



UNIVERSITY OF PIRAEUS
SCHOOL OF ECONOMICS, BUSINESS AND INTERNATIONAL STUDIES
DEPARTMENT OF ECONOMICS

**Competitiveness and Economic Growth in E.U.: Clusters and
Spillovers**

Ph.D. Thesis
Spyridon Kyriazis

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To my family

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Abstract

This study thoroughly examines the complex interconnections among competitiveness, economic growth, corporate investments, and the dynamics of the global economy. In recent decades, the global competition paradigm has experienced significant changes, which have had an impact on business productivity, market structures, and macroeconomic results. The investigation, utilizing diverse data sources, elucidates the different levels of competition and their effects on the performance of enterprises and the market structures of sectors worldwide.

The first chapter focuses on an empirical analysis that highlights the significance of competition in driving economic growth. The study examines the effects of competition on the distribution of resources, the development of new ideas, and the rate of productivity improvement. Actually, the findings indicate that more competition improves allocation of resources, which in turn stimulates investment and innovation, ultimately driving economic growth. Nevertheless, the study also recognizes the possible drawbacks of unrestricted competition, such as heightened market consolidation and concerns regarding efficiency. The empirical data demonstrates substantial disparities in profitability and market configurations among various sectors and countries, providing valuable understanding of how competition influences the business environment.

Moreover, the study examines the relationship between competition and macroeconomic performance. This section provides a thorough analysis of how competition within the domestic market stimulates innovation and technical progress, ultimately impacting the overall economic well-being. It posits that strong rivalry amplifies market dynamics, hence incentivizing corporations to allocate resources towards research and development. Furthermore, it explores the correlation between competitiveness, innovation, and growth policies. The complex nature of government interventions and their varying effects, emphasizing the compromises between market concentration and efficiency are investigated. The analysis highlights the importance of adopting a well-rounded approach in policy-making to foster inclusivity and ensure long-term, environmentally-friendly economic development.

The second chapter provides observations regarding the significance of competition in regional markets. The text emphasizes the importance of implementing more robust competition regulations and related macroeconomic strategies in order to promote competition and enhance economic efficiency. The chapter examines the influence of major economic disruptions on company investment strategy in the European Union. This study analyzes the most advantageous investment choices made by companies, taking into account the dynamics of ownership and management. Moreover, the study employs diverse approaches to differentiate between overinvestment and underinvestment, uncovering the pervasiveness of both inclinations across several sectors.

The last chapter examines the correlation between road accidents and automobile insurance rates in significant European economies. By employing non-linear nonparametric modeling, a definitive correlation is established between the incidence of road accidents and the increase in motor insurance rates. This section highlights the importance of public policy in reducing traffic congestion and its subsequent effect on insurance expenses. It promotes the adoption of intelligent artificial intelligence (AI) traffic management systems as a solution to alleviate congestion and its economic consequences. Finally, the study provides a detailed perspective of the worldwide competitive situation, highlighting the intricate connections between market rivalry, company investment patterns, and the larger economic context. The latter information is of great use to policymakers, industry stakeholders, and academics who wish to comprehend the intricacies of competition and growth in the global economy.

Περίληψη

Η μελέτη αυτή εξετάζει διεξοδικά τις πολύπλοκες διασυνδέσεις μεταξύ της ανταγωνιστικότητας, της οικονομικής ανάπτυξης, των εταιρικών επενδύσεων και της δυναμικής της παγκόσμιας οικονομίας. Τις τελευταίες δεκαετίες, ο παγκόσμιος ανταγωνισμός γνώρισε σημαντικές αλλαγές, οι οποίες είχαν αντίκτυπο στην παραγωγικότητα των επιχειρήσεων, στις δομές της αγοράς και στα μακροοικονομικά αποτελέσματα. Η έρευνα, αξιοποιώντας ποικίλες πηγές δεδομένων, εστιάζει στα διαφορετικά επίπεδα ανταγωνισμού και τις επιπτώσεις τους στις επιδόσεις των επιχειρήσεων και στις δομές της αγοράς των κλάδων παγκοσμίως.

Το πρώτο κεφάλαιο επικεντρώνεται σε μια εμπειρική ανάλυση που αναδεικνύει τη σημασία του ανταγωνισμού στην προώθηση της οικονομικής ανάπτυξης. Η μελέτη εξετάζει τις επιπτώσεις του ανταγωνισμού στην κατανομή των πόρων, στην ανάπτυξη νέων ιδεών και στον ρυθμό βελτίωσης της παραγωγικότητας. Στην πραγματικότητα, τα ευρήματα δείχνουν ότι ο περισσότερος ανταγωνισμός βελτιώνει την κατανομή των πόρων, η οποία με τη σειρά της τονώνει τις επενδύσεις και την καινοτομία, οδηγώντας τελικά στην οικονομική ανάπτυξη. Ωστόσο, η μελέτη αναγνωρίζει επίσης τα πιθανά μειονεκτήματα του απεριόριστου ανταγωνισμού, όπως η αυξημένη ενοποίηση της αγοράς και οι ανησυχίες σχετικά με την αποτελεσματικότητα. Τα εμπειρικά δεδομένα καταδεικνύουν σημαντικές διαφορές στην κερδοφορία και την διαμόρφωση της αγοράς μεταξύ διαφόρων τομέων και χωρών, παρέχοντας πολύτιμη κατανόηση του τρόπου με τον οποίο ο ανταγωνισμός επηρεάζει το επιχειρηματικό περιβάλλον.

Επιπλέον, η μελέτη εξετάζει τη σχέση μεταξύ ανταγωνισμού και μακροοικονομικών επιδόσεων. Το κεφάλαιο αυτό παρέχει μια διεξοδική ανάλυση του τρόπου με τον οποίο ο ανταγωνισμός στην εγχώρια αγορά τονώνει την καινοτομία και την πρόοδο, επηρεάζοντας τελικά τη συνολική οικονομική ευημερία. Υποστηρίζει ότι ο ισχυρός ανταγωνισμός ενισχύει τη δυναμική της αγοράς, και ως εκ τούτου δίνει κίνητρα στις επιχειρήσεις να διαθέσουν πόρους για έρευνα και ανάπτυξη. Επιπλέον, διερευνά τη συσχέτιση μεταξύ ανταγωνιστικότητας, καινοτομίας και αναπτυξιακών πολιτικών. Διερευνάται η πολύπλοκη φύση των κυβερνητικών παρεμβάσεων και τα ποικίλα αποτελέσματά τους, δίνοντας έμφαση στη συσχέτιση μεταξύ της συγκέντρωσης της αγοράς και της αποτελεσματικότητας. Στο κεφάλαιο αυτό υπογραμμίζεται η σημασία της υιοθέτησης μιας ολοκληρωμένης προσέγγισης στη χάραξη πολιτικής για την

προώθηση της συμμετοχικότητας και τη διασφάλιση μακροπρόθεσμης, φιλικής προς το περιβάλλον οικονομικής ανάπτυξης.

Το δεύτερο κεφάλαιο εμπεριέχει παρατηρήσεις σχετικά με τη σημασία του ανταγωνισμού στις περιφερειακές αγορές. Το κείμενο τονίζει τη σημασία της εφαρμογής πιο ισχυρών κανονισμών και σχετικών μακροοικονομικών στρατηγικών για την προώθηση του ανταγωνισμού και την ενίσχυση της οικονομικής αποτελεσματικότητας. Το κεφάλαιο εξετάζει την επίδραση που έχουν οι απρόβλεπτες οικονομικές αναταραχές στη στρατηγική επενδύσεων των επιχειρήσεων στην Ευρωπαϊκή Ένωση. Η μελέτη αυτή αναλύει τις πιο συμφέρουσες επενδυτικές επιλογές των εταιρειών, λαμβάνοντας υπόψη παράγοντες όπως η ιδιοκτησία και ο τρόπος διοίκησης της εκάστοτε επιχείρησης. Επιπλέον, η μελέτη χρησιμοποιεί ποικίλες προσεγγίσεις για τη διάκριση μεταξύ υπερεπενδύσεων και υποεπενδύσεων, καταδεικνύοντας την επίδραση και των δύο τάσεων σε διάφορους τομείς της οικονομίας.

Το τελευταίο κεφάλαιο εξετάζει τη συσχέτιση μεταξύ των οδικών ατυχημάτων και των ποσοστών ασφάλισης αυτοκινήτων σε σημαντικές ευρωπαϊκές οικονομίες. Χρησιμοποιώντας μη γραμμική - μη παραμετρική μοντελοποίηση, διαπιστώνεται ξεκάθαρη συσχέτιση μεταξύ της συχνότητας των οδικών ατυχημάτων και της αύξησης των συντελεστών ασφάλισης αυτοκινήτων. Η ενότητα αυτή αναδεικνύει τη σημασία των κυβερνητικών πολιτικών για τη μείωση της κυκλοφοριακής συμφόρησης και την επακόλουθη επίδρασή της στις ασφαλιστικές δαπάνες. Προωθεί την υιοθέτηση ευφών συστημάτων διαχείρισης της κυκλοφορίας με τεχνητή νοημοσύνη (AI) ως λύση για την ανακούφιση της κυκλοφοριακής συμφόρησης και των οικονομικών συνεπειών της.

Συνολικά, η μελέτη εξετάζει λεπτομερώς τις προοπτικές της παγκόσμιας κατάστασης που επικρατεί σε επίπεδο ανταγωνισμού, αναδεικνύοντας τις περίπλοκες συνδέσεις μεταξύ του ανταγωνισμού της αγοράς, των επενδυτικών προτύπων των εταιρειών και του ευρύτερου οικονομικού πλαισίου. Οι τελευταίες πληροφορίες είναι πολύ χρήσιμες για τους υπεύθυνους χάραξης πολιτικής, τους ενδιαφερόμενους του κλάδου και τους ακαδημαϊκούς που επιθυμούν να κατανοήσουν τις περίπλοκες διαστάσεις του ανταγωνισμού και της ανάπτυξης στην παγκόσμια οικονομία.

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1 Introduction

1.1 Motivation

The key element of this work is the identification of the complex and substantial interconnection between different economic, management, and public policy factors and their combined influence on sectors such as motor insurance and corporate investment strategies within the European Union (EU). The meticulous examination and extensive reporting of these subjects seek to offer unique perspectives on the interplay and impact of various economic, corporate governance, and market phenomena.

The first chapter of the study explores the intricate relationship between competitiveness and growth at a global level. The purpose of this section is to explore the impact of competitive dynamics among enterprises on economic growth, resource allocation, and innovation. The examination primarily concentrates on the regional environment, investigating the variations in market structures, such as markups and profitability, across various industries and nations, and their consequences for economic policy and company strategy.

The second chapter examines business investment behavior in the European Union, specifically in relation to substantial economic disruptions such as the COVID-19 pandemic and geopolitical occurrences. The objective is to investigate the level of optimal investment among EU enterprises, analyzing the influence of ownership and management in making these decisions. This research is essential for comprehending how companies in the European Union distribute resources, handle risks, and how these choices influence their overall performance and the wider economy.

The last chapter of the study discusses the connection between road accidents and automobile insurance prices in significant European economies. The purpose of this analysis is to examine the relationship between external elements, such as road accidents, which are affected by traffic congestion and other public infrastructure problems, and their impact on the financial aspects of the motor insurance industry. The target of this section is to present factual evidence that may be used to inform policy decisions. It suggests that by lowering traffic congestion and enhancing road safety, there can be an indirect impact on car insurance premiums, which in turn can have wider economic consequences.

There is a significant need to utilize powerful and advanced analytical techniques, such as non-parametric modeling and generalized additive modeling, to reveal the intricate connections between the variables of interest. The meticulousness of this methodology demonstrates the necessity for precise and dependable data analysis in shaping policy decisions and corporate goals. The primary objective is to obtain valuable insights that can be practically used and have ramifications for policy-making. The thesis aims to offer a comprehensive analysis that can assist policymakers, business leaders, and stakeholders in making well-informed decisions, whether it involves comprehending market competition dynamics, making informed corporate investments, or evaluating the influence of public policies on insurance premiums. Therefore, we explore and clarify the complex connections between economic competitiveness, corporate investment behavior, and sector-specific dynamics such as automobile insurance inside the EU. Thus, the current work offers a comprehensive, evidence-based examination that may guide decision-making, corporate planning, and economic comprehension in a swiftly evolving worldwide context.

1.2 Structure of the Thesis

The present thesis aims to examine the complex relationship between competitiveness, business investment, and the economic consequences of traffic accidents in major European economies. This work explores the intricate mechanics of global market rivalry and its crucial impact on business productivity, innovation, and macroeconomic growth. It examines the process of making strategic decisions in corporate investments, with a specific focus on how companies balance allocating resources and reducing risk, especially in response to recent economic shocks experienced by the European Union. Moreover, it analyzes the cause-and-effect relationship between car accidents and the cost of motor insurance, offering a fresh viewpoint on the economic side effects of traffic congestion. This research provides significant insights for policymakers, corporations, and academics by utilizing sophisticated analytical frameworks. It emphasizes the interconnectedness of economic policies, corporate strategy, and their wider societal effects.

The second chapter focuses on the competition and economic growth, which have become fundamental aspects of modern market dynamics in the field of global economics. This investigation thoroughly examines the complex connection between competition and economic development, innovation, and welfare improvement in

different locations of the world. It investigates how competition serves as a driving force for these factors. The conversation is centered around the fast-paced development of worldwide markets, emphasized by technical progress and the rise of digital platforms that have transformed conventional market frameworks. The chapter provides a comprehensive overview of the worldwide competitive environment, emphasizing the growing significance of emerging markets and the profound influence of technical advancements on competitiveness. The statement highlights the importance of competition in influencing macroeconomic performance, such as the increase of productivity, investment, exports, and labor shares, which is supported by empirical research, indicating a clear connection between increased competition and positive economic results, such as lower pricing, higher well-being, and increased innovation.

An essential component of this research involves the use of reliable data at the level of individual firms, largely obtained from the World Bank's Enterprise Survey and the Orbis database. This dataset offers a detailed perspective on the profitability of companies, markups, and other indicators connected to competitiveness. It provides a subtle comprehension of the market dynamics in action. The examination encompasses an analysis at both the sectoral and firm-level, revealing the disparities in competition among various industries and evaluating its impact on corporate conduct and outcomes.

Moreover, the current thesis explores the complex policy environment related to competition. The role of competition policy within legal and institutional frameworks, highlighting its importance in an increasingly interconnected global economy is under investigation. The research also discusses the difficulties and advantages brought about by trade and investment liberalization, emphasizing the crucial role of competition in encouraging effective distribution of resources and stimulating economic development. Ultimately, the article delineates tactics to augment competitiveness in domestic markets. It promotes the implementation of strong competition laws, liberalization of product markets, and steps to decrease obstacles to entry, thus fostering a thriving and dynamic competitive environment that supports sustained economic growth.

The third chapter examines the complex of corporate investment strategies in the European Union, with a specific emphasis on the period between 2020 and 2021. This timeframe was characterized by major disruptions caused by the COVID-19 epidemic and the economic consequences of Russia's invasion of Ukraine. These events have not

only altered the financial situation of the EU but have also increased the examination of company investment choices, emphasizing the crucial equilibrium between allocating resources and reducing risks. Our study focuses on examining how European Union firms strategically manage the intricate landscape of investment, particularly when confronted with increasing deficits, volatile borrowing rates, and the urgent requirement for private investment in specific industries. The study aims to investigate whether firms are tending towards excessive investment or insufficient investment and the consequences of these trends on overall company performance and economic stability. We explore this matter by analyzing the impact of company ownership and management on investment choices, specifically in regards to achieving a harmonious equilibrium between domestic concentration and global diversification. This research is based on the theoretical framework of agency theory, which investigates the correlation between principals (shareholders) and agents (managers), and how their interactions impact investment decisions. Understanding the dynamics of corporate governance and its impact on investing strategies is essential. The research also examines the notion of misinvestment, utilizing Richardson's (2006) approach, which distinguishes between overinvestment and underinvestment by analyzing departures from anticipated investment patterns. Finally, we conducted an empirical research using a comprehensive dataset including various enterprises. This dataset serves as a strong foundation for our investigation into the investment tendencies of EU firms. This study adds to the wider discussion on corporate investment decision-making, a topic that has long been of interest in economic and finance literature. This analysis illuminates the correlation between the interests of major shareholders and company managers, and how this interaction impacts investment choices, particularly in the realm of corporate governance. Therefore, it provides a detailed examination of investment trends in European Union (EU) companies, delving into the intricate equilibrium between expansion and uncertainty, and the crucial influence of corporate governance in steering these choices. The results of our research provide important information for politicians, investors, and business strategists, highlighting the importance of making careful investment decisions in a global economy that is becoming more intricate and linked.

The forth chapter has mostly concentrated on the relationship among claims expenditure, firm attributes, and economic indicators in the field of vehicle insurance. This research deviates from the traditional approach by integrating road congestion and

accidents into the formulation of car insurance premiums. It suggests that urban traffic congestion, due to its considerable adverse externalities, as well as road accidents, pose fundamental obstacles to achieving sustainable mobility. The current work provides a triple contribution: Firstly, this study establishes an actual connection between two bodies of literature: the impact of vehicle insurance premiums and the externalities associated with road congestion and accidents. Additionally, the study utilizes a meticulously compiled dataset encompassing 11 European nations spanning the years 2009 to 2016. This dataset consists of publicly available information on insurance premiums and traffic accidents. In addition, it presents a novel methodological approach by utilizing a nonlinear nonparametric generalized additive modeling technique, deviating from the conventional linear models employed in previous studies. The technique section provides a comprehensive explanation of the transition from linear parametric models to a non-parametric approach, employing penalized regression splines. The flexibility inherent in this approach enables a more sophisticated comprehension of the connections between automobile insurance premiums and determining factors, circumventing the limitations imposed by global fits. The process of estimating entails solving a maximization problem of penalized likelihood using the method of Penalized Iteratively Reweighted Least Squares (P-IRLS). Additionally, the ideal smoothing value is determined by the technique of Generalized Cross Validation (GCV). The empirical findings demonstrate that the motor insurance rates are considerably influenced by all six factors under consideration, namely claims spending, number of active firms, road traffic accidents, and economic indicators. The research utilizes Likelihood Ratio tests to assess the relative explanatory capacity of the nonlinear model in comparison to the conventional linear model. The findings of the study indicate a preference for the former model. Thus, it examines the functional correlations between premiums and each predictor variable, as depicted in Figure 4.1, providing valuable insights into these associations. The robustness tests provide empirical evidence supporting the stability of the suggested functional forms when examining the amalgamation of factors associated with traffic accidents and fatalities. In general, this work enhances the comprehension of automobile insurance prices by the incorporation of previously neglected variables and the utilization of a novel modeling methodology.

Overall, the findings suggest that implementing public strategies to alleviate traffic congestion could have an indirect impact on regulating automobile insurance costs. Investments in road infrastructure, rigorous enforcement of traffic laws, and the implementation of advanced traffic management systems have the ability to decrease the occurrence of accidents and, as a result, influence the costs of vehicle insurance. The study emphasizes the significance of taking into account non-linear interactions when studying and predicting traffic-related occurrences.

2 On the Nexus of Competitiveness and Growth Across the Globe

2.1 Introduction

In recent decades, competition has grown in length and complexity as companies expanded around the world in pursuit of margin improvements. Companies that successfully implemented a lean, global model of manufacturing achieved improvements in indicators such as market shares and growth rates. Intricate production networks were designed for efficiency, cost, and proximity to markets but not necessarily for transparency or resilience. Competing in the world economy does not automatically boost a firm's productivity and restructure its production capabilities. Such progress requires mobilizing capital, employment, technology and knowledge.

Competition among firms is generally deemed an essential driving force of market economies Aghion, et al. (2005, 2009, 2015 and 2016). It ensures an efficient allocation of resources as factors are allocated to their best use, and generates firm dynamics that boost innovation, productivity growth, and external competitiveness—translating into macroeconomic gains. Moreover, by limiting unfair pricing, discriminatory practices, and rent extraction, competition is seen to have significant welfare, employment generation, and distributional implications as well Atkin (2017). Competition policy, today, is an essential element of the legal and institutional framework for the global economy. Whereas decades ago, anti-competitive practices tended to be viewed mainly as a domestic phenomenon, most facets of competition law enforcement now have an important international dimension. Examples include: the investigation and prosecution of price fixing and market sharing arrangements that often spill across national borders and, in important instances, encircle the globe; multiple recent, prominent cases of abuses of a dominant position in high-tech network industries; important current cases involving transnational energy markets; and major corporate mergers that often need to be simultaneously reviewed by multiple jurisdictions (Bloom, 2010) .

The analysis, based on a sample of countries across the globe covering the period 2000–17, shows that competition in the region remains generally low. Firm-level indicators of competition—such as markups and profitability—provide deeper insights into sectoral market structures and suggest that markups and profitability are generally higher in regional countries compared to other market economies and developing economies. Both profitability and markups in the region vary considerably

across sectors and country groups but tend to be higher in the services sectors (such as food service, communication services, and transportation services), and among oil exporters relative to other country groups. In general, there is a strong association between the volume of competition faced by a firm and its markup and profitability, suggesting that reducing barriers to business development could boost competition and growth prospects.

The empirical analysis shows that regional countries have much to gain from promoting competition. Higher competition can help to significantly decrease prices and improve welfare. The analysis of firm-level analysis shows that firm behavior responds to market structure, generating the observed macroeconomic patterns. Actually, a decrease in firm markups is significantly associated with an increase in investment and exports and productivity growth. This paper reviews the different perspectives on how competition, innovation, and their interrelation affect inclusive growth in various ways. Achieving sustained broad-based growth, that is, growth that is shared by a majority, is paramount to tackle poverty. While in many cases more competition would help generate better growth outcomes, there are also contexts where limiting competition could be desirable. For instance, resource misallocation among firms as a result of barriers to entry or the ability of underperforming firms to survive can inflict a large cost on the economy in terms of productivity growth. In contrast, some monopoly power, in the form of patents, could be potentially needed to give enough incentives for firms to take the risky investment for innovation, which in turn would lead to growth. Moreover, taxation for redistribution in a country could reduce inequality. However, it could potentially accelerate the brain drain (see Akcigit, Baslandze, and Stantcheva 2016 for the top 1 percent of inventors), especially in developing economies, and limit the country's ability to innovate, compete, and achieve broad-based growth. At the same time, without redistribution, high inequality would make it difficult for potential inventors from the bottom part of the income distribution to undertake such careers, which would lead to entrenched inequalities and less innovation and growth. There are also tradeoffs between market concentration and efficiency. Large firms, holding a large share of the market, are able to take advantage of economies of scale and access sufficient resources to incur R&D fixed costs. But not all large firms are equal in terms of the provision of employment, good jobs, and their contribution to growth and equity. Moreover, they could also erect barriers to entry to reap their monopoly rents, further stifling competition and inclusive growth. The relationship between competition and innovation and growth policies to achieve inclusiveness is also multifaceted. The consensus has been that the state should focus on providing an enabling environment, which includes a legal framework, infrastructure, skills and fair competition. However, the existence of externalities may lead to suboptimal outcomes

(Krugman, 1987), requiring state intervention to alter the allocation of resources. Some state interventions, such as past import-substitution policies, curtail international and domestic competition to tackle those externalities and may be counterproductive in the medium to long-run. In general, policymakers should be cognizant of the differential impact of state interventions.

2.2 Market Analysis

The idea that competition is an important driving force of market economies that affects economic growth can be traced back to Adam Smith's *Wealth of Nations*, penned more than two centuries ago. Since then, a voluminous body of literature has examined the effect of competition on economic growth and welfare. Theoretically, the relationship is ambiguous: rivalry among firms can encourage innovation and boost productivity growth, but it can also stifle innovation and growth by limiting the expected returns for firms from innovating (Aghion and Griffith 2005). The landscape of global competition is evolving rapidly, with businesses and industries experiencing unprecedented growth on a worldwide scale. Actually, we observe that

- Emerging markets are becoming increasingly competitive as new players enter the scene, fostering innovation and challenging established norms.
- Technological advancements and the rise of digital platforms are breaking down geographical barriers, allowing companies to compete on a truly global stage.
- This heightened competition is driving organizations to adopt agile strategies, invest in research and development, and prioritize customer satisfaction to stay ahead.
- As the global marketplace continues to expand, businesses are navigating this era of heightened competition by embracing collaboration, leveraging data-driven insights, and constantly adapting to the dynamic forces shaping industries across the globe.

Competition plays a key role in determining market outcomes, and it affects inclusiveness in multiple ways. It not only matters for driving growth but also can affect the distribution of profits among firms and ultimately the distribution of earnings among their workers. It can also affect the bargaining power of workers in the labor market as well as of firms in the supply chain. It can also affect the relative prices of certain goods hurting disproportionately the poor (e.g., food and communication). Competition can also affect income and productivity growth through its effect on the production structure of the economy as well as incentives or disincentives to invest and innovate (e.g., intellectual property). In addition, as discussed in the previous section, competition is one of the key elements

needed to support high sustained broad-based growth, an important precursor for inclusive growth. To measure the level of competition in a market, economists rely on the concept of market power, which is understood as the ability of a firm to influence the market for its product. It is usually measured in terms of deviation from the theoretical case of perfect competition where firms are assumed to be price takers. The intensity of competition, and ability of firm to influence the market (Rosenstein-Rodan, 1943) is difficult to measure directly. Instead, the literature relies on indirect measures such as concentration indexes (e.g., Herfindahl index of market shares) or price markups. Market concentration is an intuitive measure; however, it is not necessarily indicative of market power (Syverson 2019).² Moreover, in many developing economies a comprehensive census of firms, including their market shares, is difficult to obtain. In recent literature, price markups, the gap between the price charged and an estimate of the marginal cost, are the measure chosen to estimate market power. Concurrent with the foregoing developments, increasing attention is being given, in international policy circles, to particular issues of competition law enforcement and competition policy with significance for the global economy. These include:

- The international dimension of competition law cases: the resulting positive spillovers for economic welfare and potential for conflicts of jurisdiction;
- The broadening application of competition policy vis-à-vis intellectual property rights in the global economy;
- Important issues concerning the potential for monopolization and the maintenance of competition in digital markets;
- Issues concerning state-owned enterprises, the role of industrial policy and the maintenance of competitive neutrality in emerging economies; and
- A mounting concern, on the part of global businesses, to ensure non-discrimination, transparency and procedural fairness in competition law enforcement worldwide.

Competition – the rivalry between firms – benefits countries and people through various channels. First, a solid competition framework provides a catalyst to increase productivity as it generates the right incentives to attract the most efficient firms. Second, a strong competition policy can be an effective tool to promote social inclusion and reduce inequalities as it tends to open up more affordable options for consumers, acting as an automatic stabiliser for prices. Third, competition promotes innovation as firms facing competitive rivals innovate more than monopolies. Competition mechanisms can even

help deliver on other strategic objectives, such as environmental or health benefits. However, growth and lower prices alone will not necessarily reduce poverty. Even in countries with growing economies and competitive markets for essential goods and services, the distribution of income may still result in some people living in poverty. Other policies in areas such as trade, investment, and anti-corruption, and the competition aspects thereof, are also crucial in the fight against poverty.

Globalisation, with increased trade, investment and technological exchange, enhances competition in various ways (Gutiérrez, 2017). Increased foreign direct investment (FDI) leads to increased trade, which in turn increases competition by exposing domestic producers to competing imports. Globalization has ushered in an era of increased interconnectedness, characterized by a surge in international trade, fostering economic integration among nations. Cross-border investments have become more prevalent as companies seek opportunities in diverse markets, leading to a global flow of capital and resources.

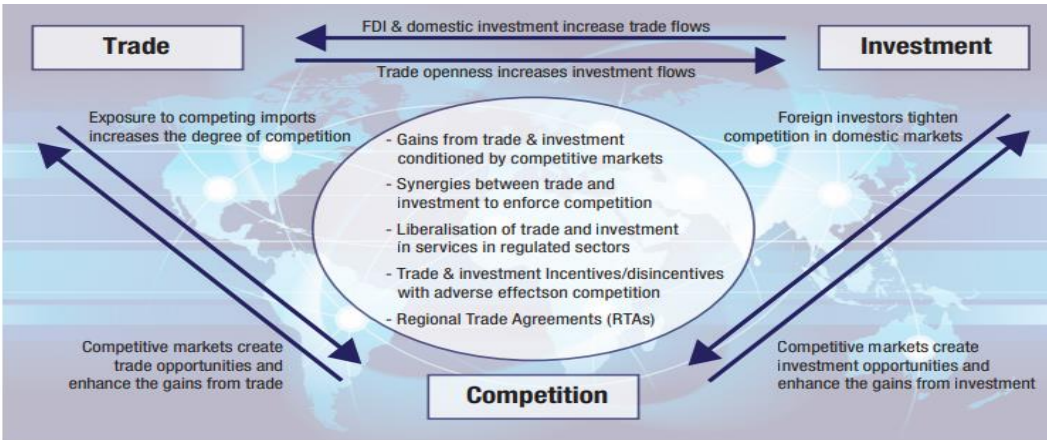
Moreover, technological exchange is a cornerstone of globalization, with the rapid dissemination of information and innovation transcending national boundaries. This interconnected global economy has not only spurred economic growth but has also presented challenges, such as the need for international cooperation to address issues like climate change and public health crises. The ongoing evolution of globalization underscores the importance of fostering inclusive and sustainable practices to ensure that the benefits of increased trade, investment, an

In particular, domestic policies implemented by advanced and emerging economies are likely to have a global reach and influence the growth and development prospects of lower-income countries. Today, as a result of escalating global FDI to developing countries – from USD 34 million in 1990 to USD 703 million in 2022 – competition authorities in countries such as China and India increasingly set rules that international businesses must follow. The above suggests that there are important synergies between trade, investment and competition policies, meaning that the combined impact of these policies on economic efficiency and income growth is higher than the sum of their individual effect (Figure 2.1).

They also complement each other in the sense that reforms in one area will have greater positive impacts if coupled with concomitant reforms in the other two policy areas. Domestic policies enacted by both advanced and emerging economies wield significant influence on a global scale, extending far beyond their national borders. Actually, advanced economies, with their substantial economic power, can shape global economic trends through policies on trade, finance, and monetary measures, impacting

the growth trajectories of lower-income countries. Similarly, the policies of emerging economies play a pivotal role in global affairs, as their economic activities increasingly contribute to and shape the dynamics of the international market. The interconnectedness of economies means that decisions related to fiscal, monetary, and trade policies in one part of the world can have cascading effects on the development prospects of lower-income countries elsewhere. Recognizing this interdependence, fostering international cooperation and coordination becomes crucial to ensuring that domestic policies contribute to global stability and inclusive growth, benefitting economies at all levels of development.

Trade liberalisation generates higher gains when markets are competitive and the movement of capital is free: static gains result from the reallocation of resources in sectors where the country has a comparative advantage, while dynamic gains result from increased productivity and lower costs. Similarly, FDI benefits the host economy when there are interactions between domestic and foreign companies and when there are incentives for technologies and know-how to be shared. The degree of competition on the host market influences the type of FDI that is attracted: border protection and weak competition enforcement is the worst policy combination. It is when trade and investment liberalisation are pursued in competitive markets that resource- and efficiency seeking investment dominates and has potential spillovers for the domestic economy. However, it is only when markets are contestable (i.e. allowing for entry and exit of firms at any given time) that trade and investment liberalisation have significant disciplining effects on competition.



Source: OECD (2007).

Figure 2 1 : The relationships between outward-oriented trade, investment and competition policies Source: OECD (2007)

Trade and investment liberalization, by opening up markets and reducing barriers, act as powerful disciplining forces on competition within the global economic landscape. Increased international trade

fosters a competitive environment by exposing domestic industries to foreign competitors, encouraging efficiency, innovation, and heightened productivity. The influx of foreign investment, facilitated by liberalization policies, introduces new players and capital, intensifying competition and compelling domestic firms to enhance their competitiveness. The disciplining effects are not limited to domestic markets; they extend globally as companies strive to align with international standards and best practices to remain competitive in the interconnected world economy. While promoting efficiency, it's essential for policymakers to balance liberalization with measures that ensure fair competition, preventing the concentration of market power and safeguarding the interests of consumers (Furceri, 2019) and smaller enterprises.

Table 2 1: Components of the World Economic Forum's Competition Index

Competition	
Domestic Competition	Foreign Competition
Intensity of local competition	Prevalence of trade barriers
Effectiveness of anti-monopoly policy	Trade tariffs
Extent of market dominance	Prevalence of foreign ownership
Effect of taxation on incentives to invest	Business impact of rules on FDI
Total tax rate	Burden of customs procedures
Number of procedures required to start a business	Imports as a percentage of GDP
Time required to start a business	
Agricultural policy costs	

Source: World Economic Forum, 2018, Methodology and Computation of the Global Competitiveness Index 2017–18.

Policymakers must carefully navigate the balance between promoting efficiency through liberalization and implementing measures to ensure fair competition. Indeed, the risk of market concentration and the accumulation of excessive market power necessitate regulatory frameworks that curb monopolistic practices and safeguard against anti-competitive behavior. Striking this balance is crucial not only for protecting consumers from potential exploitation but also for fostering an environment where smaller enterprises can thrive and compete on a level playing field. Implementing robust competition policies becomes imperative, encompassing antitrust measures, fair market practices, and mechanisms to address any undue advantage gained by larger players in liberalized markets. Ultimately, the dual objective of achieving efficiency and fair competition requires policymakers to adopt a nuanced and dynamic approach, adapting to the evolving landscape of global trade and investment.

The escalating global Foreign Direct Investment (FDI) flow into developing countries has empowered competition authorities, particularly in nations like China and India, to assertively establish rules that

govern the behavior of international businesses. The FDI has heightened the significance of these economies, enabling their regulatory bodies to shape the terms under which foreign companies operate within their jurisdictions. Competition authorities in China and India are leveraging their regulatory power to safeguard domestic interests, ensuring fair competition, and preventing monopolistic practices that could potentially undermine local businesses. This shift reflects a growing trend where emerging economies are actively participating in shaping the global regulatory environment, influencing how multinational corporations conduct business across borders. As these countries become key players in the global economic landscape, their competition authorities play a pivotal role in setting rules that balance the interests of domestic industries with the benefits of foreign investment.

2.3 Data

We employ the following types of data:

2.3.1 Firm-level Data

Firm profitability and markups are common indicators to assess the level of competition faced by firms. To construct empirical measures of firm profitability and markup, two data sources are used:

The World Bank's Enterprise Survey and the Orbis database.

2.3.2 World Bank Enterprise Survey (WBES)

The WBES collects information from a representative sample of firms by conducting face-to-face interviews, and focuses on formal firms in the manufacturing and services sectors with 5 or more employees. The survey provides information on a broad set of aspects and several variables of the firms including size, ownership, sector, geographic region, financial information, and information about the business environment in which firms operate. The WBES data is mostly cross-sectional and interviews may not be repeated with the same firms over the years.

Table 2 2: Industry Classification

<u>Manufacture of:</u>	
Manufacture of basic metals	1253
Chemicals and chemical products	3633
Coke, refined petroleum products and nuclear fuel	79
Electrical machinery and apparatus n.e.c.	1386
Fabricated metal products, except machinery and equipment	3143
Food products and beverages	7777
Furniture; manufacturing n.e.c.	1481
Machinery and equipment n.e.c.	2380
Medical, precision and optical instruments, watches and clocks	211
Motor vehicles, trailers and semi-trailers	865
Other non-metallic mineral products	2965
Other transport equipment	140
Paper and paper products	612
Radio, television and communication equipment and apparatus	239
Rubber and plastics products	2780
Textiles	3340
Tobacco products	156
Wearing apparel; dressing and dyeing of fur	4506
Wood, wood products, except furniture	1038
Luggage, handbags, footwear, etc; tanning/ dressing leather	1111
<hr/>	
<u>Others</u>	
Publishing, printing and reproduction of recorded media	1077
Recycling	99
Construction	161
Hotels and restaurants	140
Retail trade, except of motor vehicles and motorcycles;	372
Sale, maintenance and repair of motor vehicles	83
Wholesale trade and commission trade, except of motor	174

Source: World Bank Enterprise Survey.

2.3.3 Orbis Bureau van Dijk (Moody's Analytics)

The Orbis dataset provides harmonized cross-country financial information for both privately held and publicly listed firms. The information is usually gathered from local companies that collect

information from corporate registers. The raw data obtained from Orbis requires intensive cleaning.

The construction of the variables using the Orbis database is mainly based on Díez and others (2019). To compute markups, two approaches are used. In the first approach, markups are obtained as the ratio of operating Revenue (OR) to the cost of goods sold (COGS), which includes direct labor and materials costs. This measure, shown below, is similar to the measure computed using WBES data and allows direct comparisons of the indicators between the two databases.

Table 2 3. Variable Definitions and Data Sources

Variable	Description	Sources
Antitrust frameworks data	Data on anti-trust frameworks	World Bank (2016)
Competition frameworks in SSA	Data on competition frameworks	IMF, AFR survey
Enterprise Survey data	Diverse firm level data	World Bank
General gov. gross debt to GDP	In percent	IMF, WEO database
Global Competitiveness Index	Scores	World Economic Forum
Inflation rate	In percent	IMF, WEO database
Institutional quality	Score	ICRG
Market liberalization data	Scores	Alesina, et al (2019)
Orbis data	Diverse firm level data	ORBIS Bureau van Dijk
Population	Millions	World Bank, WDI
Private investment	In percent of GDP	IMF, WEO database
Real GDP	In billions of national currency	IMF, WEO database
Real GDP growth in trading partners	In percent	IMF, WEO database
Real GDP, PPP	In billions of international dollars	IMF, WEO database
Real price of investment goods	Index	PWT 9.0
Share of investment in GDP	In percent	World Bank, WDI
Share of population in working age	In percent	World Bank, WDI
Terms of trade	Index	IMF, WEO database
Trade openness	In percent	World Bank, WDI
Transformation Index	Scores	Bertelsmann Stiftung Foundation
Years of schooling	Years	World Bank, WDI

To analyze the state of anti-trust frameworks across countries, data is gathered from two sources: the World Bank, and an IMF desk survey of country authorities. The WB data is based on surveys for 36 countries jointly administered by the World Bank 2010–15 (World Bank 2016). The survey provides cross-sectional information on several aspects of competition including the existence and enforcement of competition laws, price control regulations, and the degree of independence, annual budgets and staff size of the competition authorities. The IMF data is based on a survey of competition authorities designed specifically for this paper. The survey was conducted in May–June 2019 and elicited response from 37 jurisdictions, including 29 separate jurisdictions and one regional body. Additional macroeconomic variables necessary for the empirical analysis are

collected from various sources such as the IMF’s World Economic Outlook, the World Development Indicators, etc.

The construction of variables in the Orbis database relies heavily on the methodology outlined by Díez and others (2019). Markups, a key metric, are computed using two approaches. The first method involves calculating markups as the ratio of operating revenue (OR) to the cost of goods sold (COGS).

The cost of goods sold includes direct labor and materials costs, providing a comprehensive measure that reflects the expenses associated with production. This markup calculation approach mirrors the methodology employed with World Bank Enterprise Survey (WBES) data, facilitating direct comparisons of indicators between the two databases. By adopting consistent methodologies across datasets, this approach enhances the reliability and comparability of markup data, allowing for meaningful analysis and insights into business performance.

2.3.4 Firm-Level Competition Indicators

Firm-level competition indicators—such as profitability and markups—corroborate the country-level indicators and show that the extent of competition faced by firms in the region is indeed limited. Actually, firm-level competition indicators, including profitability and markups, serve as additional evidence supporting the observation that competition faced by firms in the region is constrained. The examination of profitability, a crucial metric, underscores the challenges faced by firms in generating substantial returns, indicating potential limitations in market competitiveness. Markups, another key indicator, further reinforces this narrative, highlighting the degree to which firms can set prices above production costs—a measure that tends to be influenced by the competitive landscape. The correlation between firm-level indicators and country-level indicators strengthens the argument that the overall competitive environment in the region is restricted, impacting the economic performance of individual enterprises. These findings emphasize the importance of addressing competition-related issues at both the macroeconomic and microeconomic levels to foster a more dynamic and competitive business environment in the region.

Table 2 4: Sample of Countries

Country	Database	Country	Database	Country	Database
Afghanistan	BTI, WBES	Guatemala	WEF, BTI, WBES, Orbis	Paraguay	WEF, BTI, WBES, Orbis
Albania	WEF, BTI, WBES, Orbis	Guyana	WBES	Peru	WEF, BTI, WBES, Orbis

Algeria	WEF, BTI, Orbis	Haiti	WEF, BTI	Philippines	WEF, BTI, WBES
Antigua and Barbuda	WBES	Honduras	WEF, BTI, WBES, Orbis	Poland	WEF, BTI, WBES
Argentina	WEF, BTI, WBES	Hong Kong SAR	WEF	Portugal	WEF
Armenia	WEF, BTI, WBES, Orbis	Hungary	WEF, BTI, WBES	Qatar	WEF, BTI
Australia	WEF	Iceland	WEF	Romania	WEF, BTI, WBES, Orbis
Austria	WEF	India	WEF, BTI, WBES	Russia	WEF, BTI, WBES
Azerbaijan	WEF, BTI, WBES, Orbis	Indonesia	WEF, BTI, WBES, Orbis	Samoa	WBES
Bahamas, The	WBES	Iran	WEF, BTI, Orbis	Saudi Arabia	WEF, BTI
Bahrain	WEF, BTI	Iraq	BTI, WBES, Orbis	Serbia	WEF, BTI, WBES, Orbis
Bangladesh	WEF, BTI, WBES, Orbis	Ireland	WEF	Singapore	WEF, BTI
Barbados	WBES	Israel	WEF	Slovak Republic	WEF, BTI
Belarus	BTI, WBES	Italy	WEF	Slovenia	WEF, BTI
Belgium	WEF	Jamaica	WEF, BTI, WBES, Orbis	Solomon Islands	WBES
Belize	WBES	Japan	WEF	Somalia	BTI
Bhutan	BTI, WBES, Orbis	Jordan	WEF, BTI, WBES, Orbis	Spain	WEF
Bolivia	BTI, WBES, Orbis	Kazakhstan	WEF, BTI, WBES, Orbis	Sri Lanka	WEF, BTI, WBES, Orbis
Bosnia and Herzegovina	BTI, WBES, Orbis	Korea	WEF, BTI	St. Kitts and Nevis	WBES
Brazil	WEF, BTI, WBES, Orbis	Kosovo	BTI, WBES, Orbis	St. Lucia	WBES
Brunei Darussalam	WEF	Kuwait	WEF, BTI	St. Vincent and the Grenadines	WBES
Bulgaria	WEF, BTI, WBES, Orbis	Kyrgyz Republic	BTI, WBES, Orbis	Sudan	BTI, WBES, Orbis
Cambodia	BTI, WBES, Orbis	Lao P.D.R.	BTI, WBES, Orbis	Suriname	WEF, WBES
Canada	WEF	Latvia	WEF, BTI	Sweden	WEF
Chile	WEF, BTI, WBES	Lebanon	WEF, BTI, WBES, Orbis	Switzerland	WEF
China	WEF, BTI, WBES	Libya	BTI	Syria	WEF, BTI
Colombia	WEF, BTI, WBES, Orbis	Lithuania	BTI	Taiwan Province of China	BTI, Orbis
Costa Rica	WEF, BTI, WBES, Orbis	Luxembourg	WEF	Tajikistan	BTI, WBES
Croatia	WEF, BTI, WBES	Malaysia	WEF, BTI, WBES	Thailand	WEF, BTI, WBES, Orbis
Cyprus	WEF	Malta	WEF	Timor-Leste, Dem. Rep. of	WBES
Czech Republic	BTI	Mauritania	BTI, WBES	Tonga	WBES
Denmark	WEF	Mexico	WEF, BTI, WBES, Orbis	Trinidad and Tobago	WEF, WBES
Djibouti	WBES	Micronesia, Fed. States of	WBES	Tunisia	WEF, BTI, WBES, Orbis
Dominica	WBES	Moldova	WEF, BTI, WBES, Orbis	Turkey	WEF, BTI, WBES, Orbis
Dominican Republic	WEF, BTI, WBES, Orbis	Mongolia	BTI, WBES, Orbis	Turkmenistan	BTI
Ecuador	WEF, BTI, WBES, Orbis	Montenegro, Rep. of	BTI, WBES	Ukraine	WEF, BTI, WBES
Egypt	WEF, BTI, WBES, Orbis	Morocco	WEF, BTI, WBES, Orbis	United Arab Emirates	WEF, BTI
El Salvador	WEF, BTI, WBES, Orbis	Myanmar	WEF, BTI, WBES, Orbis	United Kingdom	WEF
Estonia	WEF, BTI	Nepal	BTI, WBES, Orbis	United States	WEF
Fiji	WBES	Netherlands	WEF	Uruguay	WEF, BTI, WBES
Finland	WEF	New Zealand	WEF	Uzbekistan	BTI, WBES, Orbis
France	WEF	Nicaragua	WEF, BTI, WBES, Orbis	Vanuatu	WBES
FYR Macedonia	BTI, WBES, Orbis	Norway	WEF	Venezuela	WEF, BTI, WBES, Orbis
Georgia	BTI, WBES, Orbis	Oman	WEF, BTI	Vietnam	WEF, BTI, WBES, Orbis
Germany	WEF	Pakistan	WEF, BTI, WBES	Yemen	WEF, BTI, WBES, Orbis
Greece	WEF	Panama	WEF, BTI, WBES		
Grenada	WBES	Papua New Guinea	BTI, WBES, Orbis		

Source: Author's compilation.

2.3.5 Sectoral Competition

The macro and firm-level competition indicators presented above suggest generally significant levels of competition in regional markets, but are all sectors equally anticompetitive across countries? To answer this question, the computed firm profitability and markup measures are aggregated across sectors to gauge the degree of sectoral competition in the region. While the

macro and firm-level competition indicators discussed indicate generally substantial levels of competition in regional markets, the question arises: are all sectors equally anticompetitive across countries?

Table 2 5: Average Sectoral Profitability and Markup Based

	Profitability	Markup
Hotels and restaurants	0.98	1.23
Wholesale trade, except of motor vehicles	0.75	1.09
Retail trade, excl. motor vehicles/cycles	0.81	1.11
Construction	0.75	0.98
Manuf. of food products and beverages	0.62	0.77
Manuf. of motor vehicles/trailers	0.68	0.79
Manuf. of electrical machinery/apparatus n.e.c.	0.61	0.81
Manuf. of basic metals	0.59	0.88
Manuf. of other non-metallic mineral products	0.55	0.77
Manuf. of chemicals/chemical products	0.64	0.81
Manuf. of rubber and plastics products	0.52	0.92
Publishing, printing	0.53	0.79
Manuf. of wood/wood products	0.52	0.77
Manuf. of furniture; manufacturing n.e.c.	0.58	0.81
Manuf. of fabricated metal products	0.59	0.69
Manuf. of wearing apparel; dressing/dyeing	0.52	0.72
Manuf. of machinery and equipment n.e.c.	0.67	0.82
Manuf of leather products	0.51	0.69
Manuf. of textiles	0.49	0.72
Manuf. of paper and paper products	0.45	0.65

Source: IMF staff estimates based on the World Bank Enterprise Survey [WEBS].

Notes: Profitability is defined as the ratio of the difference between sales and cost of labor, raw materials and intermediate inputs to sales. Markup is defined as log ratio of sales to cost of labor, raw materials and intermediate inputs.

The nuances of competition may vary among sectors, prompting a more granular analysis to understand the specific dynamics influencing competitiveness in different industries. It's essential to recognize that factors contributing to competition levels, such as regulatory frameworks, market structures, and entry barriers, can differ significantly between sectors, leading to variations in the degree of competitiveness.

A sector-specific examination becomes crucial to identify any disparities, allowing policymakers and businesses to tailor interventions and strategies that address the unique challenges faced by each industry. This nuanced understanding of sectoral competitiveness can guide more targeted policy measures aimed at promoting fair competition and enhancing economic vibrancy across diverse segments of the regional markets.

2.4 Competition and Macroeconomic Performance

Given the importance of the influence of competition on productivity growth, a closer look is taken on the influence of competition in domestic markets on innovation and technological advancement (De Loecker, 2020). Recognizing the pivotal role of competition in driving productivity growth, a focused examination is undertaken to assess how competition within domestic markets influences innovation and technological advancement. Actually, competitive environments often serve as catalysts for innovation, compelling firms to seek technological advancements as a means of gaining a competitive edge.

We may observe that robust competition Baker (2019) fosters a dynamic marketplace where companies are motivated to invest in research and development, driving technological progress and contributing to overall economic growth. The link between competition, innovation, and technological advancement underscores the need for policies that promote fair competition, remove barriers to entry, and incentivize firms to invest in cutting-edge technologies. By understanding and harnessing the positive influence of competition on innovation, policymakers (Syverson, 2019) can formulate strategies that not only enhance productivity but also position domestic industries at the forefront of technological advancements on the global stage.

2.4.1 Growth

What are the macroeconomic implications of domestic market competition? Competition can stimulate economic growth by ensuring an efficient allocation of resources, encouraging investment, boosting innovation and productivity, and promoting exports. Also, competition can also have important welfare and distributional implications through its effects on prices and output.

To analyze the effect of competition on economic growth and its determinants (such as investment, exports, productivity), regressions various specifications are estimated under a number of conditions:

1. **Efficient Allocation of Resources:** In a competitive market, businesses strive to offer better products or services at lower prices to attract customers. This competition encourages firms to use resources more efficiently, as they need to minimize costs to stay competitive. This efficient allocation of resources contributes to overall economic productivity.
2. **Encouraging Investment:** Fierce competition motivates businesses to invest in research and development, technology, and human capital to gain a competitive edge. This investment in turn leads to the development of new technologies, processes, and products, driving economic growth.
3. **Boosting Innovation and Productivity:** To survive and thrive in a competitive environment, companies are incentivized to innovate. This constant drive for innovation enhances productivity, as firms seek more efficient ways to produce goods and services. This can lead to advancements that benefit the entire economy.
4. **Promoting Exports:** Intense competition often pushes businesses to explore new markets and expand their reach. This can contribute to increased exports, positively impacting a country's balance of trade and economic growth.
5. **Welfare and Distributional Implications:** Competition can influence the distribution of wealth and impact consumer welfare. Through its effects on prices and output, competition can lead to more affordable goods and services for consumers. However, it's crucial to consider the potential negative impacts, such as market concentration and income inequality, which might arise if competition is not adequately regulated.

Table 2 6: Competition and Real GDP Per Capita Growth

	Real GDP Per Capita Growth					
	World	EU	Non EU	World	EU	Non EU
	(1)	(2)	(3)	(4)	(5)	(6)
Spatially weighted competition	1.431*** (0.529)	1.510** (0.628)	1.035 (0.809)			
Economically weighted competition				-17.050*** (2.084)	-17.053*** (2.425)	-18.910*** (5.839)
Investment	14.997*** (3.495)	14.432*** (4.069)	4.270 (3.853)	12.025*** (3.138)	11.549*** (3.345)	8.364** (3.332)
Years of schooling	-0.073 (0.756)	-0.440 (1.050)	-0.311 (2.252)	-0.337 (0.745)	-0.764 (1.031)	-1.514 (1.906)
Trade openness	0.918 (1.054)	0.845 (1.273)	0.975 (2.457)	2.130* (1.189)	2.390* (1.387)	2.145 (1.685)
Terms of trade change	0.012 (0.010)	0.022* (0.011)	0.012 (0.014)	0.009 (0.011)	0.018 (0.012)	0.026* (0.013)
Trading partner growth	0.472*** (0.158)	0.337* (0.175)	-0.038 (0.209)	0.512*** (0.152)	0.402** (0.154)	-0.157 (0.263)
Institutional quality	1.712*** (0.646)	0.915 (0.828)	3.530* (1.714)	1.202** (0.600)	1.018 (0.739)	2.989* (1.529)
Public debt				-0.053*** (0.018)	-0.084*** (0.022)	-0.152*** (0.029)
Price of capital formation				0.634 (2.437)	0.598 (3.309)	7.718** (3.101)
Country/Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	971	678	179	963	670	179
R-squared	0.610	0.560	0.515	0.627	0.586	0.619
No. of Countries	121	28	25	120	28	25

Source: IMF staff estimates.

Note: Dependent variable is real GDP growth per capita (in PPP terms). Competition is the WEF's Index fo Intensity of Local Competition, ranging from 1 to 7 (best). Investment, trade openness, and public debt in percent of GDP. Terms of trade change in percent. All specifications include constant, country and fixed year effects. Clustered standard errors at country level in parenthesis. ***, ** and * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Table 2 7: Competition and Real GDP Per Capita Growth: IV-2SLS

	Values of Local Competition Intensity Index						Regional Average of Local Competition Intensity Index					
	World	EU	Non EU	World	EU	Non EU	World	EU	Non EU	World	EU	Non EU
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Spatially weighted competition	1.978*	2.646**	1.337**				1.624**	1.532	0.814			
	(1.063)	(1.311)	(0.652)				(0.303)	(0.933)	(0.254)			
Economically weighted competition				-4.998***	-5.270***	-5.093***	-			-1.609***	-1.871***	-0.499***
				(1.179)	(1.043)	(1.789)	(4.269)	(4.697)	(7.771)	(0.037)	(0.189)	(0.589)
Investment	16.307***	15.891***	10.250*	13.729***	13.402***	12.566***	12.535**	13.750**	2.676	10.512**	11.636*	3.485
	(4.618)	(5.074)	(5.426)	(4.078)	(4.454)	(4.379)	(5.339)	(6.399)	(5.082)	(5.201)	(6.091)	(4.523)
Years of schooling	-0.234	-0.457	-0.247	-0.618	-0.985	-0.688	-0.387	-0.280	-0.809	-0.561	-0.540	-0.760
	(1.072)	(1.541)	(2.702)	(1.051)	(1.506)	(2.103)	(0.718)	(0.869)	(2.530)	(0.696)	(0.880)	(2.228)
Trade openness	0.323	-0.651	-0.809	1.674	1.350	1.677	-3.231	-2.824	0.516	-2.089	-1.362	2.022
	(1.419)	(1.604)	(3.297)	(1.332)	(1.533)	(2.380)	(2.799)	(3.435)	(3.165)	(2.837)	(3.554)	(2.383)
Terms of trade change	0.011	0.019	-0.006	0.002	0.008	-0.007	-0.007	-0.002	-0.001	-0.009	-0.003	0.000
	(0.013)	(0.015)	(0.018)	(0.012)	(0.014)	(0.015)	(0.017)	(0.024)	(0.020)	(0.016)	(0.022)	(0.017)
Trading partner growth	0.365**	0.373**	0.065	0.421***	0.499***	0.014	0.475**	0.225	-0.099	0.527***	0.309	-0.144
	(0.158)	(0.189)	(0.241)	(0.155)	(0.162)	(0.278)	(0.194)	(0.248)	(0.248)	(0.186)	(0.230)	(0.255)
Institutional quality	1.360*	-0.352	2.127	0.766	-0.415	0.742	0.281	-1.205	2.837	0.125	-0.896	2.250
	(0.741)	(1.043)	(2.484)	(0.702)	(0.958)	(1.900)	(1.257)	(2.069)	(2.326)	(1.168)	(1.958)	(2.158)
Public debt				-0.068***	-0.109***	-0.204***				-0.033	-0.054	-0.105**
				(0.025)	(0.037)	(0.063)				(0.023)	(0.040)	(0.042)
Country/Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	739	512	131	733	506	131	971	678	179	963	670	179
No. of Countries	118	25	23	117	24	23	121	26	25	120	27	25

Source: IMF staff estimates

Note: Dependent variable is real GDP growth per capita (in PPP terms). Competition WEF's Index of Intensity of Local Competition, ranging from 1 to 7 (best). Investment, trade openness, and public debt in percent of GDP. Terms of trade change in percent. Columns 1-6 are estimated using the first two lags of local competition as instruments; Columns 7-12 use regional average local competition score as instrument. All specifications include a constant, and country and fixed year effects. Statistics in parentheses denote clustered standard errors at country level. ***, ** and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

In summary, competition plays a vital role in fostering economic growth by driving efficiency, innovation, and productivity. However, it is important for regulatory frameworks to ensure fair competition and prevent monopolistic practices that could hinder the overall benefits of a competitive market.

2.4.2 Spatial and Economic Channels of Transmission

What are some of the channels through which competition lifts economic growth? Analyzing the effect of competition on private investment, non-oil exports and labor productivity, the results show a positive but statistically weak association of the spatially weighted competition intensity index and economically weighted investment (percent of GDP) but a strongly positive association with exports (percent of GDP) and labor productivity growth.

Spatial and economic channels of growth refer to the various factors and mechanisms through which growth occurs in both geographical and economic dimensions. These channels are interconnected and contribute to the overall development of regions and economies. Let's explore each of these channels:

2.4.2.1 Spatial Channels

- **Urbanization:** Growth often involves the migration of people from rural to urban areas, leading to increased urbanization. Cities become hubs of economic activity, attracting businesses, talent, and infrastructure development.
- **Infrastructure Development:** Improved transportation, communication, and other infrastructure in specific regions can stimulate economic growth. This can include the development of roads, ports, airports, and telecommunications networks.
- **Agglomeration Effects:** Concentration of industries and businesses in specific regions can lead to agglomeration effects, where the proximity of firms fosters innovation, knowledge sharing, and economies of scale.

2.4.2.2 Economic Channels

Investment: Economic growth is often driven by increased investment, both domestic and foreign. Investments in capital goods, technology, and human capital can boost productivity and output.

Innovation and Technology: Advancements in technology and innovation play a crucial role in economic growth. Investments in research and development (R&D) contribute to the creation of new products, processes, and industries.

Human Capital Development: Education and skill development contribute to economic growth by enhancing the productivity of the workforce. A skilled and educated workforce is more adaptable to technological changes and innovation.

Trade and Globalization: International trade can be a significant driver of economic growth. Access to global markets allows countries to specialize in the production of goods and services where they have a comparative advantage, leading to increased efficiency and growth.

Financial Development: Well-developed financial systems, including banking and capital markets, facilitate investment and economic growth by providing funds for businesses and entrepreneurs.

2.4.2.3 Interactions between Spatial and Economic Channels

Regional Disparities: Economic growth may not be evenly distributed across regions, leading to regional disparities. Spatial channels play a role in these disparities, as certain regions may benefit more from infrastructure development, urbanization, and agglomeration effects.

Innovation Hubs: Economic growth often clusters around innovation hubs, which are characterized by a concentration of research institutions, technology companies, and a skilled workforce. These hubs are often found in specific spatial locations, contributing to both spatial and economic channels of growth.

In summary, the spatial and economic channels of growth are interconnected processes that involve factors such as urbanization, infrastructure development, investment, innovation, and globalization. Understanding the dynamics of these channels is essential for policymakers and businesses seeking to foster sustainable and inclusive economic development.

2.4.3 Firm Dynamics and Competition

To estimate the effect of competition on the behavior of firms along several dimensions as investment, export orientation, labor share and productivity, a baseline regression with the following explanatory variables is estimated. Indicator of competition intensity: the markup, as described above, the variable of interest; firm specific controls as size (number of employees in logs); direct exports (share of direct exports in sales); dummy variables indicating whether foreign and private ownership of firms is greater than 50 percent; age (number of years since establishment); and a

dummy variable for the number of competitors (equal to one if the number of competitors facing the firm is less than five and zero otherwise); macroeconomic controls: the log of real GDP per capita in PPP terms (from Penn World Table 2.8), and industry, country and year fixed effects.

Table 2 8: Internationally Comparable Price Levels

	Food & Beverages		Alcohol & Tobacco		Clothes & Footwear		Furniture		Utilities		Miscellaneous Goods & Services		Machinery & Equipment	
Spatially weighted competition	-0.082**		0.008		-0.294***		-0.129***		0.042		-0.074		-0.058**	
Economically weighted competition		0.163***		0.169***		0.237***		0.197***		0.291***		0.217***		0.007
Emerging market	-0.320***	-0.306***	-0.209***	-0.203***	-0.279**	-0.242**	-0.230***	-0.204***	-0.588***	-0.559***	-0.359***	-0.338***	-0.072*	-0.061
Developing country	-0.344***	-0.330***	-0.399***	-0.403***	-0.392***	-0.351***	-0.346***	-0.318***	-0.665***	-0.635***	-0.459***	-0.435***	-0.114**	-0.103**
Sub-Saharan Africa	-0.107	-0.086	-0.090	-0.088	-0.581***	-0.525***	-0.203**	-0.164**	-0.024	0.019	-0.418***	-0.385***	-0.003	0.013
Logistics index	0.046	0.077	0.159*	0.174*	0.109	0.186*	0.064	0.119**	0.275***	0.337***	0.183***	0.227***	0.003	0.026
Trade openness	-0.001***	-0.001***	-0.000	-0.001	-0.001**	-0.002***	-0.001**	-0.001***	-0.001***	-0.002***	-0.001***	-0.001***	-0.000**	-0.001**
FDI to GDP		-0.002**		-0.001		-0.005***		-0.003***		-0.004		-0.003**		-0.001**
Constant	3.570***	3.511***	2.453***	2.457***	3.768***	3.605***	3.228***	3.115***	0.778	0.652	2.331***	2.233***		
Observations	122	121	122	121	122	121	122	121	122	121	122	121	122	121
R-squared	0.658	0.669	0.656	0.667	0.599	0.615	0.690	0.711	0.753	0.762	0.823	0.830	0.202	0.224
	Health services		Transport		Communication		Recreation		Restaurants & Hotels		Individual Consumption		Household Consumption	
Spatially weighted competition	-0.145*		-0.107*		-0.155**		-0.138***		-0.144***		-0.106***		-0.120***	
Economically weighted competition		0.324***		0.066		0.213***		0.222***		0.284***		0.207***		0.169***
Emerging market	-0.390***	-0.355***	-0.496***	-0.482***	-0.257*	-0.219	-0.408***	-0.376***	-0.387***	-0.365***	-0.427***	-0.402***	-0.416***	-0.393***
Developing country	-0.319***	-0.281**	-0.687***	-0.675***	-0.503***	-0.452***	-0.469***	-0.433***	-0.357***	-0.329***	-0.491***	-0.463***	-0.509***	-0.485***
Sub-Saharan Africa	-0.057	-0.004	-0.612***	-0.592***	-0.215	-0.152	-0.252***	-0.204**	-0.044	-0.009	-0.260***	-0.222***	-0.336***	-0.302***
Logistics index	0.486***	0.560***	0.062	0.093	0.026	0.104	0.091	0.156**	0.083	0.129	0.163***	0.216***	0.132**	0.180***
Trade openness	-0.001**	-0.002***	-0.001	-0.001*	-0.001*	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.001***	-0.001***	-0.001***	-0.001***
FDI to GDP		-0.005**		-0.002		-0.005**		-0.004***		-0.003**		-0.003***		-0.003***
Constant	0.553	0.399	4.581***	4.529***	3.521***	3.329***	3.010***	2.868***	2.486***	2.377***	2.791***	2.680***		
Observations	122	121	122	121	122	121	122	121	122	121	122	121	122	121
R-squared	0.711	0.720	0.625	0.634	0.402	0.416	0.692	0.710	0.641	0.647	0.799	0.812	0.756	0.770

Source: IMF staff estimates.

Notes: Dependent variable is internationally comparable price of the respective items. Spatially and economically weighted competition use distance and Real GDP measures. Emerging market, developing country, sub-Saharan Africa are (mutually exclusive) dummy variables with advanced country as the base category. All specifications include a constant. Robust standard errors are computed. ***, **, * indicate statistical significance at the 1, 5 and 10 percent levels, respectively.

2.4.3.1 Investment

Investment is measured with the purchase of equipment reported by firms to sales. A standard definition used in the literature the investment rate, which is investment as a ratio of the stock of fixed capital in the previous period, but WBES does not offer firm-level time series and the variable available to proxy the stock of capital (cost to re-purchase its machinery) has limited coverage. The estimation results indicate that higher firm markups are associated with lower investment with an elasticity of about 0.5–0.7, and it is highly statistically significant across both samples.

2.4.3.2 Exports

We measure exports as the share of exports to firm's value added, to represent both export orientation and the ability to compete in international markets. The value of exports is backed out from WBES using the share of direct exports in sales. Measuring exports as a share of a firm's value added is a common approach used in economic analysis to assess a company's export orientation and its ability to compete in international markets. This measurement provides insights into the efficiency and competitiveness of a firm in the global marketplace.

Export orientation refers to the extent to which a company is focused on selling its products or services in international markets. By measuring exports as a share of a firm's value added, you are assessing the proportion of a company's output that is directed towards international markets. A higher share indicates a greater emphasis on exporting. The use of value added in the denominator of the ratio is crucial. It reflects the value that a firm adds to the production process, capturing the difference between the value of its output and the value of its intermediate inputs. Moreover, a higher share of exports to value added suggests that the firm is efficient and competitive in the global market. It indicates that the firm's products or services have a higher value component, possibly due to factors such as innovation, quality, or specialization.

The measure takes into account not just the final product but also the intermediate inputs. This is especially important in the context of global value chains, where different stages of production occur in different countries. A firm that exports a significant share of its value added may be positioned higher in the value chain, indicating a more sophisticated role in the production process.

Policymakers can use this metric to assess the effectiveness of policies aimed at promoting export-oriented industries. For businesses, this measure can guide strategic decisions regarding international expansion, product differentiation, and overall competitiveness. The metric allows for comparisons between firms in the same industry or between firms in different countries. It can be a useful benchmark for evaluating a company's global competitiveness relative to its peers.

In conclusion, measuring exports as a share of a firm's value added provides a nuanced understanding of a company's export orientation and competitiveness in international markets. It goes beyond simple export volumes, taking into consideration the value created by the firm in the production process.

2.4.3.3 Labor Shares

The dependent variable measuring labor share is labor cost to value added. The effect of markups on labor share is negative and significant across samples, with an elasticity of about one, suggesting that competition can have significant distributional consequences. More specifically, the results suggest that increased competition leading to lower market power and markups is associated with higher shares of labor in total value added.

There is a negative and significant relationship between markups and the labor share of income across different samples Autor et al. (2017). Additionally an elasticity of about one, implies that changes in markups have a proportionate effect on the labor share.

Markups refer to the difference between the price of a good or service and its production cost. It is essentially the percentage of the selling price that is above the cost of production. If markups increase, it implies that firms are charging a higher price relative to their production costs. The effect of this increase in markups on the labor share suggests that a larger portion of the value created by the firm is going to factors other than labor.

Labor share represents the portion of income in an economy that goes to labor (wages and benefits) as opposed to other factors of production, such as capital. It is often expressed as a percentage of total income. The negative relationship between markups and the labor share suggests that as markups increase, the share of income going to labor decreases. Elasticity measures the responsiveness of one variable to changes in another variable. In this context, the elasticity of about one indicates that the labor share is changing proportionately to changes in

markups. Therefore, If markups increase by a certain percentage, the labor share would decrease by approximately the same percentage, indicating a one-to-one relationship.

Our analysis implies that increased competition, which tends to limit markups, has a positive effect on the labor share. In a competitive market, firms are pressured to keep prices closer to production costs, and this may benefit labor in terms of a higher share of income. The current work suggests that policies or regulatory measures that enhance competition in markets could positively impact the labor share. Antitrust policies, for example, may play a role in preventing excessive market power and maintaining competitive conditions.

In summary there is a relationship between market competition (as reflected in markups) and the distribution of income, with a negative impact on the labor share when markups increase. Understanding these dynamics can be important for policymakers and economists in assessing the implications of market structures on income distribution.

Thus, firm level evidence supports the country-level results and show that lower market power and markups are statistically significantly associated with higher firm investment and exports in emerging market economies and developing countries including sub-Saharan Africa. Using WBES data—and controlling for firm characteristics, as well as country and year-fixed effects—the results show that a 1 percent decline in markups is associated with an increase in investment and exports of about 0.7 percent and 0.2 percent of the firm’s value added, respectively. Notably, the labor share is also significantly associated with firm markups, with a 1 percent decline in markup implying a one percentage point in the share of output that is remunerated to labor.

2.5 Productivity

Estimation results using Orbis data, presented in Table 2.9, show that lower markups are significantly associated with higher labor and total factor productivity growth, with a 1 percent decline in markups implying a 0.8 percentage point increase in the rate of productivity growth.

Table 2 9: Competition, Investment, Exports and Productivity

	Investment			Exports			Labor Productivity Growth		
	World	EU	Non EU	World	EU	Non EU	World	EU	Non EU
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Spatially weighted competition	0.213 (0.772)	0.160 (0.983)	0.304* (0.159)	0.598* (0.232)	1.186 (0.884)	0.704* (0.244)	0.916** (0.452)	1.090* (0.556)	1.200 (0.934)
Economically weighted competition	4.726 (3.386)	2.552 (4.329)	-9.634 (12.182)	-0.410* (0.268)	-7.959 (6.164)	0.376 (4.461)	-1.156 (5.378)	5.413 (7.569)	0.120** (0.065)
Terms of trade change	0.018 (0.016)	0.019 (0.017)	0.038 (0.031)	-0.013 (0.013)	-0.014 (0.014)	0.009 (0.022)			
Trade openness	-1.423 (2.177)	-0.659 (2.628)	4.200 (5.162)				0.818 (1.273)	0.468 (1.534)	4.725 (2.933)
Growth (lag)	0.247*** (0.050)	0.193*** (0.049)	0.147 (0.087)						
Real interest rate	-0.066 (0.062)	-0.059 (0.070)	0.100 (0.066)						
Institutional quality	-0.220 (0.779)	-1.502 (0.917)	4.010* (2.288)	0.474*** (0.177)	0.576*** (0.201)	0.339 (0.225)	0.010 (0.559)	0.261 (0.862)	4.735* (2.311)
Trading partner growth				-7.097** (3.282)	-5.080* (2.817)	-12.863*** (3.498)			
REER (log)				-0.674 (1.261)	-0.840 (1.366)	0.099 (2.369)			
Investment							11.835*** (3.852)	13.039*** (4.594)	8.073* (4.429)
Years of schooling							0.108 (0.508)	-0.106 (0.740)	1.929 (1.989)
Country/Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,069	748	190	1,354	935	238	989	683	180
R-squared	0.738	0.738	0.762	0.965	0.935	0.935	0.510	0.494	0.516
No. of Countries	104	26	23	125	20	25	122	28	25

Source: IMF staff estimates.

Note: Dependent variable is share of investment to GDP in cols. 1-3, non-oil exports to GDP in cols. 4-6, and labor productivity growth in cols. 7-9. Competition is the World Economic Forum's Intensity of Local Competition index that ranges from 1 to 7 (best). All specifications include a constant, and country and fixed year effects. Statistics in parentheses denote clustered standard errors at country level. ***, ** and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

In summary, the findings from firm-level data echo the results of earlier studies, which show—mostly in the context of advanced economies—that firms with higher markups and greater market power tend to have lower investment, productivity growth, and labor shares (Nickell 1996; Autor and others 2017; Gutiérrez and Philippon 2017; IMF 2019a). While at the same time, the findings do not support the view that stronger competition discourages innovation. Also, the results suggest that the association between markups and investment, labor share, and productivity growth is nearly twice as strong in the manufacturing sector as in the services sector—implying that weak competition in the manufacturing sector may have a greater impact on economic growth compared to the services sector. Differentiating firms based on their ownership structure does not show any statistically significant difference in their response to market power (publicly or privately owned firms), however, for a given increase in markups, domestically owned firms have significantly lower investment and labor shares compared to their foreign counterparts.

2.6 How to Boost Competition in Domestic Markets?

Given the benefits of competition, how can it be strengthened, in particular in regional markets? Several factors are important, most notably enforcement of a strong competition policy framework that encompasses, among other things, product market liberalization, the adoption of an adequate competition law, an independent enforcement body, and competition advocacy. Other policies—notably, trade, fiscal, and structural—that facilitate business activity and reduce barriers to entry also play a critical role in stimulating competition.

A. Competition Policies

An adequate competition policy framework is essential to derive the expected developmental benefits from product market reforms and protect consumer welfare. Such a policy framework is a linchpin for realizing the developmental benefits of product market reforms and safeguarding consumer welfare. It creates an environment conducive to fair competition, innovation, and efficient resource allocation, ultimately contributing to economic growth and improved consumer well-being.

Competition policy contributes to efficient resource allocation by encouraging businesses to operate efficiently and allocate resources effectively. In a competitive market, businesses are incentivized to innovate to gain a competitive edge, leading to technological advancements and improved products and services. Moreover, they are typically implemented through legal and regulatory tools that address issues such as mergers and acquisitions, antitrust laws, and market entry barriers. Effective implementation involves monitoring market activities and enforcing regulations to ensure compliance. A sound competition policy framework is often considered essential for participating in international trade, as it demonstrates a commitment to fair competition practices.

B. Complementary Policies

Competition policies are essential but may not be enough to increase competition without complementary macroeconomic policies, notably trade, foreign investment, and fiscal policies. In the context of regional markets, several studies show that trade barriers—both tariff and nontariff—hurt overall competition and competitiveness (World Bank 2012; Cadot and others 2015).

Competition is also affected by government interventions and fiscal policies. For example, preferential tax treatment to selected firms or the selective implementation of policies can hamper competition by creating an uneven playing field. Public procurement policies that benefit certain firms—whether state or privately owned—can also hurt competition and entrench the dominant position of large firms.

Table 2 10: Competition and Firm Behavior

	Investment		Exports		Labor Share	
	EU	Non EU	EU	Non EU	EU	Non EU
	(1)	(2)	(3)	(4)	(5)	(6)
Markup	-0.724***	-0.539***	-0.168***	-0.053***	-1.236***	-1.311***
	(0.031)	(0.081)	(0.008)	(0.010)	(0.010)	(0.028)
Log real GDP per capita (PPP)	0.335	0.107	-0.114*	-0.043	0.125**	0.223**
	(0.221)	(0.385)	(0.059)	(0.043)	(0.049)	(0.088)
No. of competitors	-0.015	0.026	-0.124***	-0.027***	-0.011	0.003
	(0.027)	(0.062)	(0.006)	(0.008)	(0.008)	(0.018)
Size (in logs)	-0.193***	-0.116***	0.142***	0.078***	-0.000	-0.000
	(0.010)	(0.031)	(0.003)	(0.005)	(0.000)	(0.000)
Direct exports (in pct. of sales)	-0.041	-0.527***			-0.156***	-0.078
	(0.052)	(0.199)			(0.016)	(0.064)
Foreign ownership	-0.060	0.062	0.264***	0.113***	-0.127***	-0.173***
	(0.046)	(0.096)	(0.019)	(0.020)	(0.016)	(0.033)
Private ownership	0.196**	0.477**	-0.068***	-0.051**	-0.012	0.000
	(0.083)	(0.228)	(0.026)	(0.021)	(0.023)	(0.054)
Age	-0.004***	-0.006**	-0.002***	-0.001	-0.001***	-0.001
	(0.001)	(0.002)	(0.000)	(0.000)	(0.000)	(0.001)
Constant	-4.134**	-3.645	0.840*	0.243	-1.868***	-2.167***
	(1.964)	(3.312)	(0.495)	(0.372)	(0.437)	(0.762)
Observations	17,933	3,598	41,956	8,110	41,956	8,110
R-squared	0.117	0.068	0.158	0.164	0.408	0.407
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Source: IMF staff estimates and World Bank Enterprise Survey Data

Notes: Dependent variable in cols. (1)-(2) is log of equipment purchase to value added; in cols. (3)-(4) is log of exports to value added; in cols. (5)-(6) is log of labor cost to value added. Markup is log of sales to cost of inputs. No. of competitors is a binary variable equal to one if the no. of competitors reported by the firm is less than 5 and zero otherwise. Foreign and private ownership are binary variables equal to one if foreign and private ownership of the firm is greater than 50 percent, respectively, and zero otherwise. All specifications include log real GDP per capita, a constant, and industry, year, and country fixed effects. Statistics in parentheses are robust standard errors.

***, ** and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

Absolutely, government interventions and fiscal policies play a significant role in shaping the competitive landscape of markets. These interventions can either promote or hinder competition, depending on their nature and objectives. Here are some ways in which government actions can impact competition:

Government regulations can have a profound effect on competition. Regulations may be designed to ensure fair play, protect consumers, and prevent monopolistic practices. On the other hand, excessive or poorly designed regulations can create barriers to entry, limiting competition. Removing certain regulations in sectors can promote competition by encouraging new entrants and fostering innovation. Deregulation is often aimed at increasing market efficiency and reducing unnecessary barriers. Governments enforce antitrust and competition laws to prevent anti-competitive behavior such as price-fixing, market allocation, and monopolistic practices. Effective enforcement promotes fair competition and protects consumers and smaller businesses from unfair practices. Moreover, government policies related to international trade can impact domestic competition. Import tariffs and trade barriers can affect the competitiveness of domestic industries by influencing the prices and availability of goods. Government subsidies and support programs can influence competition by providing advantages to specific industries or companies. While subsidies may promote growth in targeted sectors, they can also distort competition and create an uneven playing field.

It is vital to clarify that tax policies, including corporate tax rates and incentives, can affect the competitiveness of businesses. Lower corporate taxes may attract more investment and promote competition, while higher taxes could have the opposite effect. However, how do governments award contracts and procure goods and services can impact competition? Transparent and fair procurement processes contribute to a competitive environment, while favoritism or lack of competition in procurement can stifle it. In summary, government interventions and fiscal policies wield significant influence over competition. Striking the right balance is crucial to create an environment that fosters innovation, efficiency, and fair play, ultimately benefiting consumers and promoting economic growth.

2.7 Concluding Remarks

Product market competition in regional markets is considerable relative to the rest of the world. However, Country-level data suggest that more than 70 percent of countries in the region are below the global median in terms competition indicators. Firm markups—directly calculated using enterprise data—corroborate the macro-level observations and suggest that, on average, markups in regional markets countries are higher than in more exceled market economies and

developing countries, especially in the services sectors. In addition, a comparison of the price levels of internationally comparable products and services indicates that prices in the region are relatively higher than in other regions at a similar level of development, which can at least partly be attributed to low product market competition. The empirical observation that markups are higher in regional markets and certain countries, particularly in the services sectors, underscores the importance of investigating the underlying causes. Addressing competition concerns and promoting fair market conditions are key considerations for policymakers to enhance consumer welfare and support healthy economic development.

The empirical analysis suggests that an increase in competition can help to improve economic growth and welfare through increased productivity, export competitiveness and lower consumer prices. These findings are supported by firm-level evidence, which shows that market structure significantly affects firms' behavior and performance, which ultimately shapes macroeconomic outcomes. The empirical analysis supports the idea that an increase in competition is associated with positive outcomes for economic growth and welfare. Policymakers, guided by these findings, can implement measures to cultivate competitive markets, foster innovation, and enhance the overall economic well-being of the society. Specifically, a decline in markups is significantly associated with an increase in firm investment, exports, productivity growth, and labor's share in output. These effects are more pronounced in the manufacturing sector relative to services and tend to be stronger for domestic firms relative to foreign-owned firms.

Markups refer to the percentage difference between the selling price of a good or service and its production cost. Calculating markups using enterprise data involves examining the pricing strategies and profit margins of individual businesses. The use of enterprise data aligns with broader macro-level observations indicating that regional markets and certain countries exhibit higher average markups. Therefore, higher markups can suggest reduced competition or increased market power in these regions, potentially influencing pricing dynamics and profitability for businesses. The statement implies that, on average, markups are higher in regional markets and certain countries than in more developed market economies and developing countries. Various factors may contribute to this observation, such as differences in market structure, regulatory environments, and competitive conditions. Governments may need to evaluate and strengthen competition policies to address potential market distortions that contribute to higher markups. Regulatory measures may be considered to ensure fair competition, prevent anti-competitive practices, and promote consumer welfare. Further

research may be necessary to understand the specific factors contributing to the observed variations in markups. This could involve examining market structures, regulatory frameworks, and industry-specific dynamics.

3 Corporate Investments: Resource Allocation and Risk Mitigation Channels

3.1 Introduction

Since 2020, the European Union has suffered two large shocks: first, the pandemic, then the price shocks triggered by Russia's invasion of Ukraine (referred to as 'war shocks' below). These shocks have created new fiscal challenges for the EU, through three channels. First, deficits and debt have increased. Second, there has been an impact on both actual and expected real interest rates, and hence the cost of public borrowing. Third, the shocks have accelerated and increased the need for private investment in specific areas. This creates a fundamental question for corporations: Is there a trade off between resource allocation and risk mitigation channels?

Of vital importance of a firm's strategy is the decisions it takes about investment. Such decisions shape the future success and growth of a firm as well as its shareholder's value. Typical investments which are of strategic significance include the development of new products, adoption of new production technology or production lines, merging and acquisitions (M&As), asset restructuring, enhancement of production capacity or marketing competency, entering new markets, international diversification of its operations among other.

Nevertheless, the economic notion of optimality also applies to firms investments. An important issue in this respect is whether firms invest more (less) than they should. Overinvestment can be considered as the result of firms' risk taking behavior providing higher firm performance but also higher risks putting firms into troubles. The opposite holds for underinvestment. Both overinvestment and underinvestment are value destroying and have negative impact on firm performance (Titman, Wei and Xie, 2004; Yang, 2005; Liu and Bredin, 2010; Fu, 2010)¹. For instance, if firms in a sector or country overinvest then there may be too much risk for a sector or the economy as a whole or restricted growth in the case of underinvestment.

The purpose of this paper is to study whether EU firms invest too much (or too little). Particularly, it aims to examine the effect of firm's ownership and management in optimal

¹ In fact, the literature is split, as on one hand a firm's overinvesting is considered to be a good strategy under uncertainty (Chevalier-Roignant et al., 2011) and, on another, it can have negative impact on firm's future performance (Fu, 2010).

invest decision. In addition, we will explore whether the strategic decision of staying home versus going international and diversify relates to investment optimality and to the owner-manager relationship.

To identify firm's misinvestment, in terms of over- or underinvestment, we follow the study of Richardson (2006) which proposes a relative measure that assesses the degree of over- or underinvestment using the residuals from firms' investment functions. According to Richardson (2006) overinvestment is defined as "investment expenditures beyond that required to maintain assets in place and to finance expected new investments in positive net present value (NPV) projects and vice versa the case for underinvestment.

This chapter, in general contributes to a large literature about firms investment decision making, which has been a central topic in economics and finance literature (Kydland and Prescott, 1982; Long and Plosser, 1983). More specifically, it contributes to the literature by examining how the alignment of the interests of professional money managers such as large shareholder group with the interests of firm managers (board members) affects firms' investment decision. As different governance constituents (institutional investors and boards of directors) can provide differing types of support for vital corporate strategies such as investment and international diversification, this line of inquiry has important implications.

Our work elates and adds to the literature of corporate governance in speaking to the debate on whether institutional investors' monitoring and activism is effective. Studies have shown that certain types of institutional investors have some influence on specific corporate events such as anti-takeover amendments (Brickley et al., 1988), research and development expenditures (Bushee, 1998), executive compensation (Almazan et al., 2005), and merger and acquisition decisions (Gaspar, Massa, and Matos, 2005; Chen et al., 2006). We add to this literature by bringing evidence on the role of corporate governance on firm's optimal investment.

Based on a large number of 10,141 US firms over the period 185-2020 statistics of our sample, 32% of the firms in the US are doing proper investment, 38% firms are doing overinvestment while 30% firms are doing underinvestment. Sector-level analysis shows that most efficient investments are taking place in Finance, Insurance and Real Estate sector which accounts for 70% firms doing proper investment. Investment inefficiency as a result of overinvestment and underinvestment is the key element in our study. The basic intuition behind estimating over and underinvestment in investments is decomposed into discretionary and non-discretionary components by estimating the expected investments of the firms. In other words, actual

investments greater or less than the non-discretionary expected investment is considered discretionary. The largest overinvestment takes place in Construction sector and worst underinvestment in Manufacturing. The remainder of this study proceeds as follows. Section 2 introduces a theoretical overview. Section 3 presents the methodology to assess a firm's (mis)investment. Section 4 discusses the data. Section 5 presents the results. Section 6 concludes.

3.2 Theoretical Overview

Agency theory, a cornerstone of management theory, considers the relationship between two parties; 'the principal' and 'the agent'. Having been the subject of many authors, including, Myers (1977) and Smith and Warner (1979), agency theory has been examined rigorously in the context of firm financing. Perhaps the most significant contribution to the field came from Jensen and Meckling (1976) who defined the principal-agent relationship as:

'A contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision-making authority to the agent.' (Jensen and Meckling, 1976:308).

They go on to note that if both the principal and the agent are utility maximisers then probability would suggest that the agent will not act in the interests of the principal. This is due to the agent pursuing goals which maximise their own utility. So agency issues and therefore agency costs arise due to asymmetric information. This asymmetry then further gives way to moral hazard. If the principal knew every decision the agent made there would be no agency issue. Thus the agent must be monitored however perfect monitoring is impossible due to the high costs involved in doing so. Agency costs are borne by the principal and are involved in resolving principal-agent conflicts of self-interest. Agency costs consist of three parts; financial costs, the costs of monitoring the agent to the principal and finally the loss of wealth the principal suffer as a result of the agent pursuing goals which are not in the principal's interests within an imperfect contract. The third and final cost is highest when the first two are minimised. Jensen and Meckling (1976) asserted that firm behavior is an aggregate function of the contracts within the firm. Contracts are framed to minimise agency issues. They further contend that firm behaviour is the aggregate equilibrium of a complex set of variables. This essay will examine how decisions regarding firm financing are the aggregate equilibrium result of agency issues and costs. In particular it will be noted how companies make acquisitions that are not maximising for the shareholders of firm itself but also how bond warrants and indentures are the result of agency issues.

3.2.1 Leverage and agency theory

Along with factors such as tax incentives and ease of access of funds, the choice of source for firm financing can be driven by agency theory. Figure 3.1 below outlines some of the key Principal-agent relationships that can be at play within certain types of entities. Perhaps the most interesting of these entities are the publicly held corporations. Jensen and meckling (1976) observed that the larger a firm becomes, the larger the agency costs accrued. this is due to monitoring being inherently more expensive and difficult in large organizations.

Entity	Principals	Agent(s)
Publicly-held corporations	Stockholders	Managers
Publicly-held corporations	Debt-holders and other lenders	Stockholders
Publicly-held corporations	Consumers	Firm
Closely-held company	Lenders to the company	Owner-manager(s)
Limited partnership	Limited partners	General partner(s)
Leveraged buyout fund	Investors	Fund manager

Figure 3 1 : Principal-Agent Relationships (Source: Emery D.R. and Finnerty J.D, 1991:221)

A privately held company's actions will be the result of utility maximisation of the sole owner-manager. this utility maximisation will be dependent upon their preference for consumption i.e. does the manager get satisfaction from company profits or from job benefits such as a nice office. Jensen and meckling (1976) formalised this rationale by noting the situation where the owner-manager to sell equity to an outsider. as the owner-manager's share in the firm falls his/her claim on the residual profits falls. thus the owner-manager, as a utility maximiser, will use firm resources to gain perquisites in place of profit. the conflict between owners and managers takes four principle forms (masulis, 1988); (i) managers favour greater privilege levels and lower effort levels so long as they do not have to pay for the full costs (ii) managers favour less risky investments and lower leverage to lower the probability of bankruptcy (iii) managers prefer investments with short time horizons at the expense of more profitable long term projects (iv) managers prefer to minimise the chance of them being terminated which increases in probability with corporate control.

Figure 3.2 below outlines a scenario for a one hundred per cent equity financed project, if it were to be financed entirely by an owner-manager or by an owner manager and outside equity.the expansion path oBZc denotes were the project entirely financed by the owner-manager. Point c on this graph shows the point at which any additional investment will not

be beneficial to the firm's value. the curve oBZc also may be considered as the scenario whereby agency costs equal zero and monitoring costs are zero. this would be the ideal scenario.

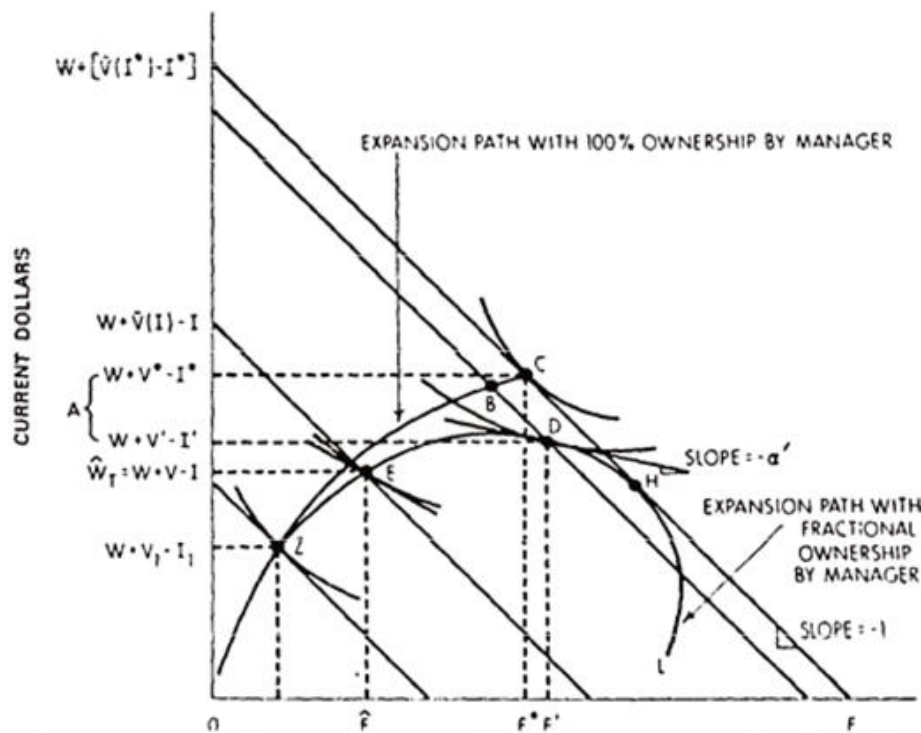


Figure 3.2 : Equity Financed Project (Source: Jensen and Meckling, 1976)

Alternatively curve ZeDhL denotes a potential equilibrium path for the owner-managers non-pecuniary benefits at each level of investment. at points e and D his remaining claim on the firm is equal to his indifference for these factors. As we move along ZeDhL his claim on the residual value of the firm falls as the manager raises more capital. this curve shows his complete opportunity set for combinations of wealth and non-pecuniary benefits given the costs of the agency relationship. the area highlighted by 'a' shows the probable agency costs for a similar level of investment. agency costs in this case will equal $(V^* - i^*) - (V' - i')$.

This quite technical analysis by Jensen and meckling is underpinned by a number of assumptions, which do diminish the real life validity of the theory. for example this scenario assumes that debt is unavailable, there are no potential convertible bonds or preferred stock and all taxes are zero. however while flawed, the analysis highlights the effects agency issues may have on an entirely equity financed firm. ultimately the manager will stop increasing the size of the firm when the incremental gain in value is offset by the incremental loss involved in the consumption of additional benefits due to his/hers declining interest in the firm. to limit this undesirable behavior from managers' principles may en- gage in bonding or monitoring.

A firm will have a preference for its mode of financing. myers (1977) noted that this ‘peck- ing order theory’ dictates that firms rather internally finance projects. then when this op- tion is exhausted they will finance with debt or a hybrid convertible bond and then finally they with equity. Figure 3.3 below illustrates the factors cfos consider when issuing new debt for project financing. We can see financial flexibility plays a major role for decision makers. ultimately financial flexibility (debt covenants, timeliness of payments, discount rates) will be dictated by how the market interprets the need for monitoring. as such the financing costs can clearly be linked to the severity of agency problems within the firm.

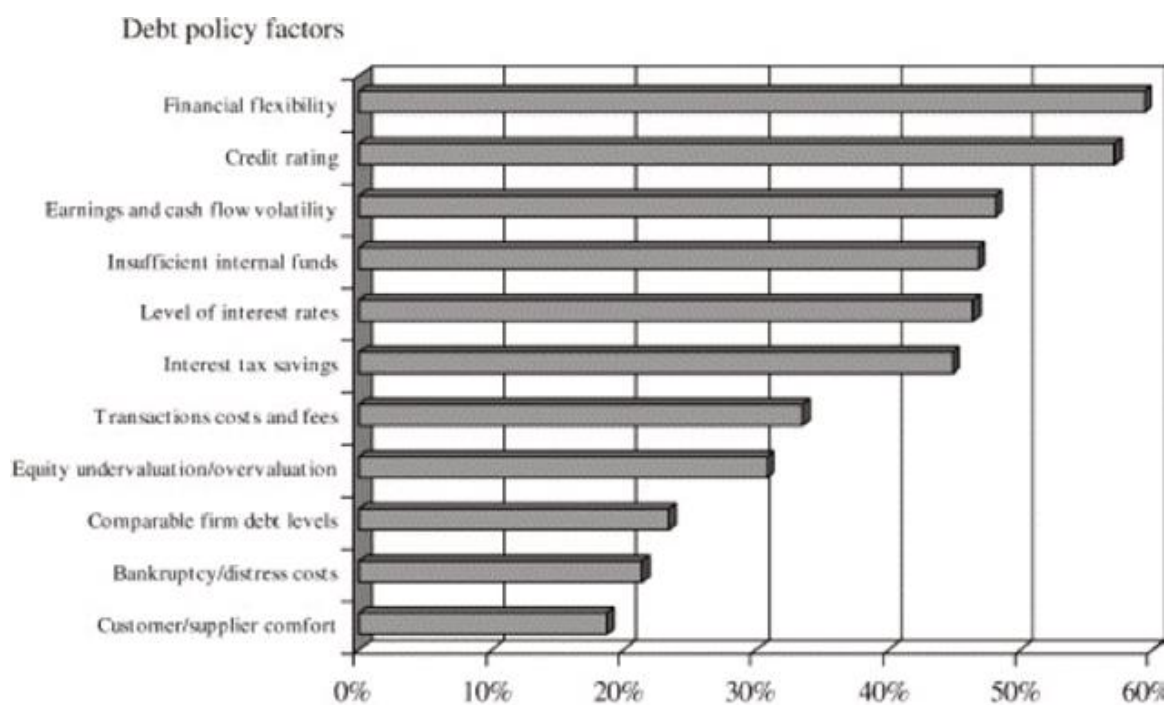


Figure 3 3 : Percent of CFO’s Identifying Factor as Important or Very Important (Source: Graham and Harvey, 2001)

Figure 3.4 below illustrates the tradeoff model, which shows that the value of the firm is optimal where agency and insolvency costs are offset by a favourable tax shield/ subsidy. ultimately the optimal level of debt is that where by the marginal benefits of debt financing outweigh the marginal agency cost and this too outweighs the marginal cost of further equity financing (Jensen and meckling, 1976).

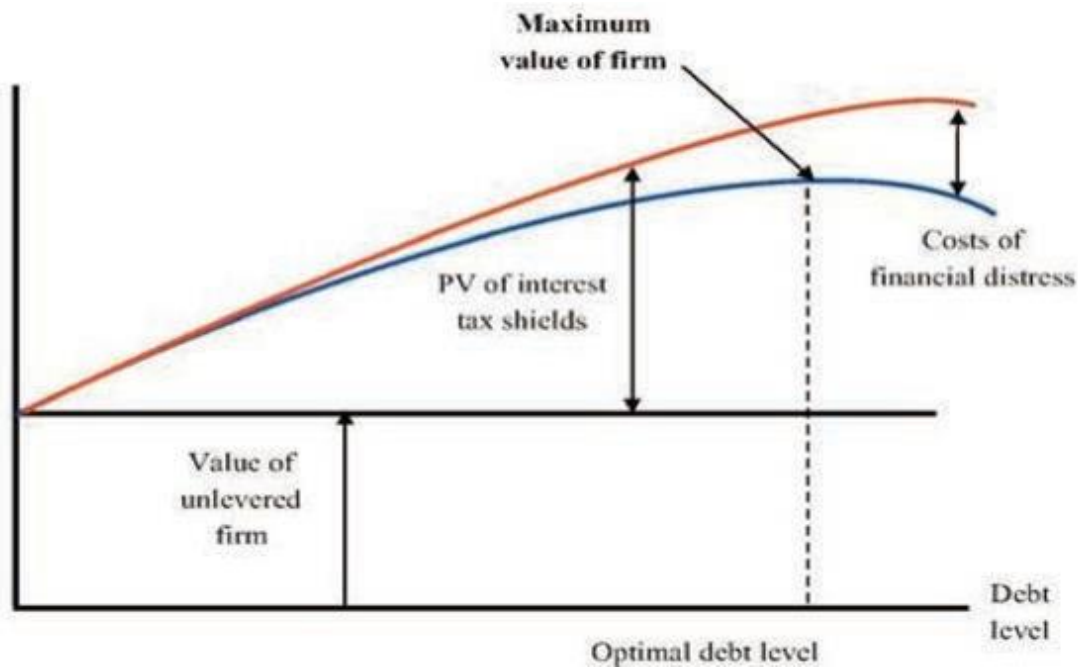


Figure 3 4 : Trade Off Model (Source: http://academlib.com/735/business_finance/trade-off_theory_capital_structure)

3.2.2 Agency Theory and Firms Misinvestment

This issue in a sense is the opposite of the asset substitution problem. under investment occurs when positive net Present Value investments are rejected because the benefits of the project accrue to bondholders. Smith and Warner (1979) observed that bondholders could specify in bond indentures specific investment policy. They noted however that this was rarely the case in reality. They observed that firms would be foregoing the opportunity cost of freedom of investment and as such deem debt issuance too costly in that scenario. Smith and Warner use the 'costly contracting hypothesis' to predict that firms with a high propensity for mergers will allow fewer restrictions on investments within their issued bond's covenants. Ultimately a debt call provision would partially relieve the risk of asset substitution or under investment (Thatcher, 1985). Litzenberger (1986) found that in two cases of capital restructuring when the announcement of large increases in debt associated with these actions it appeared to cause a decrease in the market values of company debt issues. Lehn and Poulsen (1989) observed that in the event of a leveraged buyout non-convertible debt holders did not share in the price gains of common stock holders and debt holders experienced a rating reduction.

As claimants to the assets of the firm the debtholder will likely prefer to charge a premium for highly specific investments. Assets that are unique tend to have more risk associated with their disposal due to a niche market. Knowing this the firm may opt to invest in assets that are less

specific (Williamson, 1988). This is however dependent upon the marginal benefits of using less specific assets being greater than the marginal costs of using highly specific assets.

Though perhaps dated, Smith and Warner (1979) observed how standard covenants protect bondholders in each of the four types of actions outlined above. They found that in a sample of eighty-seven indentures filed in 1974-1975 91 per cent contained restrictions against the issuance of additional debt, 36 per cent contained restrictions on the disposition of assets and only 23 per cent contained restrictions on dividends. They finally noted that firms in weaker financial positions have stricter protective covenants. One must assume then that these bonds are discounted for the given level of risk unaccounted for by protective covenants. An agency, in broad terms, is any relationship between two parties in which one, the agent, represents the other, the principal, in day-to-day transactions. The principal or principals have hired the agent to perform a service on their behalf. Principals delegate decision-making authority to agents. Because many decisions that affect the principal financially are made by the agent, differences of opinion, and even differences in priorities and interests, can arise. Agency theory assumes that the interests of a principal and an agent are not always in alignment. This is sometimes referred to as the principal-agent problem.

Actually, an agent is using the resources of a principal and the principal has entrusted money but has little or no day-to-day input. The agent is the decision-maker but is incurring little or no risk because any losses will be borne by the principal. Financial planners and portfolio managers are agents on behalf of their principals and are given responsibility for the principals' assets. A lessee may be in charge of protecting and safeguarding assets that do not belong to them. Even though the lessee is tasked with the job of taking care of the assets, the lessee has less interest in protecting the goods than the actual owners.

Agency theory addresses disputes that arise primarily in two key areas: A difference in goals or a difference in risk aversion. For example, company executives, with an eye toward short-term profitability and elevated compensation, may desire to expand a business into new, high-risk markets. However, this could pose an unjustified risk to shareholders, who are most concerned with the long-term growth of earnings and share price appreciation.

Another central issue often addressed by agency theory involves incompatible levels of risk tolerance between a principal and an agent. For example, shareholders in a bank may object that management has set the bar too low on loan approvals, thus taking on too great a risk of defaults. Agency theory addresses disputes that arise primarily in two key areas: A difference

in goals or a difference in risk aversion. Management may desire to expand a business into new markets, focusing on the prospect of short-term profitability and elevated compensation. However, this may not sit well with a more risk-averse group of shareholders, who are most concerned with long-term growth of earnings and share price appreciation. There could also be incompatible levels of risk tolerance between a principal and an agent. For example, shareholders in a bank may object that management has set the bar too low on loan approvals, thus taking on too great a risk of defaults.

This theory seeks to explain the relationship between two or more individuals. According to Hendriksen and Breda (1999, p. 139), “one of these two individuals is an agent of the other, called principal – from there the name of the agency theory. The agent undertakes to do certain tasks for the principal; the principal undertakes to remunerate the agent”. In this relationship it is expected that the agent will make decisions that aim at the interests of the principal, however, according to principal and agent are engaged in a corporative behavior but have different goals and different attitudes with relation to the risk. Jensen and Meckling (1976, p. 5), define an agency relationship as “a contract by which one or more persons (the principal(s)) contract another person (the agent) to execute some service in favor of them and which involves delegating to the agent some authority of decision making” (our translation). It is worth highlighting that the contract that regulates the relationships between the parties can be formal or informal, that is, they can be expressed and declared in a written contract signed by the parties or informally when the relationships are orientated by the uses and customs that sustain and give legitimacy to the actions practiced between the parties related.

3.2.2.1 Overinvestment

Overinvestment is managerial investment behavior of investing in negative net present value (NPV) projects (Jensen, 1986; Brealey et al., 2008; Stulz, 1990). The literature offers a number of explanations why overinvestment is an indication of agency problem. Brealey et al. (2008) explained the managerial overinvestment behavior as empire building. Managers love power and are keen to have more resources under their discretion, therefore it leads to empire building which is possible through reckless investment in negative NPV projects (Brealey et al., 2008). The managerial temptation to overinvest greatly increases with abundant supply of free cash flows, which are excessive cash flows available then required for financing positive NPV projects (Jensen, 1986; Stulz, 1990). Managers have an incentive to grow firms beyond its optimal size because firstly its puts lot of assets under manager’s control and secondly managerial compensation is directly linked with the growth in sales (Conyon and Murphy,

2000). Overinvestment gets more severe when the firm has both the combination of low growth opportunities i.e. unavailability of positive NPV projects and high cash flows (Jensen, 1986). Based on these arguments, overinvestment is clearly an indication of agency problem because it is totally against the managers interests of investing in negative net present value (NPV) and shareholders' interests of investment in positive NPV projects.

Stulz (1990) develops a theoretical model of the relationship between the source of financing and agency costs of managerial discretion over investment funds. Given poor investment opportunities, the likelihood that management invests in negative NPV projects increases in the level of managerial discretion over investment funds. It is shown that debt reduces such overinvestment by forcing managers to pay out when cash flows accrue. Thus, firms with poor investment opportunities benefit from higher leverage because increased capital market monitoring and discipline reduce the overinvestment problem. In other words, debt financing pre-commits management to pay out free cash flow rather than to waste it when positive NPV investment opportunities are exhausted. Aghion et al. (1999) argue similarly that debt instruments reduce the agency costs of free cash flow by reducing the cash available for spending at the discretion of managers. In their theoretical model, this not only mitigates managerial slack but also accelerates the rate at which managers adopt new technologies and thus fosters growth. An alternative explanation for overinvestment can be found in the literature on financial constraints. According to Myers and Majluf (1984), information asymmetries increase the cost of capital for firms forced to raise external finance, therefore reducing investment. Yet, financial constraints are eased by the existence of abundant internally generated funds, which creates a tendency for overinvestment.

3.2.2.2 Underinvestment

Underinvestment takes place when managers pass on positive NPV projects, which if taken could prove highly profitable investment projects. The literature points to a number of explanations for firms underinvestment.

Myers (1977) argued that agency conflict arises between bondholders and shareholders when leverage is included in the capital structure. Managers will start ignoring to invest in several positive NPV projects because, lenders (bondholders) have the first right to get the money back from the added benefit received from investing in positive NPV project. Hence a positive NPV project can be considered as a negative NPV project from the perspective of shareholders and hence ignored leading to underinvestment (Lyandres and Zhdanov 2005).

Information asymmetry, which is the unequal level of information between managers and owners could be another explanation. Managers know more about a firm's internal situation and investment opportunities, while shareholders and bondholders may know less. Information asymmetry may lead to underinvestment problem and under this problem managers will ignore lot of positive NPV investment projects which were needed to be financed through issuing equity (Myers and Majluf 1984).

Another explanation offered in the literature is that managerial behavior of reduced efforts and risk avoidance. Some managers are not motivated enough to find, evaluate and fund several valuable investment opportunities (Brealey et al, 2008). Remaining rather passive helps them to avoid uncertainty or avoid decision errors (Voicu, 2013). Further, risky projects may have a huge potential but due to fear of losing jobs, if the project doesn't turn out successful. When managerial interests are not aligned with shareholders interest through insider ownership, managers would give up investing in several valuable risky projects due to their risk avoidance behavior (Brealey et al, 2008). This prevents managers to invest in several of these positive NPV projects. Underinvestment appears to be more severe in firms which have high growth opportunities (McConnel and Servaes, 1995).

3.3 Model and Methodology

One of the first attempts in the literature to separate the overinvestment and underinvestment is the study of Richardson (2006).² In general, total investment I_{TOTAL} (measured by cash paid for the purchase and construction of fixed assets, intangible assets and other long-term assets minus net cash recovered from disposal of fixed assets, intangible assets and other long-term assets) can be split into two components: one is investment expenditure to maintenance, $I_{MAINTENANCE}$ (defined as depreciation and amortization expenses) and the other is investment expenditure to new projects, I_{NEW} ($=I_{TOTAL} - I_{MAINTENANCE}$).

Using this concept, a regression equation was formulated which is specifically used to estimate "expected investments". We follow Richardson (2006) and model expected investments (scaled by total assets) as follows:

² A number of subsequent studies investigated the impact of overinvestment/underinvestment on firm performance and stock performance (Liu and Bredin, 2010; Fu, 2010).

$$I_{NEW} t = \alpha + \beta_1 Growth_{t-1} + \beta_2 RD_{t-1} + \beta_3 Leverage_{t-1} + \beta_4 Returns_{t-1} + \beta_5 Size_{t-1} + \beta_6 I_{NEW} t-1 + \sum Year + \sum Industry + \varepsilon \quad (1)$$

where *Growth* is proxied by Tobin's Q which is defined as the ratio of the market value of assets to the current replacement cost of those assets; *RD* is the research and development spending divided by total assets; *Leverage* is defined as the total liabilities over total assets; *Returns* is the stock returns for the year prior to the firm's investment year in market value; *Size* is measured by the logarithm of total assets; *Year*, *Industry* are vector of indicator variables to capture annual and industry fixed effects, respectively. All regressors are lagged one year.

Richardson (2006) argued that after running regression the estimated fitted line shows the "expected investments" (I_{NEW}^E) of the firm while residuals capture the "unexpected investments", I_{NEW}^U . This unexplained component of regression could be positive or negative; negative values are considered underinvestment while positive values are considered overinvestment.

3.4 Data

Our sample consists of companies over the period 2011-2021. Table 3.1 below reports descriptive statistics of all variables used in our sample. As statistics show EU companies are investing 6.1% of their total assets. The large difference between minimum and maximum values indicates that there considerable variation in investment across EU firms.

Table 3 1: Sample Summary Statistics

All firms	N	Mean	Median	Std. Dev.	min	max
I_{NEW}	6509	.078	.052	.107	-1.237	1.44
<i>TobinsQ</i>	6498	2.243	1.736	2.055	.298	105.09
<i>Leverage</i>	6455	.2	.185	.173	0	.876
<i>RD</i>	6463	.109	.109	.139	-7.643	2.692
<i>Returns</i>	6404	.194	.109	.68	-.978	26.194
<i>Size</i>	6509	7.234	7.101	1.625	2.03	11.153
<i>Age</i>	6509	26.395	22	16.286	1	58

Both mean and median value of *Tobin's Q* are above one, 2.243 and 1.736, respectively which indicates that their market value is higher than their book values and therefore EU companies

appear to have +NPV projects and future growth opportunities. On average, EU firms are rely on long term debt which accounts for 20%. On average, Cash flow accounts for about 11% of total assets and this figure touches the maximum of 269% of total assets, indicative that some companies have abundant availability of cash flows. Further, EU companies are earning 19% average stock returns annually which indicates the continuously increasing market value of EU companies.

A sector level analysis is presented in the Appendix. Table A.1 shows descriptive statistics for nine one-digit sectors of the EU economy. The retail trade sector is the sector that reports the highest new investment as a share of its total assets (13%) while the mining sector the least (1.3%). All EU industries have fairly high growth opportunities as all of them have Tobin's Q higher than one, with the Finance, Insurance and Real Estate to show the highest prospects for future growth while Mining the lowest.

The allocation of firms by sector in terms of their (new) investment behavior is presented in Table A.2. In almost all sectors of the EU there is overinvestment with the Service sector to be the only exception in which firms underinvest. Although underinvestment and overinvestment have about the same shares in Manufacturing this sector however, is the sector with the highest under-investment followed by the Service sector. In contrast, the Construction sector heavily over-invests followed by the (Wholesale and Retail) Trade Sector. Finally, the only sector that invests optimally is the Finance, Insurance and Real Estate sector in which more than 70% of the firms there neither under- or over-invest.

3.5 Conclusion

The concept of agency costs may go against the theory of economics that all must be rational and efficient. By their very nature additional costs are inefficient. But to assert that these costs are inefficient would be incorrect. they are only inefficient in the perfect hypothetical academic world described with the theory itself. in reality the actors in the principal agent relationship are behaving as efficiently as they perceive to be possible within the constraints of the environment. They are entering into what simon (1991) described as "bounded rationality" whereby they make the most efficient decision possible given the parameters and constraints of the situation. ultimately this is what underpins agency theory with regard to firm financing. the equilibrium position reached by firms when all variables considered may not theoretically be efficient but it is the optimal level of efficiency given the constraints of reality.

We can conclude that at the equilibrium position the firm's capital structure will be the aggregate position of the marginal benefits of debt/equity financing instruments exceeding their marginal costs. this equilibrium position will be the aggregate position resulting from a complex set of variables stemming from the issue of information asymmetry, insuring against this asymmetry and the self-interest of the individual groups of investors, managers and stockholders.

We investigated EU companies, with our sample size covering 12 years period, from 2011 to 2021. Our study had two objectives (1) measuring extent of overinvestment and underinvestment in the firms and (2) measuring the impact of ownership on firm's overinvestment and under-investment.

Based on summary statistics of our sample, 32% of the firms in the EU are doing proper investment, 38% firms are doing overinvestment while 30% firms are doing underinvestment. Sector-level analysis shows that most efficient investments are taking place in Finance, Insurance and Real Estate sector which accounts for 70% firms doing proper investment. The largest overinvestment takes place in Construction sector and worst underinvestment in Manufacturing.

Our results indicate that agency problem due to overinvestment and underinvestment exists in the EU with about one third of the firms to do proper investment and overinvestment and underinvestment to be prevalent.

4 Road accidents and motor insurance premiums in major European economies

In this chapter, we analyze the linkage between road accidents and motor insurance premiums in European countries. The contribution of the present paper is threefold. Firstly, it combines traffic accidents, an important externality arising from road congestion, with motor insurance premiums. Secondly, it focuses on carefully assembled data set comprising of public data on premium and road accident data for various European countries. Thirdly, departing from the linear models previously employed, the present study considers the nonlinear nonparametric generalized additive modelling approach, which is flexible enough to reveal the functional form between motor insurance premiums and determinant factors. We find that the functional form between road accidents and premiums is an upwards sloping line, highlighting the fact that the larger the traffic accidents the higher the premiums. This finding is robust to various combinations among the number of accidents and the number of either injured or killed persons in accidents. This finding provides empirical support for our hypothesized relationship between motor insurance premiums and road accidents. We also find that claims expenditure and per capital income exercise an increasing effect on premiums. Public policies aiming at mitigating traffic congestion should have an effect in terms of controlling motor insurance premiums.

4.1 Introduction

According to a World Health Organisation report (WHO, 2021), every year the lives of approximately 1.3 million people are lost due to road traffic crashes. Furthermore, million more people suffer non-fatal injuries, with many incurring a disability as a result of traffic accident related injuries. Economic and societal costs arising from traffic crashes are not negligible. Road traffic injuries cause considerable economic losses to individuals, their families, and to economies and societies. It has been estimated that road traffic crashes cost most countries 3% of their gross domestic product (WHO, 2021). In addition, traffic insurance providers face a profitability exposure arising from the random evolution of insured claims.

Motor insurance includes mandatory motor third-party liability (MTPL) and optional damage cover. It is the largest Property and Casualty (P&C) business line and represents 36% of the P&C sector in terms of premiums.

Modelling the impact of road accidents and quantity of insured losses on motor insurance premiums is therefore of significant importance. This modelling exercise can have important policy related implications. Such include the development of an online information system advising drivers for traffic congestion and other risk factors, the designing of an online ‘friendly declaration’ scheme when an accident occurs, and measures assisting drivers to develop a responsible driving habit and attitude.

The main task would be to reveal determinant factors of insurance premiums in motor insurance and hence profitability of motor insurance providers, in view of determining public policy measures aiming at reducing the detrimental effect of these factors on firms’ profitability.

4.2 Literature review and contribution

Motor insurance is considered one of the biggest insurance sectors. In Europe, the German, French, Italian and the UK motor insurance markets have been historically the dominant markets over the last decade or so (Insurance Europe, 2014, 2016, 2019). The size of the market in a country depends on a range of factors, such as the size of its economy, its geography and its demography. In recent years, an increase in the number of insured vehicles has been observed in most markets. Based on recent data from Insurance Europe (2019), the growth of claims paid and premiums between 2018 and 2019 was 3.9% and 3.1% respectively. Furthermore, motor claims paid reached an amount of 100 billion Euros in 2019, highlighting the need for revealing their determinant factors³.

Bortoluzzo et al. (2011), using a dataset provided by an insurance company, estimate insurance claims using the Tweedie and zero adjusted inverse Gaussian (ZAIG) methods. Their estimation approach was flexible enough to yield confidence intervals based on empirical quantiles using bootstrap simulation, with the fitted models potentially being useful in developing premium pricing strategies. They reveal determinant factors that influence claim size, and compare the results of these methods.

Guggemoos and Wagner (2018) focused on the German motor insurance market, and explored, amongst other issues, to what extent firms’ characteristics of the companies can explain premiums in MTPL. Using a panel data of German insurance companies and applying linear

³ <https://www.insuranceeurope.eu/publications/689/european-insurance-in-figures-2019-data/download/EIF+2021.pdf> (accessed 19 October 2022).

regression models, they revealed specific company characteristics associated with lower premiums.

In the present study, we depart from previous literature by adding another dimension to modelling motor insurance premiums. That extension refers to road congestion and road accidents and losses. Congestion and road accidents are both considered essential challenges for sustainable mobility in large cities, but their relationship is only partially explored by the literature. According to Albalade and Fageda (2019), the problem of urban traffic congestion carries significant negative externalities. Indeed, road congestion is considered a growing challenge for sustainable mobility and transport policy. In Europe, the costs attributable to congestion are estimated to be around 1% of annual gross domestic product (GDP), and constitutes one of the major concerns faced by urban citizens.

The contribution of the present paper is threefold. Firstly, it combines traffic accidents, an important externality arising from road congestion, with motor insurance premiums. Hence, the present study is an attempt to empirically link two strands of literatures, one analyzing motor insurance premiums and another looking at externalities of road congestion and accidents in terms of the motor insurance sector. Secondly, the present study focuses on carefully assembled data set comprising of public data on premium and road accident data for various European countries. Thirdly, the present paper wishes to contribute to the area of the employed methodology. Departing from the linear models previously employed, the present study considers the nonlinear nonparametric generalized additive modelling approach, which is flexible enough to reveal the functional form between motor insurance premiums and determinant factors. Thus, the present study methodologically relaxes the restrictive linearity or parametric nonlinearity approaches considered elsewhere in the literature.

4.3 Data

For this study, a panel data set was compiled from public data sources. The panel comprises of 11 European countries, namely Austria, Belgium, France, Germany, Greece, Italy, the Netherlands, Portugal, Spain, Switzerland, and the UK, and spans the period 2009-2016. Annual data were collected for the following variables reported in Table C.1. A pictorial representation of the variables for 2009, 2011, 2013, and 2016 is provided in Chart 1 through to Chart 28.

4.4 Methodology

Prior studies consider insurance premia, denoted by $prem$, to be a linear function of a set of independent variables collected in vector X . Vector X contains the variables with the names reported in Table 1, namely $X = \{claims_expenditure, no_active_comp_motor_ins, road_traffic_accidents, no_of_persons_killed, no_of_persons_injured, per_capita_gdp\}$.

A common representation of this relationship is the following linear parametric model:

$$E(prem/X) = \alpha + \beta' X \quad (1)$$

This parametric specification is quite restrictive and it is not based on solid theoretical foundations. To the contrary, we allow for a non-parametric nonlinear relationship between $prem$ and X to be estimated from the data (see Florackis et al., 2015; Florackis et al., 2020). The fundamental advantage of non-parametric estimation methods over parametric ones is that they do not require the specification of a functional form for the relationship between the variables under examination. These methods let data determine an appropriate model rather than imposing a specific parametric assumption on the data generating process. In this way, non-parametric methods are not subject to severe misspecification problems (see Racine, 2008).⁴

Misspecification is a particularly important concern when the examined relationship is non-linear. To address this concern using parametric techniques, power transformations of the variables are typically used (e.g., quadratic models). Apart from the difficulty in choosing the correct power transformation, these are global rather than local fits. Using a global fit, one assumes that the relationship between $prem$ and X does not vary over the entire range of X . This is again a rather strict assumption, since the relationship between the variables can be specific to local regions of X . Non-parametric techniques avoid this issue as they are flexible enough to provide local estimates of the relationship (see Keele, 2008).

⁴ It is also important to recall that testable theories typically indicate the direction (sign) of a relationship between two or more variables rather than the exact functional form of the relationship (see Beck and Jackman, 1998, for a critical overview of this issue). Therefore, relying solely on parametric techniques could prove inappropriate to test such hypotheses.

Local fit is particularly desirable when the examined relationship is highly non-linear, exhibiting multiple turning points. Parametric techniques try to capture such a relationship using piecewise regression models or adding higher order polynomials in equation (1) above.⁵ However, this approach is suboptimal as one has to exogenously impose the turning points of the relationship and then estimate these models. Non-parametric techniques avoid this problem, as the local fit endogenously produces these turning points.

While non-parametric estimation methods are much more flexible than parametric ones, they become rather computationally intensive as the number of regressors increases. Estimating multidimensional non-parametric models is carried out using splines (see Keele, 2008, for an overview of estimation methods).

To this end, we also put forward a non-parametric model, which relaxes the functional form on X . In this case, the conditional mean of the model is given by:

$$E(prem | X_1, X_2, \dots, X_6) = \alpha + f_1(X_1) + f_2(X_2) + \dots + f_6(X_6) \quad (2)$$

where $f_1(X_1) + f_2(X_2) + \dots + f_6(X_6)$ represent the non-linear non-parametric functions (relationships) between $prem$ and X_1, X_2, \dots, X_6 , respectively. Each non-parametric function is estimated using splines with optimal basis functions, a method discussed analytically in Keele (2008). The logic behind a spline is to estimate separate regression lines that are joined at the corresponding knots. An important advantage of the splines methodology, in comparison to the commonly used piecewise regressions, is that it does not pre-specify ad hoc cutoff points. The employed methodology in this study minimizes the following objective function:

⁵ See, for example, Sueyoshi, Goto and Omi (2010).

$$\min \left\{ \frac{1}{n} \sum_{i=1}^n (\text{prem}_i - f_1(X_{1i}) - \dots - f_6(X_{6i}))^2 + \lambda J \right\} \quad (3)$$

where J represents the roughness of the function f and n denotes the number of observations. The previous expression describes the trade-off between fitting perfectly the data (i.e. minimizing the squared residuals) and having the smoothest possible approximating function f . This trade off is controlled by parameter λ . As $\lambda \rightarrow \infty$, the penalty assigned to the roughness of the function is so high that the optimal function, f , is of linear form, since, by definition, a linear function has zero roughness for the whole range of the dependent variable values. In this case, the minimization problem becomes identical to least squares. On the other extreme, if $\lambda \rightarrow 0$, then this methodology will provide a very rough approximating function f that essentially fits each individual observation.⁶

Previous studies that employ a non-parametric approach use smoothing splines (e.g. Engle et al., 1986). In this study, instead of smoothing splines we employ penalized regression splines. Even though these two approaches yield similar results in practice, penalized regression splines use fewer parameters and, therefore, are computationally more efficient. This choice implies that the objective function becomes:

$$\min \left\{ \frac{1}{n} \sum_{i=1}^n (\text{prem}_i - f_1(X_{1i}) - \dots - f_6(X_{6i}))^2 + \lambda \int f''(\text{prem}_i) d(\text{prem}) \right\} \quad (4)$$

where $f(\text{prem})$ is a thin plate regression spline and f'' stands for the second derivative of f . This spline is constructed by starting with the basis for a full thin plate spline and then truncating this basis in an optimal manner to obtain a low rank smoother. Details of this procedure are provided in Wood (2006). The roughness of the function $f(\text{prem})$ is captured by its curvature $\int f''(\text{prem}) d(\text{prem})$.

⁶ Equation (3) is equivalent to minimizing the sum of squared residuals in the case of ordinary least squares (OLS). The main difference here is the presence of the term λJ .

The above methodology essentially refers to a penalized likelihood maximization problem solved by Penalized Iteratively Reweighted Least Squares (P-IRLS) (see Keele, 2008, ch. 5, for a description of the procedure). The selection of the optimal smoothing parameter λ is integrated in this procedure using the Generalized Cross Validation (GCV) criterion. According to this criterion, the optimal λ minimizes the following expression:

$$GCV(\lambda) = \frac{RSS(\lambda)}{[1 - n^{-1}tr(S(\lambda))]^2} \quad (5)$$

where $RSS(\lambda) = e'e$ is the sum of squared residuals of the estimated model for a given λ and $tr(S(\lambda))$ is the trace of the projection matrix $S(\lambda)$ that satisfies $Q^\perp \Lambda = SQ$. For each of the models estimated in this study, the corresponding minimized GCV scores are also reported.

This methodology also allows us to construct confidence bands for the fitted spline $Q^\perp \Lambda = SQ$. Its covariance matrix is given by $cov(Q) = SS'\sigma^2$, where σ^2 is the residuals' variance. Given an unbiased estimator for this variance and a large sample size, we can form approximate 95% pointwise confidence interval bands, using ± 2 times the square root of $SS'\sigma^2$.

Furthermore, this methodology enables us to test the statistical significance of the non-parametric component in the correspondent parametric linear model. This is done via an F-test that compares the sum of squared residuals (RSS) of the nonlinear nonparametric model (unrestricted) with the RSS of the restricted linear model. The corresponding F statistic is given by:

$$F = \frac{(RSS_{restricted} - RSS_{unrestricted}) / (tr(S) - 1)}{RSS_{unrestricted} / df_{res,unrestricted}} \quad (6)$$

where $df_{res} = n - tr(2S - SS')$. This test statistic under the null hypothesis of equal RSS follows an approximate F-distribution with $df_{res,restricted} - df_{res,unrestricted}$ and $df_{res,unrestricted}$ degrees of freedom.

Similarly, we are also able to test whether the non-parametric model has superior explanatory power in comparison to the parametric linear model. Since we employ P-IRLS, a Likelihood Ratio test can be used as follows:

$$LR = -2(\text{LogLikelihood}_{restricted} - \text{LogLikelihood}_{unrestricted}) \quad (7)$$

This test compares the log-likelihood of the linear parametric model (restricted) with the log-likelihood of the nonparametric model (unrestricted). The test statistic under the null hypothesis of equal likelihoods follows an approximate χ^2 distribution with degrees of freedom given by the difference in the number of parameters across the two models.

4.5 Empirical Findings

We estimate model (2) where the six regressors, X_1, \dots, X_6 (as defined in Table 1) enter non-parametrically as nonlinear functions denoted by $s(X_i), i = 1, \dots, 6$. The significance of each of these functions is reported in Table 4.1. As shown in this Table, all 6 variables appear to significantly influence prem. Importantly, 5 out of the 6 smooth terms are significant at the 1% level. This suggests that our nonlinear non-parametric model is capable of revealing strong connections from the 6 independent variables.

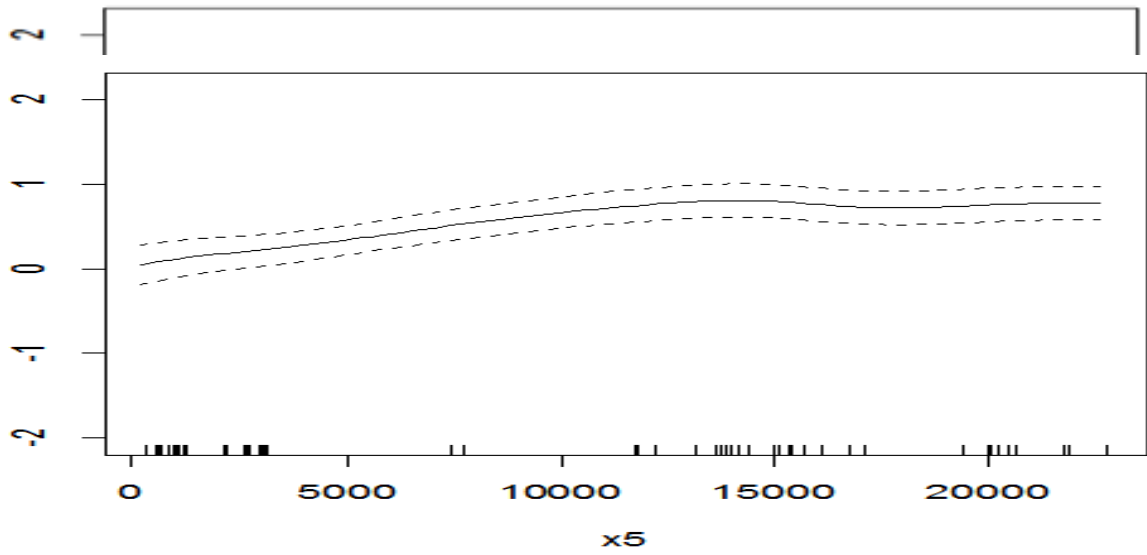
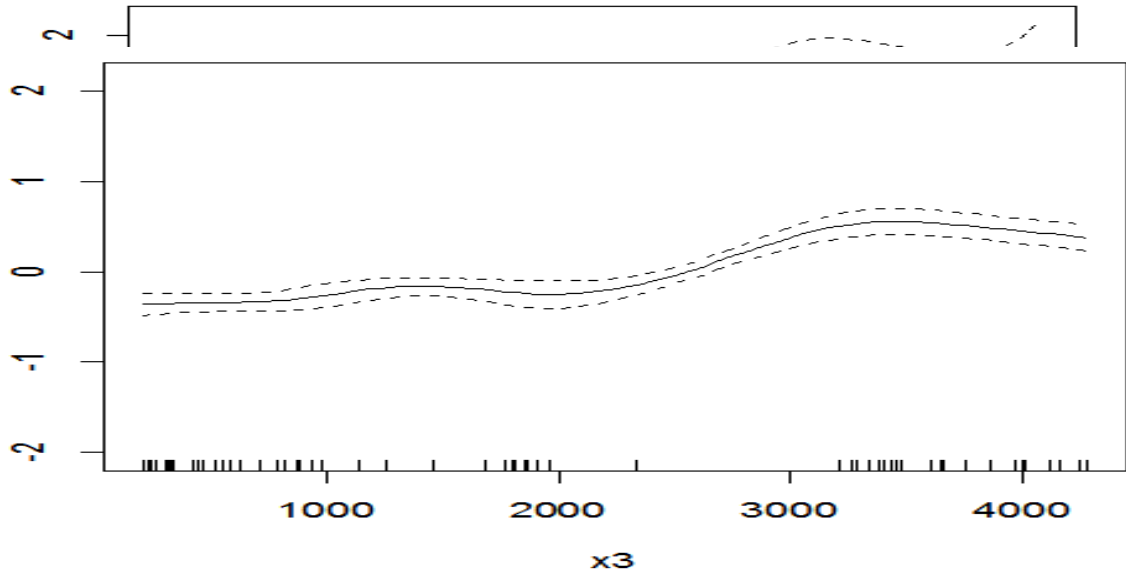
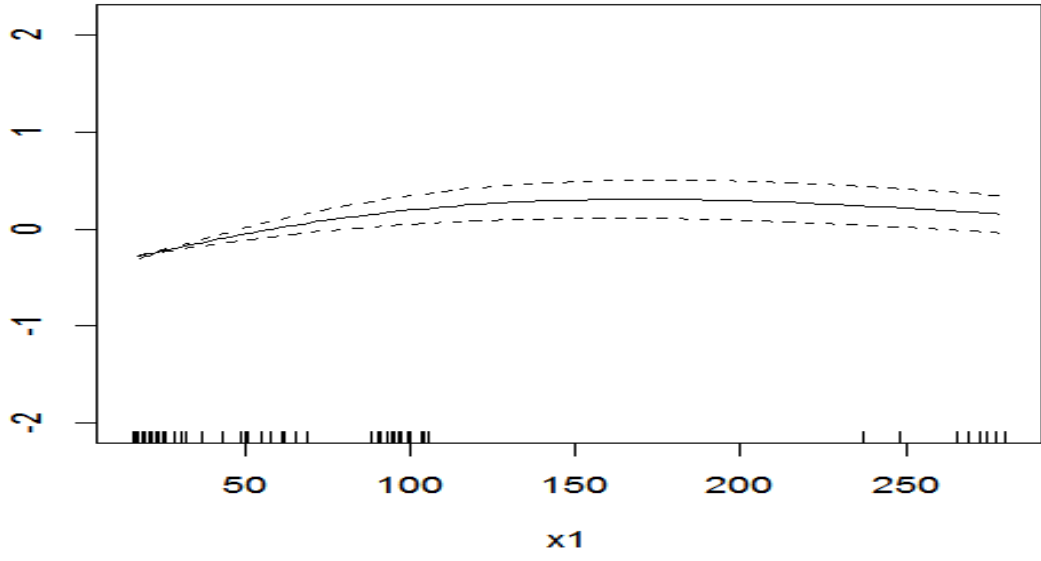
Table 4 1: Approximate significance of smooth terms

	Chi.sq	p-value
$s(X_1)$	54.11	<2e-16 ***
$s(X_2)$	587.09	<2e-16 ***
$s(X_3)$	121.89	<2e-16 ***
$s(X_4)$	15.06	0.0166 *
$s(X_5)$	32.35	<2e-16 ***
$s(X_6)$	429.72	<2e-16 ***

Notes: ‘***’ denotes significance at 0.001, ‘**’ denotes significance at 0.01, and ‘*’ denotes significance at 0.05.

We next test whether the nonlinear model has superior explanatory power in comparison to the parametric linear model. Since we employ P-IRLS, a Likelihood Ratio test reflected in (7) is applied. The test statistic under the null hypothesis of equal likelihoods follows an approximate χ^2 distribution with degrees of freedom given by the difference in the number of parameters across the two models. The results suggest that the log likelihood of the nonlinear model is -395.22 whilst that of the linear model is -541.72, highlighting that, on the basis of the F-test, defined in (6), the nonlinear model has superior explanatory power (p-value <0.01) and thus the nonlinear model is preferred to the linear specification.

We next explore the functional form between the motor insurance premiums and each of the 6 predictor variables. The functions and the confidence intervals are pictorially represented in Figure 4.1.



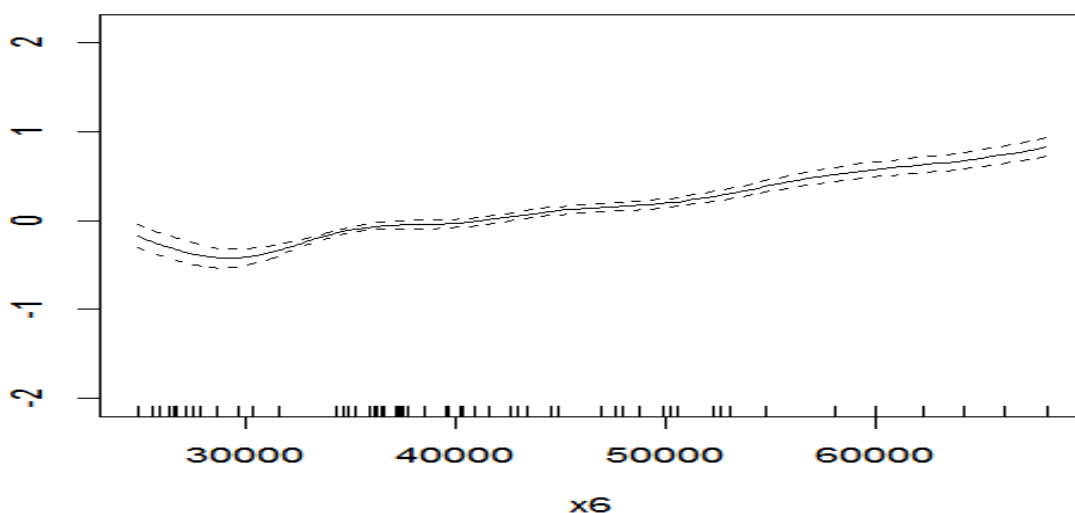


Figure 4.1 : Estimated functional forms

As shown in the Figure, changes in the number of active companies in the motor insurance sector ($\text{no_active_comp_motor_ins} = [X]_{-1}$) does not appear to influence dramatically premiums as the function appears to be a flat line especially for large numbers of companies in the sector. The functional form between variable measuring road accidents ($\text{road_traffic_accidents} = X_2$) and prem is an upwards sloping line in a nonlinear way, highlighting the fact that the larger the traffic accidents the higher the premiums. This finding provides support for our hypothesized relationship between motor insurance premiums and road accidents. Given that road accidents can be seen a negative externality of traffic congestion, we could conclude that traffic congestion has a detrimental knock-on effect on motor insurance premiums. Therefore, public policies aiming at mitigating traffic congestion should have an effect in terms of controlling motor insurance premiums. The functional form between the variable $\text{no_of_persons_killed} (=X_3)$ and prem appears to be also upwards sloping in a nonlinear way, especially at higher levels of the independent variable. The functional form between the variable $\text{no_of_persons_injured} (=X_4)$ and prem appears to be linear. Comparing the latter three functional forms, one could argue that the effect of road traffic accidents upon premiums and the effect of deaths upon premiums may absorb the effect of injuries, so that any ‘remaining’ effect on premiums arising from injuries is only linearly related to premiums. The functional form for the relationship between variable $\text{claims_expenditure} (=X_5)$ and premiums appears to be positively sloping, suggesting that an increase in claims expenditures is passed through on to premiums. Finally, the functional form for the relationship between $\text{per_capita_gdp} (=X_6)$ and premiums is positively sloping,

indicating that motor insurance companies' pricing policy follows the behavior of economic activity.

4.6 Robustness

Having justified the importance of the nonlinear model, we next proceed to some robustness tests. We first seek to assess if the combination of variables road_traffic_accidents (=X₂) and no_of_persons_killed (=X₃) would alter the results. The intuition of examining this combination is that the higher the number of road accidents the higher will be the number of persons killed, thereby there may be a relationship between these two variables. To capture this case, a tensor product smooth is employed for the two variables in question. The result for the tensor product smooth is reported in Figure 4.2, and the resulting functional forms are in Figure 4.3. As shown in Figure 4.3, the previously identified upwards sloping functions remain valid for this case.

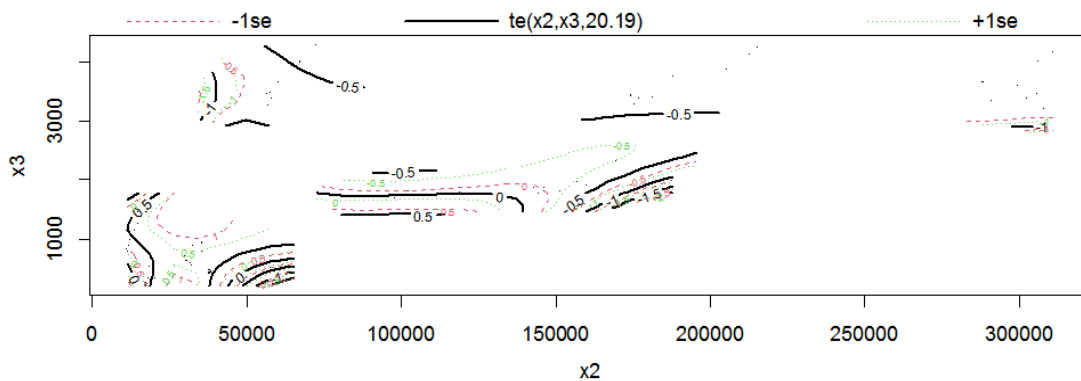


Figure 4.2 : Tensor, X₂ and X₃

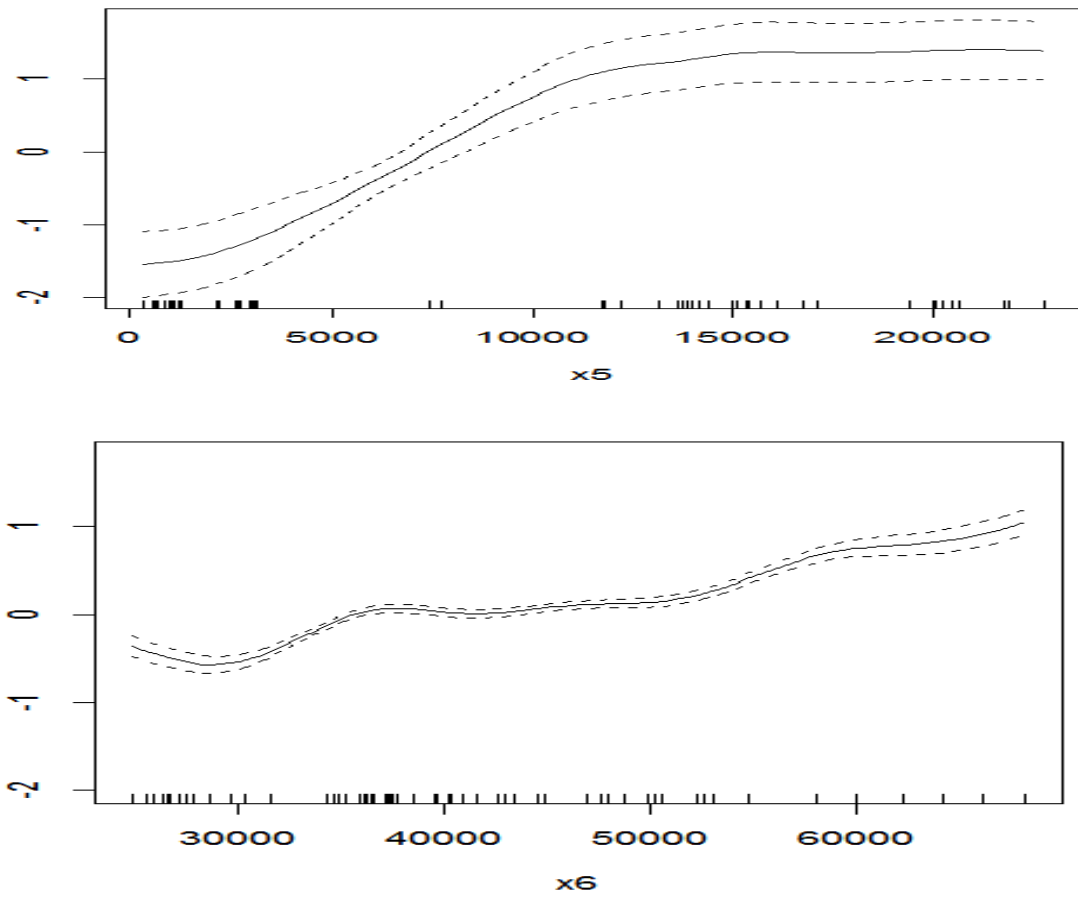


Figure 4 3 : Functional forms, tensor X2 and X3

In a second robustness test, we assess if the combination of X_2 (no_of_road_accidents) and X_4 (no_of_persons_injured) could alter the results. The tensor product and the resulting functional forms are reported in Figures 4.4 and 4.5 respectively.

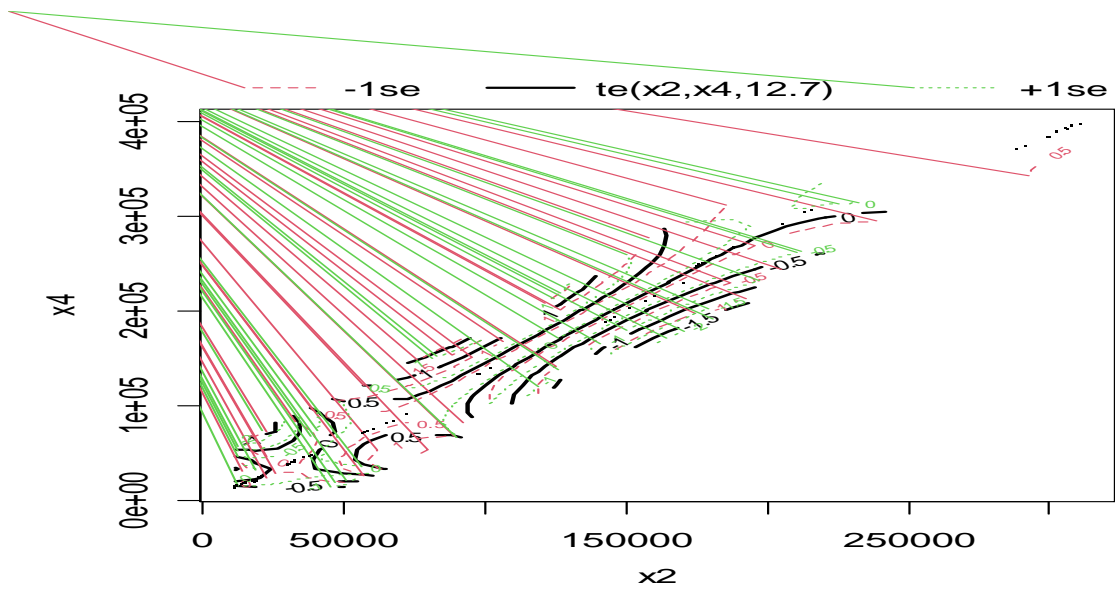


Figure 4 4 : Tensor, X2 and X4

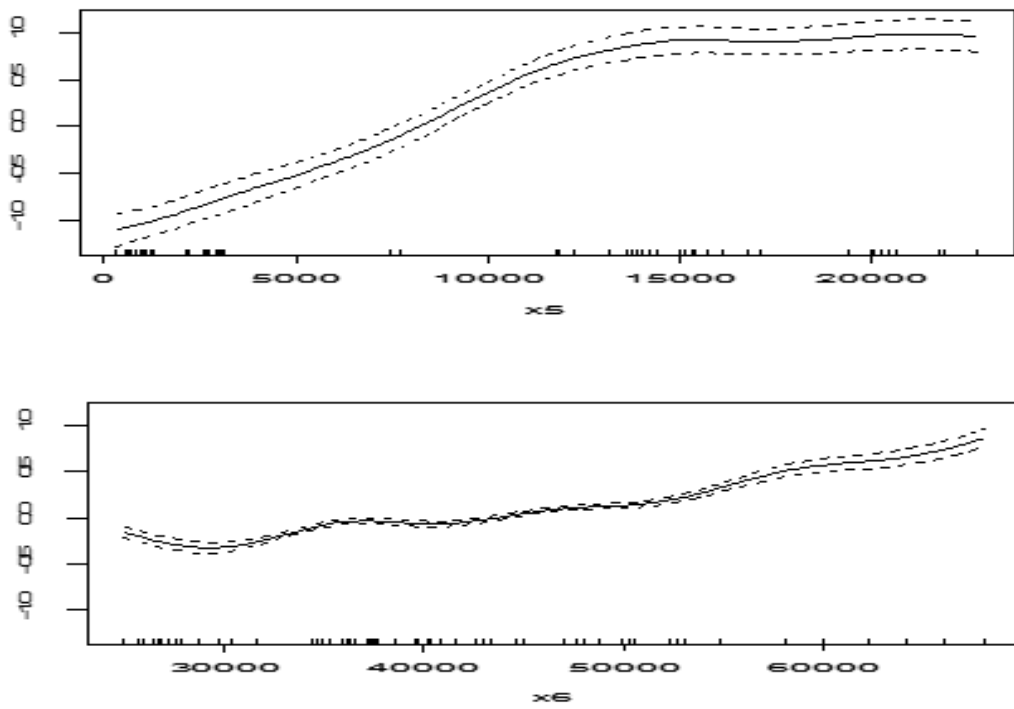


Figure 4 5 : Functional forms, tensor X2 and X4

Figure 4.5 illustrates that the previously identified functional forms are robust to the combination between the number of traffic accidents and the number of persons injured.

4.7 Conclusions and Implications

We have explored the relationship between traffic road accidents and motor insurance premiums in major European countries, by hypothesizing that traffic accidents, being an important externality arising from road congestion, are linked with motor insurance premiums. We used a carefully assembled data set comprising of public data on premium and road accident data for various European countries. In terms of the empirical methodology adopted, we depart from the linearity framework employed in the existing literature and adopt the nonlinear nonparametric generalized additive modelling approach. This approach has the advantage of being flexible enough to reveal the functional form between motor insurance premiums and determinant factors. We find that the functional form between road accidents and premiums is an upwards sloping line, highlighting the fact that the larger the traffic accidents the higher the premiums. This finding is robust to various combinations among the number of accidents and the number of either injured or killed persons in accidents. This finding provides empirical support for our hypothesized relationship. We also find that claims expenditure and per capital income exercise an increasing effect on premiums.

Public policies aiming at mitigating traffic congestion should have an (implicit) effect upon motor insurance premiums. In addition, public policies including public infrastructure investment projects, for instance in the form of proper road maintenance, and traffic law enforcement aiming at managing traffic accidents should also carry a knock-on effect on motor insurance industry and the pricing of motor insurance policies. Electronic traffic avoidance applications should, furthermore, be useful in terms of reducing congestion and consequently exercising an implicit effect upon motor premiums. The development of smart artificial intelligence-based systems advising drivers of the optimum and/or fastest routes should carry

implications upon the motor insurance sector as well. As the realization of congestion is a random variable obeying random walk behavior, nonlinear models for analyzing and forecasting traffic congestion (and thus, advising on traffic avoidance) are of paramount relevance, as is highlighted by the findings in the present study.

5 Conclusion

The present dissertation investigates the relationship between competitiveness and growth on a worldwide scale. It also includes a thorough examination of business investments, resource distribution, and risk management, with a specific focus on the European Union. The study explores intricate ideas and empirical research concerning market competition, investment habits at the firm level, the influence of agency theory on corporate investments, and the correlation between road accidents and motor insurance premiums in major European economies.

The first part of the study (Section 2 "On the Nexus of Competitiveness and Growth Across the Globe") elucidates various significant conclusions pertaining to the interconnection between competitiveness, growth, and technology within the framework of global markets. The study posits that the presence of competition among enterprises is a fundamental factor in propelling market economies. In recent decades, the phenomenon of globalization has resulted in a heightened level of competitiveness characterized by increased complexity. This has prompted corporations to expand their operations on a worldwide scale, driven by the objective of achieving improved profit margins. Nevertheless, the research emphasizes that competition offers advantages that go beyond just market shares and growth rates, as it plays a pivotal role in promoting innovation, enhancing productivity development, and bolstering external competitiveness. Furthermore, the COVID-19 epidemic has caused substantial disruptions to the global economy, affecting both the supply and demand aspects. The research highlights the significance of multinational companies (MNEs) within global value chains and the prospective trend towards reshoring as a risk mitigation strategy. The aforementioned transition, although serving to alleviate the impact of unforeseen disruptions, has the potential to impede developing nations' acquisition of financial resources and their ability to engage with global markets, hence influencing their capacity for human capital accumulation and knowledge advancement. Furthermore, the empirical examination of competition within a diverse range of countries from 2000 to 2019 demonstrates consistently reduced levels of competitiveness. Firm-level metrics, such as markups and profitability, indicate that the intensity of competition differs between sectors and countries, with greater levels reported in the services sector and among nations that export oil. Moreover, the research reveals a significant positive relationship between competition and economic growth. Increased competition is correlated with a reduction in prices, an enhancement of welfare, and a rise in investment and exports. The findings from firm-level research suggest that a decrease in firm

markups is associated with higher levels of investment, exports, and productivity growth. The research also examines the influence of cutting-edge technologies, including artificial intelligence (AI), robotics, biotechnology, and nanotechnology. The aforementioned technologies, which are predominantly dominated by key stakeholders like as the United States and China, constitute a substantial market. The results emphasize the necessity for nations to cultivate technological capabilities and foster innovation in order to effectively leverage the advantages offered by these cutting-edge technologies. In summary, the research underscores the significance of competition as a catalyst for economic expansion, advancement in technology, and enhancement of efficiency. The aforementioned statement highlights the potential benefits that can be derived from the promotion of competition, particularly within the realm of emerging technologies. Policymakers are advised to prioritize the promotion of competition by implementing comprehensive competition policies, complemented by macroeconomic policies, and devising strategies to effectively address the complexities and potential benefits associated with emerging frontier technologies. The second essay examines the investment behavior of enterprises inside the European Union (EU) following notable disruptions, such as the COVID-19 epidemic and geopolitical occurrences like Russia's incursion into Ukraine. The study centers around the fundamental inquiry of whether a trade-off exists between the allocation of resources and the implementation of risk mitigation strategies when confronted with fiscal difficulties. The study utilizes a comprehensive methodology, taking into account the effects of ownership and management choices on the most advantageous investment strategies. The examination of the interactions between principals and agents within organizations is guided by theoretical frameworks, such as Agency Theory. The investigation uncovers two essential facets of investing behavior: excessive investment and insufficient investment. Overinvestment refers to the allocation of resources towards projects that have a negative net present value (NPV). This phenomenon is frequently linked to agency problems, namely the tendency of managers to engage in empire building. Conversely, the phenomenon of underinvestment arises when companies choose to forgo initiatives with positive net present value (NPV), which may stem from disagreements between bondholders and shareholders or knowledge asymmetry between managers and owners. The methodology utilized in this study, drawing inspiration from Richardson's (2006) work, involves the division of total investment into two distinct components: maintenance and new project expenditures. The regression model provides an estimation of anticipated investments, hence enabling the detection of potential overinvestment or underinvestment by examining the residuals. The results derived from a representative sample of 10,141 United States firms

during the time span of 2011 to 2021 reveal that 32% of European Union firms exhibit appropriate investment behavior, whereas 38% demonstrate excessive investment tendencies, and the other 30% engage in insufficient investment practices. The findings of sector-level study reveal that the Finance, Insurance, and Real Estate sector indicate a high level of investment efficiency, as almost 70% of enterprises within this industry demonstrate sound investment practices. It is worth noting that the Construction industry exhibits the most significant overinvestment, whilst the Manufacturing sector encounters the most severe underinvestment.

The second part of the study (Section 3 "Corporate Investments: Resource Allocation and Risk Mitigation Channels") provides a comprehensive analysis of corporate investment strategies in the European Union, with a specific focus on the effects of recent economic shocks and how they have influenced the allocation of resources and the management of risks. The approach emphasizes the crucial equilibrium that organizations must uphold between excessive investment and insufficient investment, since both extremes provide substantial risks to company expansion and shareholder worth. The study emphasizes the significance of strategic decision-making in investments, including aspects such as the development of new products, mergers and acquisitions, and international diversification.

The research also provides vital insights into how companies manage the intricacies of investment decisions in the face of changeable economic situations. The data analysis indicates that a substantial proportion of European Union (EU) companies are involved in either excessive or insufficient investment, indicating a widespread discrepancy between managerial decisions and the most advantageous investment approaches. The misalignment is mostly caused by agency difficulties, when the interests of managers may not always line with those of the shareholders, resulting in poor investment decisions.

Furthermore, the study explores the intricacies of agency theory, elucidating the impact of principal-agent relationships on corporate investment choices. The results suggest that the organizational framework of a company, specifically the congruence between the objectives of major shareholders and company executives, has a pivotal influence on the formulation of investment approaches. This relationship is crucial in assessing whether a company is prone to overinvestment or underinvestment.

The research further expands its scope to examine the relationship between road accidents and car insurance prices in significant European economies. This study focuses on the externalities

of road congestion and its economic repercussions, providing a distinct viewpoint on the interaction between public policy, corporate finance, and societal concerns.

This study makes a substantial contribution to the comprehension of business investment plans in the European Union, offering vital insights for policymakers, corporate executives, and investors. The statement highlights the necessity of having efficient systems of governance in place to ensure that managerial actions are in line with the interests of shareholders. It also emphasizes the significance of taking into account external economic considerations when making corporate decisions.

The third part of the study (Section 4 "Road accidents and motor insurance premiums in major European economies") provides valuable insights into the correlation between road accidents and car insurance prices in prominent European economies. In our research, we utilize a non-linear nonparametric generalized additive modeling strategy to deviate from conventional linear models. This allows us to gain a more adaptable comprehension of the complex relationship between automobile insurance rates and the factors that determine them. Our research findings demonstrate a strong positive association between traffic accidents and motor insurance premiums. The relationship between the number of traffic accidents and insurance premiums is represented by a positively inclined line, indicating that an escalation in traffic accidents is associated with elevated insurance premiums. This association is valid even when accounting for fluctuations in the frequency of accidents, as well as the number of individuals affected by injuries or fatalities resulting from accidents. Furthermore, our research elucidates additional influential elements that impact vehicle insurance premiums. The relationship between expenditure on claims and per capita income demonstrates a positive correlation with insurance premiums, indicating that higher levels of claims and economic well-being are associated with elevated costs of insurance. This implies that economic issues are of significant importance in determining the formulation of car insurance pricing regulations. The consequences of the research have broader significance that beyond the domain of insurance. Research has demonstrated that the implementation of public policies designed to alleviate traffic congestion, which is a notable factor in the occurrence of road accidents, has the ability to influence the regulation of motor insurance costs. Investments in public infrastructure, namely in the areas of road maintenance and the implementation of effective traffic law enforcement, have the potential to exert an indirect influence on the motor insurance business and its pricing tactics. Furthermore, our findings highlight the potential impact of electronic traffic avoidance applications and intelligent artificial intelligence-based systems that provide

drivers with guidance on the most efficient routes. This suggests a potential opportunity for mitigating traffic congestion and, subsequently, lowering motor insurance costs. In summary, our research not only reveals a definitive empirical correlation between road accidents and motor insurance premiums, but also underscores the wider economic and policy ramifications. The incorporation of a non-linear nonparametric modeling approach enhances the comprehension of this intricate association, establishing a basis for well-informed policy formulation and strategic decision-making in the motor insurance industry and other related domains.

Overall, the analysis is a comprehensive study encompassing various aspects of market competition, corporate investment strategies, and their macroeconomic implications, including the specific case of motor insurance in the context of European road safety.

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Appendix A

Table A 1: Summary Statistics By Sector

Agriculture, Forestry and Fishing	N	Mean	Median	Std. Dev.	min	max
<i>I_{NEW}</i>	534	.084	.063	.116	-.442	.723
<i>TobinsQ</i>	1024	1.684	1.495	.93	.534	13.782
<i>Leverage</i>	1024	.248	.235	.14	0	.876
<i>RD</i>	1008	.13	.131	.118	-.554	.804
<i>Returns</i>	994	.135	.082	.534	-.854	5.17
<i>Size</i>	1024	8.211	8.133	1.564	4.141	11.153
<i>ROA</i>	1024	.028	.046	.12	-1.227	.273
<i>FCF</i>	912	-.055	-.051	.071	-.313	.234
Mining	N	Mean	Median	Std. Dev.	min	max
<i>I_{NEW}</i>	255	.013	.002	.041	-.176	.225
<i>TobinsQ</i>	448	1.384	1.27	.486	.698	4.795
<i>Leverage</i>	448	.271	.31	.179	0	.842
<i>RD</i>	428	.081	.083	.087	-.223	.414
<i>Returns</i>	421	.178	.093	.519	-.773	4.02
<i>Size</i>	448	7.548	7.543	1.075	3.953	10.26
<i>ROA</i>	448	.04	.05	.082	-.454	.273
<i>FCF</i>	370	-.041	-.045	.076	-.271	.269
Construction	N	Mean	Median	Std. Dev.	min	max
<i>I_{NEW}</i>	8617	.091	.064	.112	-1.237	1.44
<i>TobinsQ</i>	12466	2.238	1.753	1.755	.345	48.839
<i>Leverage</i>	12466	.198	.189	.166	0	.876
<i>RD</i>	12261	.103	.108	.151	-7.643	1.88

<i>Returns</i>	12266	.196	.109	.712	-.972	26.194
<i>Size</i>	12466	7.158	7.015	1.594	2.03	11.153
<i>ROA</i>	12465	.046	.06	.12	-1.577	.273
<i>FCF</i>	11063	-.047	-.033	.109	-1.612	.234

Manufacturing	N	Mean	Median	Std. Dev.	min	max
<i>I_{NEW}</i>	719	.044	.029	.084	-.209	.513
<i>TobinsQ</i>	1109	1.87	1.511	1.589	.566	43.995
<i>Leverage</i>	1109	.27	.269	.183	0	.876
<i>RD</i>	1083	.127	.117	.142	-1.234	2.692
<i>Returns</i>	1071	.177	.104	.609	-.948	9.897
<i>Size</i>	1109	7.939	7.635	1.89	3.07	11.153
<i>ROA</i>	1109	.05	.052	.086	-.966	.273
<i>FCF</i>	1034	-.029	-.025	.068	-.576	.253

Transportation, Communications, Electric, Gas and Sanitary service	N	Mean	Median	Std. Dev.	min	max
<i>I_{NEW}</i>	735	.036	.02	.06	-.104	.429
<i>TobinsQ</i>	944	1.814	1.438	1.222	.741	14.8
<i>Leverage</i>	944	.203	.195	.139	0	.639
<i>RD</i>	935	.091	.083	.064	-.25	.401
<i>Returns</i>	941	.151	.118	.422	-.785	3.912
<i>Size</i>	944	7.423	7.419	1.297	3.783	11.018
<i>ROA</i>	944	.054	.051	.057	-.397	.251
<i>FCF</i>	799	-.021	-.016	.073	-.987	.237

Wholesale Trade	N	Mean	Median	Std. Dev.	min	max
<i>I_{NEW}</i>	1490	.041	.026	.068	-.469	.41

<i>TobinsQ</i>	1954	2.231	1.83	1.499	.514	27.087
<i>Leverage</i>	1954	.189	.159	.178	0	.876
<i>RD</i>	1924	.137	.134	.094	-1.266	.671
<i>Returns</i>	1915	.195	.098	.631	-.893	9.664
<i>Size</i>	1954	7.316	7.181	1.602	2.917	11.153
<i>ROA</i>	1954	.069	.072	.088	-1.577	.273
<i>FCF</i>	1736	-.008	-.009	.07	-.519	.265

Retail Trade	N	Mean	Median	Std. Dev.	min	max
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<i>I_{NEW}</i>	39	.129	.101	.156	-.119	.54
<i>TobinsQ</i>	135	1.685	1.069	1.213	.842	6.503
<i>Leverage</i>	135	.179	.134	.171	0	.714
<i>RD</i>	55	.125	.119	.075	-.072	.327
<i>Returns</i>	135	.286	.212	.451	-.749	1.889
<i>Size</i>	135	7.546	7.977	1.347	4.592	9.823
<i>ROA</i>	135	.033	.013	.051	-.124	.24
<i>FCF</i>	45	-.012	-.008	.06	-.173	.123

Finance, Insurance and Real Estate	N	Mean	Median	Std. Dev.	min	max
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<i>I_{NEW}</i>	2875	.082	.061	.113	-.498	1.207
<i>TobinsQ</i>	4026	2.731	2.016	3.292	.298	105.09
<i>Leverage</i>	4027	.17	.113	.19	0	.876
<i>RD</i>	3894	.11	.106	.133	-1.409	1.517
<i>Returns</i>	3982	.216	.118	.728	-.978	17.743
<i>Size</i>	4027	6.856	6.716	1.581	2.185	11.153
<i>ROA</i>	4026	.042	.055	.14	-1.577	.273
<i>FCF</i>	3454	-.027	-.016	.108	-1.364	.257

Services	N	Mean	Median	Std. Dev.	min	max
<i>I_{NEW}</i>	48	.04	.033	.034	-.03	.147
<i>TobinsQ</i>	48	1.62	1.516	.428	1.056	2.648
<i>Leverage</i>	48	.385	.388	.183	.006	.67
<i>RD</i>	48	.049	.049	.084	-.463	.156
<i>Returns</i>	48	.077	.104	.318	-.947	.535
<i>Size</i>	48	10.742	11.153	1.01	4.356	11.153
<i>ROA</i>	48	.002	.027	.234	-1.57	.117
<i>FCF</i>	47	-.021	-.021	.021	-.088	.011

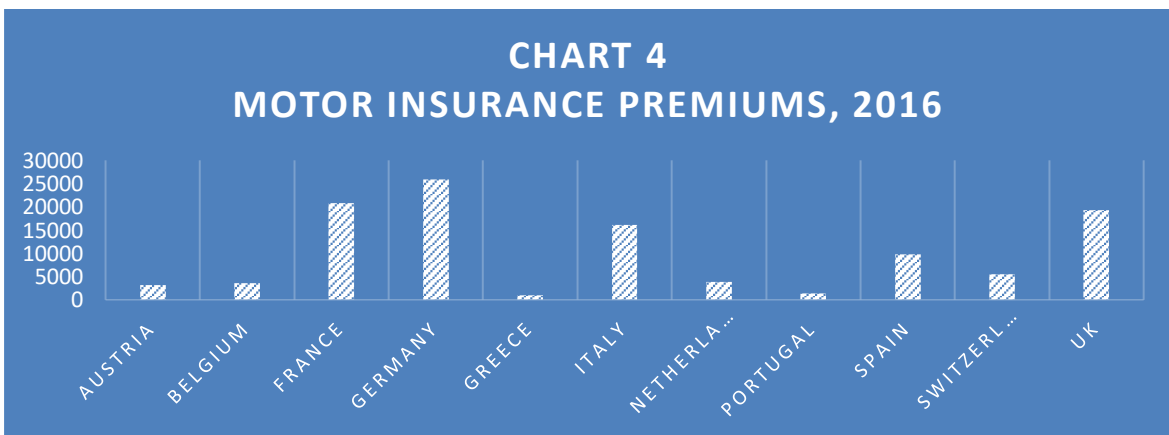
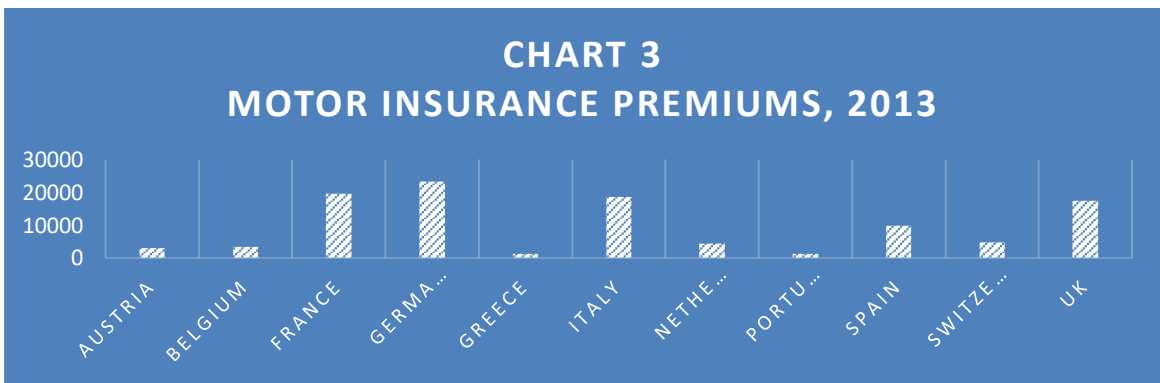
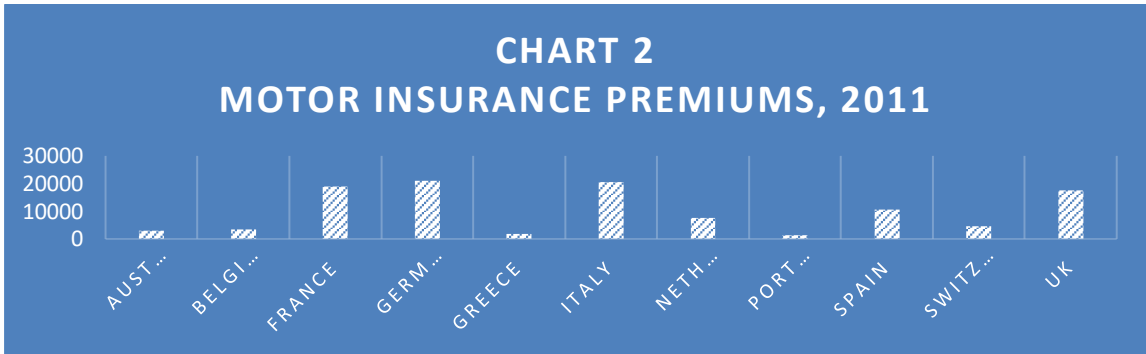
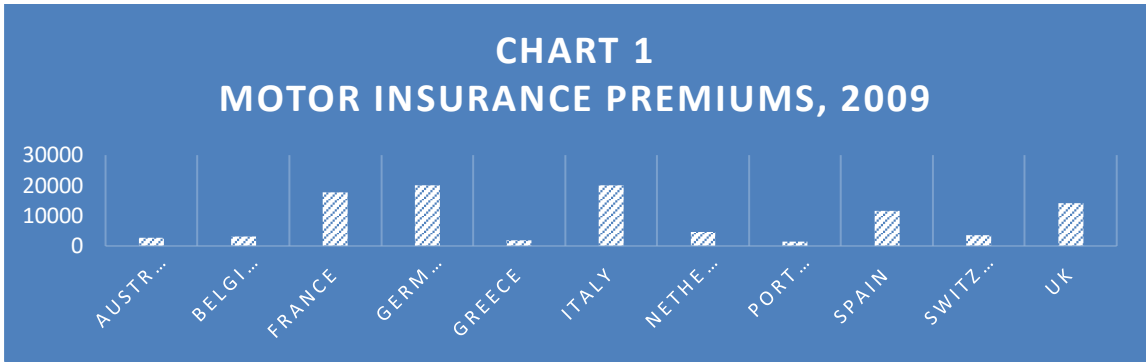
Table A 2: Under/Over-Investment By Sector

	Sector Investment Behavior			Number of firms	Sector Characteristics		
	Under-investment	Over investment	Normal investment	# of firms	Subsidiary number (st. dev.)	R&D	HHI
Agriculture, Forestry and Fishing	9 (27.28%)	16 (48.48%)	8 (24.24%)	33	13.14 (33.88)	0.04 (0.05)	0.49 (0.28)
Mining	161 (33.6%)	263 (55%)	54 (11.4%)	478	22.81 (33.88)	0.04 (0.05)	0.49 (0.28)
Construction	36 (38.29%)	62 (65.95%)	4 (4.25%)	102	12.67 (45.34)	0 (0)	0.14 (0.08)
Manufacturing	1,615 (40.72%)	1,576 (39.73%)	775 (19.55%)	3,966	29.51 (64.27)	0.05 (0.08)	0.07 (0.05)
Transportation, Communications, Electric, Gas and Sanitary service	204 (30.54%)	322 (48.20%)	142 (21.26%)	668	12.71 (34.23)	0.003 (0.02)	0.15 (0.13)
Wholesale Trade	101 (32.01%)	165 (52.38%)	49 (15.61%)	315	22.97 (43.91)	0 (0.002)	0.12 (0.10)
Retail Trade	175 (35.35%)	254 (51.31%)	66 (13.34%)	495	4.96 (17.77)	0.001 (0.013)	0.19 (0.15)
Finance, Insurance and Real Estate	20 (9.94%)	581 (28.87%)	1,411 (61.19%)	2,012	0.83 (2.28)	0.02 (0.06)	0.24 (0.31)
Services	715 (37.01%)	602 (31.22%)	611 (31.77%)	1,928	23.83 (69.69)	0.04 (0.07)	0.07 (0.06)
Total	3,036 (30%)	3,841 (38%)	3,120 (32%)	10,141			

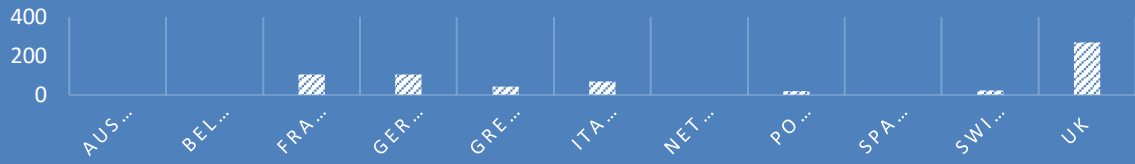
Appendix B

Table C 1: Variables and data sources

Variable	Name	Source	Access
Total motor insurance (MTPL and damage): Direct premiums written on Domestic Market	prem	https://www.insuranceeuropa.eu/statistics	https://www.insuranceeuropa.eu/statistics
Number of active companies in motor insurance on Domestic Market	no_active_comp_motor_ins (= X_1)	https://www.insuranceeuropa.eu/statistics	https://www.insuranceeuropa.eu/statistics
Road traffic accidents (number)	road_traffic_accidents (= X_2)	Table A, Statistics of Road Traffic Accidents in Europe and North America	https://unece.org/sites/default/files/2022-01/2113621_E_pdf_web.pdf
Number of persons killed in road traffic accidents (number)	no_of_persons_killed (= X_3)	Table A, Statistics of Road Traffic Accidents in Europe and North America	https://unece.org/sites/default/files/2022-01/2113621_E_pdf_web.pdf
Number of persons injured in road traffic accidents	no_of_persons_injured (= X_4)	Table A, Statistics of Road Traffic Accidents in Europe and North America	https://unece.org/sites/default/files/2022-01/2113621_E_pdf_web.pdf
Total motor insurance (MTPL and damage): claims expenditure	claims_expenditure (= X_5)	https://www.insuranceeuropa.eu/statistics	https://www.insuranceeuropa.eu/statistics
GDP per capita, USD, current prices and PPPs	per_capita_gdp (= X_6)	OECD	https://stats.oecd.org/indices.aspx?queryid=61433



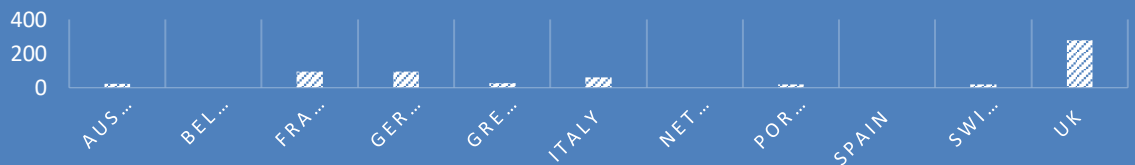
**CHART 5
NUMBER OF ACTIVE MOTOR INSURANCE
COMPANIES, 2009**



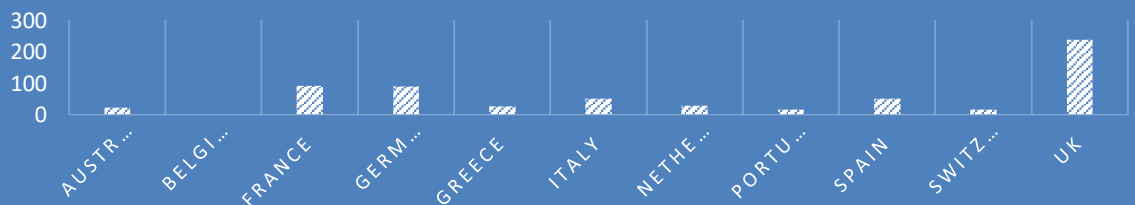
**CHART 6
NUMBER OF ACTIVE MOTOR INSURANCE
COMPANIES, 2011**



**CHART 7
NUMBER OF ACTIVE MOTOR INSURANCE
COMPANIES, 2013**



**CHART 8
NUMBER OF ACTIVE MOTOR INSURANCE
COMPANIES, 2016**



**CHART 9
TRAFFIC ACCIDENTS, 2009**



**CHART 10
TRAFFIC ACCIDENTS, 2011**



**CHART 11
TRAFFIC ACCIDENTS, 2013**



**CHART 12
TRAFFIC ACCIDENTS, 2016**



CHART 13
NUMBER OF PERSONS KILLED, 2009



CHART 14
NUMBER OF PERSONS KILLED, 2011



CHART 15
NUMBER OF PERSONS KILLED, 2013



CHART 16
NUMBER OF PERSONS KILLED, 2016



CHART 17
NUMBER OF PERSONS INJURED, 2009



CHART 18
NUMBER OF PERSONS INJURED, 2011

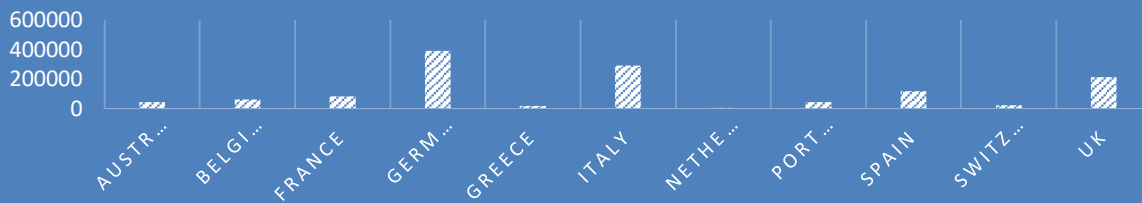


CHART 19
NUMBER OF PERSONS INJURED, 2013



CHART 20
NUMBER OF PERSONS INJURED, 2016



**CHART 21
PER CAPITA GDP, 2009**



**CHART 22
PER CAPITA GDP, 2011**



**CHART 23
PER CAPITA GDP, 2013**



**CHART 24
PER CAPITA GDP, 2016**



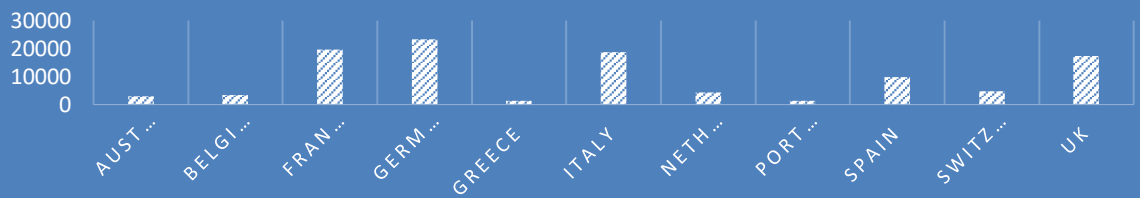
**CHART 25
CLAIMS EXPENDITURE, 2009**



**CHART 26
CLAIMS EXPENDITURE, 2011**



**CHART 27
CLAIMS EXPENDITURE, 2013**



**CHART 28
CLAIMS EXPENDITURE, 2016**

