac{P_G}{P_O} \qquad (40)$$

Then, the competition advantage before the reform would be:

$$\frac{P_O - P_G}{P_O} = 1 - \frac{P_G}{P_O} = 1 - \frac{(1-a)*P_O}{P_O} = a \qquad (41)$$

The competition advantage after the reform would be:

$$\frac{P''_O - P''_G}{P''_O} = 1 - \frac{P''_G}{P''_O} = 1 - \frac{(1-a)*P''_O}{P''_O} = a \qquad (42)$$

We show thus that this rule leaves the same competition advantage for generics, regardless of the values of coefficients b and i.

Lemma 2: The new equilibrium ensures that prices do not fall below the current levels.

At the same time, the rule should ensure that prices for generics producers are sufficiently high, so that they do not fall below the threshold chosen by the regulator. In the current policy rule, the lowest prices of both generics and off-patent reference products equal $(1-b)*P_G$.

Proof:

If we follow the alternative rule, the new price of generics and off-patents would equal:

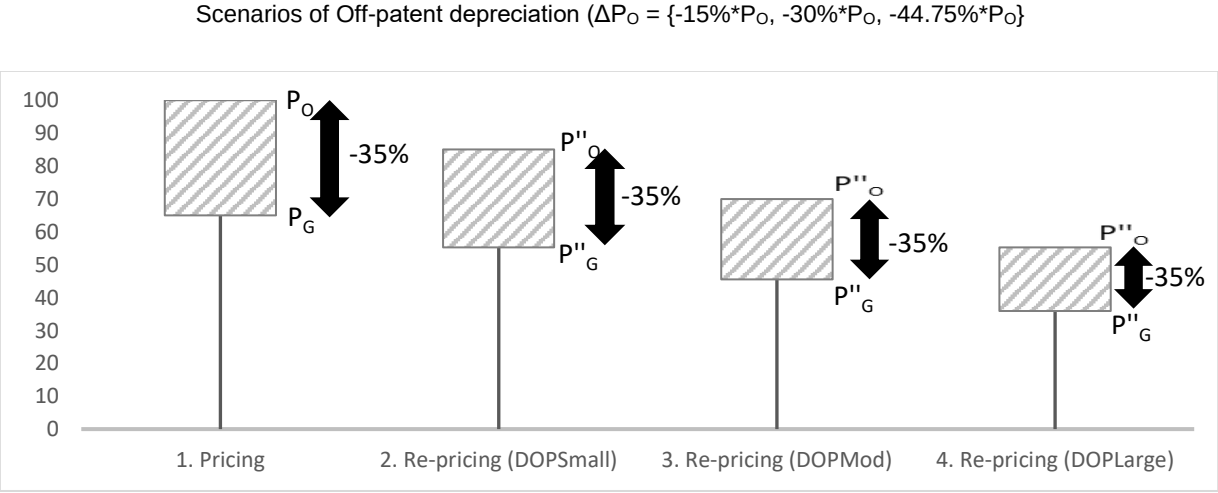
$$P''_O = (1-b)*P_O \qquad (43)$$

$$P''_G = (1-a)*P''_O = (1-a)*(1-b)*P_O = (1-b)*P_G \leq P''_O \qquad (44)$$

In the initial model, both prices can fall no lower than the minimum threshold $(1 - b) * P_G$. Compared to the initial model and reform with the price drop limit imposed on generics, both minimum prices of the alternative model are at least as high. We have proved thus the second lemma, which we also show schematically in the figure below for the cases of small, medium and large price drops in international reference prices. We note that in all scenarios the competition advantage of generics remains the same. Hence, the reform is shown to be able to achieve the cost containment policy objective without any competition distortion.

We show schematically the scenarios of the alternative repricing policy in the graph below. As proved mathematically above, the price advantage of generics would remain constant at 35%, under any chosen scenario. Similar to the scenarios of generics and off-patent repricing procedure of Figure 4.10, the three repricing examples shown below refer to the prices that off-patent and generic products would be assigned in the scenarios of the off-patent's price drop of 15%, 30% and 44.75% respectively. The equivalent percentual decrease of the price of generics that is achieved under this rule provides for a competition-neutral outcome of the pricing reform.

Figure 4.11 Alternative of generics and off-patent repricing procedure



The following section provides the results of our estimations concerning the competition effect of the reform in terms of higher pharmaceutical expenditure for patients. As explained in the methodology section above, we approximate this by using the real prices of all prescribed medicines and their sold quantities in 2015. The results quantify the loss of consumer welfare that was the result of the specific pricing reform, compared to the price that would have prevailed by using the general rule used until then, i.e. the average of the three lower prices for the same product in the EU.

4.5. Results and policy implications

By placing a cap (15%) on the price reduction of generics and, in some cases, by increasing the prices of the reference off-patent products, we show that their prices are higher than what would otherwise be based on the reference pricing scheme. Based on the August 2016 price revision, there were 2,489 (out of the 9,523 prescription drugs priced in total by EOF) affected by this provision, or roughly 26% of the total number of prescription drugs. If one compares the final wholesale price assigned to these products to the wholesale price that would have prevailed given the 65% reference pricing rule, then the mean difference between the two prices across all products would be EUR 5.58 (with a range from 0.15 in the 5th percentile to EUR 12.53 in the 95th percentile, as shown in row 1 of Table 4.1). This means that, on average, the prices of the 2,489 affected drugs were about EUR 5.58 higher than the average of the three lowest prices found in the EU for the same products.

Table 4.1 The distribution of price difference in wholesale price of affected medicinal products

	Mean	Standard deviation	Percentile 5%	Percentile 10%	Median	Percentile 90%	Percentile 95%	N
Price Difference	5.58	29.96	0.15	0.26	1.14	7.83	12.53	2 489
Price difference weighted by quantity sold	1.63	1.85	0.05	0.06	0.72	4.06	5.89	1 330
Quantity (2015)	19 963	56 854	23	85	4 547	49 928	83 088	1 330

If the 15% maximum price reduction cap were to be abolished or not imposed, the new equilibrium would have been at a lower level. According to legislation in place, the new price level would not only be 15% below the previous price, but also equal the simple average of the three lowest prices of the same pharmaceutical product in the EU28. In the left graph of Figure 4.1, this is point A. The average regulated price would have fallen to P*, whereas the quantity would have remained constant at Q* (due to the inelasticity assumption).

To calculate the impact on consumer welfare we use detailed (drug barcode level) information on the sales of the affected products in 2015. As shown in row 2 of Table 4.1, which contains the price difference weighted by quantity sold, many of the affected drugs were priced but had no sales in 2015. Hence, the weighted mean difference across the sales values of all products is lower than shown in row 1. The weighted price difference is EUR 1.63, with a range from 0.05 in the 5^{th} percentile to EUR 5.89 in the 95^{th} percentile. At the same time, average sales for these drugs were 19,963 units ranging from 23 in the 5^{th} percentile to 83,088 in the 95^{th} percentile, as shown in row 3 of Table 4.1. Using these two numbers we can estimate the consumer welfare loss (as shown in the left graph of Figure 4.1) for each affected drug, assuming that the demand and the supply will be unaffected, at least in the short run. By placing a restriction on the price reduction

of the generic drug and by equating them to the off-patent products, the provision deprives the former of their price advantage compared to the original product, leaving little room for competition. Taking into consideration the real prices and quantities, the total consumer welfare loss due to maximum price reduction cap is estimated to be EUR 43 million. This constitutes an estimate of the exercise we conducted to quantify the competition-distortion effect of this regulation. This regulation is proved to be able to limit the price advantage of generics vis-à-vis off-patent pharmaceutical products, partly explaining thus the policy challenge of low generics penetration.

4.6. Concluding remarks

Given the considerations above, this paper shows that complex pricing systems of pharmaceutical products can potentially distort the objective of policies or lead to opposite results compared to the intended one. The 15% threshold was introduced in the Greek pharmaceutical pricing legislation with the aim to promote the use of generic products and to secure the supply of medicines in the Greek market. However, we show both theoretically and empirically that the provision has artificially distorted competition between off-patent and generic medicines, which comes with a significant cost to consumers. First, the provision incurs a welfare loss to consumers. Second, it reduces the scope for competition between generics and off-patent drugs. Instead of serving the objective of achieving a higher volume use of generics, the provision limits the incentives of patients to choose generics over off-patent products already circulating in the market. Since the law may sometimes provide for equal prices in off-patent products and generics, it

deprives the latter of their price advantage compared to the originator products, leaving no room for competition and further market penetration.

We show that an alternative way of achieving the policy maker's objective of cost containment would be the introduction of a maximum threshold for off-patent medicines price reductions during the re-pricing procedure. The suggested threshold follows the rationale of the 'generic price linkage', previously applied for the pricing of generics. As a result, price reductions of generics would follow the respective reductions of their off-patent reference medicines, ensuring thus both the competition advantage of the former and the continued presence of off-patent and generic medicines in the market.

Various extensions of this research could further contribute to exploring the link between pharmaceutical policies and competition. Challenging the price elasticity assumption opens up a number of paths for future research. A limitation of this paper relates to the fact that quantities of medicines sold are considered insensitive to price changes – due to doctor's prescriptions and at least valid for an analysis in the short run – leading thus to no change in the consumption of drugs. However, the existence of both originator and generic competitors in the pharmaceutical market for a long time, along with generics substitutions policies and awareness-raising campaigns, may render patients more price sensitive. For example, Frank and Salkever (1992) assert that the effect of generic competition changes significantly when consumers become more price sensitive. Estimating welfare effects of similar policies under price sensitivity conditions constitutes a topic for further research.

Other research extensions could go into the direction of non-competition effects of this reform. One could investigate, for example, whether the competition distortions and any potential consumer welfare loss could be compensated by equivalent or larger increase in the surplus of

producers. In the same spirit, it could be useful to further research whether the relatively high pharmaceutical expenditure is due to artificial demand, over-prescription of Greek doctors, over-consumption of Greek patients or high prices. These would fall mostly under the domain of health economics research and can have extensions beyond the competition policy focus of this essay. Another desirable potential outcome that deserves to be researched is whether some stimulus in the dominant firms through higher prices for domestic companies leads to more innovation, more patenting activity and leaders in the sector. This could open a discussion about the policy on the distribution of gains through taxation and reimbursement policies.

Lastly, a third potential direction of further research could lie in the welfare effects of similar reforms in other countries. Given that Greece is home to generics, mostly, companies – while it imports the originator medicines – a similar price cap reform could be welfare improving for countries where the industrial base of the pharmaceutical sector consists of companies producing originator medicines and generics penetration is low.

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About the author

Dr. Panagiotis Barkas is an academic economist and policy analyst, whose work and research focuses on the design and implementation of economic policy, at both national and international level. His research and policymaking interests comprise international trade and industrial organisation, with a special focus on competitiveness, investment and competition policy.

Dr. Barkas has contributed to research projects in the areas of trade and international economics, economic policy and reforms, sectoral competitiveness and the political economy of innovation financing. He has worked as research associate and assistant at the Max Planck Institute for the Study of Societies in Cologne, Germany, the Division of International Economics and Development of the University of Athens (under Prof. Panagiotis Petrakis) and the Foundation for Economic and Industrial Research (under Prof. Yannis Stournaras), while also held two teaching assistantships in financial markets and corporate finance at the University of Athens.

Beyond academia, his professional experience extends into international organisations and institutions in France, Switzerland and Greece, while he has actively participated in policy missions of international organisations in Albania, Greece, Kosovo, Kuwait and Tunisia. Panagiotis is one of the twelve selected participants of the 2020 cohort of the Young Professionals Programme of the World Trade Organization (WTO). He joined the Trade in Services and Investment Division in January 2020, where he supports the policy and research work of the WTO Secretariat on domestic regulation, Council notifications, services trade policies in the travel, tourism, transport, e-commerce, financial sector, etc. He also conducts research on the impact of Covid-19 on services trade, travel and tourism policies across WTO member countries. Prior to joining the WTO, Panagiotis held various positions as Junior Economist and Policy Consultant at the Organisation for Economic Co-operation and Development (OECD). Between 2014 and 2016, he supported the work of the OECD South East Europe Division in designing policy frameworks for innovation and social innovation in Albania, Croatia and Kosovo. He is also a co-author of the first OECD Competitiveness Outlook for the South East Europe region. Panagiotis then moved to the OECD Competition Division of the Directorate for Financial and Enterprise Affairs, where he worked as OECD official staff on competition policy issues in Greece (2016) and Tunisia (2018-2019). Panagiotis also worked in the OECD Directorate for Science, Technology and Innovation, as well as the OECD Economics Department, in conducting research on innovation policy in Kuwait, as well as investment and product market regulation in Greece.

Panagiotis Barkas holds a Master of Philosophy (MPhil) degree in Finance and Economics from the University of Cambridge (St. John's College). He also graduated with a first class honours degree as class valedictorian from the Faculty of Economics of the National and Kapodistrian University of Athens. He fluently speaks six languages, and is the recipient of more than fifteen scholarships, grants, and awards.

Dr. Panagiotis Barkas successfully defended the present thesis and was awarded the title of Doctor of Philosophy in Economics by the examining committee of the Faculty of Economics of the National and Kapodistrian University of Athens with excellent grade on July 20th, 2020.