3

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3

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Content

Non-technical summary

July 2019

This issue of Banco de Portugal Economic Studies includes three articles, whose non-technical summaries are presented below, and a synopsis titled "Business models and firm performance".

Regulatory costs and performance of Portuguese firms

João Amador, Sónia Cabral and Birgitte Ringstad

The institutional setting of an economy in its multiple dimensions is one of the drivers of productivity and sustainable growth. Hence, it is important to understand how firms' assessments of institutional barriers correlate with their performance. This article confirms that there are aspects of regulatory costs that have a significant relation with firms' performance.

The article describes the relation between several regulatory costs faced by Portuguese non-financial firms and two performance variables: labour productivity and export intensity. More specifically, we use detailed data from the Business Costs of Context Survey (Inquérito aos Custos de Contexto, IaCC) for 2014, a representative survey conducted by Statistics Portugal (INE), merged with balance-sheet data. The survey covers nine domains of regulatory costs (starting activity, licensing, network industries, financing, judicial system, tax system, administrative burden, barriers to internationalisation, human resources) and comprises several questions on the current level of different obstacles within each domain. We apply methods of Item Response Theory (IRT) to aggregate the individual responses in each domain and obtain nine composite indicators (latent obstacle) that represent firms' evaluation of the level of obstacles associated with each regulatory cost. Additionally, we implement a partition of firms that corresponds to their responses to a complementary question about the importance of each domain of regulatory costs to activity.

Although no causality is established, we find several statistically significant relations between firms' performance, the level of latent obstacles and firms' perception of the importance of each domain for their activity. For productivity, only obstacles related to human resources are identified as having a significant negative relation in terms of both the importance to firms' activity and the level of the latent obstacle, while for export intensity the same result is observed for the domain judicial system. Moreover, the link of firms' performance variables with the level of latent obstacles tends to differ between firms that assess the domain of regulatory costs as important for their

activity and those that do not. Finally, the article examines in more detail the domain barriers to internationalisation, showing that to consider these costs as important tends to be associated with lower productivity and higher export intensity.

Euro area credit market: who contributed to the recent recovery?

Carla Soares

In recent years, the dispersion of bank lending conditions in the euro area has increased substantially. This was reflected in the geographical fragmentation, where credit developments in countries considered to be vulnerable (periphery) were much weaker compared to the countries with the highest credit rating. Fragmentation was associated with the close links between the sovereign and the country's banking system, with a mutual reinforcement of weaknesses. More recently, the degree of dispersion of credit developments has narrowed as bank lending rebounded.

It is expected that, in addition to the country factor, other idiosyncratic factors of the bank will also contribute to lending activity and explain the heterogeneity observed in the evolution of euro area bank lending. For example, banks with capital or balance sheet restrictions may be expected to have limits on their ability to provide credit. The question raised in this article is then to what extent the credit recovery was more associated with country factors, similar to what happened during the crisis, or to idiosyncratic factors, which in turn may also be related to the country and the sovereign.

To answer this question, we gather bank individual information from a large and representative sample of euro area banks, in particular on loans to non-financial corporations and households. The individual bank indicators used as a benchmark of their vulnerabilities or how they are perceived by investors fall into two categories: (i) internal indicators, in particular a ratio of regulatory capital and a ratio of problem loans; (ii) external indicators, in particular the credit rating and the price-to-book ratio.

It is found that banks with more robust characteristics, such as higher regulatory capital levels or higher credit ratings, have contributed relatively more to the recovery of lending in the euro area. These banks that have lower balance sheet restrictions and likely have lower financing costs, and thus are able to transmit more favorable credit terms and conditions. Nevertheless, these characteristics are closely related to country-specific factors, which is in line with recent studies on the amplification of the effects of sovereign-banking nexus in the face of adverse conditions.

The conclusions of the article should be read with due caution, since the analysis focuses on correlations between growth of bank loans and banks'

characteristics, without proper control for other factors, in particular on the demand side of credit, not being due conclusions on causality effects.

The import content of final demand in Portugal: Nominal and real evolution

Fátima Cardoso and António Rua

In a context of globalization and development of trade relations among countries, the economic interdependence has been increasing. Naturally, such process of international integration translates into the penetration of imports in a given economy. Therefore, the assessment of the external dependence of the different final demand components is essential to evaluate the corresponding impact on the national economic activity.

The aim of this article is to quantify the import content of the main final demand components in Portugal and analyze its evolution since the beginning of the euro area. Besides assessing the import content in nominal terms in line with previous literature, the authors estimate and analyze the evolution of the import content in real terms. The importance of such distinction stems from the fact that while the import content of final demand, in nominal terms, has remained relatively stable throughout time, the import content in real terms has presented a clear upward trend. Hence, it becomes relevant to evaluate such dichotomy for the various final demand components.

The results point to a noteworthy heterogeneity of the import content across the main final demand components. In particular, exports have been presenting systematically the highest import content over time. Naturally, there is also a significant heterogeneity within exports, with the exports of fuels recording the largest import content. Investment also presents a relatively high import content, most notably machinery and transport equipment, while public consumption is the final demand component that depends less on imports.

Regarding the nominal evolution since the beginning of the euro area, the relative stability of the import content observed for final demand as a whole, hides different patterns across components. In particular, exports registered an increase of the penetration of imports while the remaining components of final demand recorded a slight decrease.

Concerning the evolution of the import content in real terms, the results suggest a marked upward trend for final demand. This increase has been visible in the various final demand components, most notably in the cases of investment and exports. In the case of GFCF, some important composition effects played a role, as the one resulting from the decrease in the relative weight of GFCF in construction. In what concerns exports, a broadly based

increase of the import content across products has been observed, suggesting a higher integration in global value chains.

Regulatory costs and performance of Portuguese firms

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Abstract
This article studies the relations between firms' evaluation of nine domains of regulatory costs and two performance variables: labour productivity and export intensity. We use a representative micro-level database from a survey on Portuguese firms' perceptions of the regulatory framework in 2014 (Business Costs of Context Survey, IaCC) merged with balance sheet data. Although no causality is established, we find several statistically significant relations between firms' performance and their assessments of regulatory costs. For productivity, only obstacles related to "human resources" are identified as having a significant negative relation both in terms of the importance to firms' activity and the level of the barrier, while for export intensity the same result is observed for obstacles related with the "judicial system". The article examines in more detail the domain "barriers to internationalisation" showing that to consider these costs as important tends to be associated with lower productivity and higher export intensity. (JEL: D22, L51)

Introduction

The institutional setting of an economy, defined as existing legislation and its inherent costs, strongly impacts on the operation of firms in the different sectors of activity and on overall economic performance.[1] Nevertheless, regulatory costs are often neglected or misinterpreted in micro-level analysis. One reason is the relatively scarce firm-level information on the evaluation of regulatory costs. Another reason is the lack of a clear and consistent definition, as well as a practical and exhaustive typology of

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1. For a survey of the recent literature on the importance of institutions for cross-country differences in growth rates, see Lloyd and Lee (2016).

regulatory costs and their impacts. Figure 1 presents the main categories of regulatory costs, as suggested by the OECD (1997), and highlights that regulations affect virtually all agents in the economy, including the public sector and households. However, firms tend to concentrate most of the attention of the economic analysis of regulatory costs, due to their crucial role on the creation of employment and value added. The areas shaded in grey in Figure 1 correspond to different types of regulatory impacts on firms. Although specific types of regulations are not detailed in the diagram, it is straightforward to conclude that regulatory costs imposed on firms are quite diverse in nature, ranging from licensing procedures to the functioning of the judicial system, as well as labour market rules and ease of access to finance. The terminology used in the literature for the identification of such regulatory costs is diverse, including terms like "institutional costs", "red tape costs", "business environment" or "costs of doing business".

The economic analysis of regulatory costs at the firm-level is typically carried out in two stages. The first step is to collect information on firms' evaluation of the importance of the different regulatory costs. Given their diffuse nature, firms are typically unable to quantify the impacts of regulatory costs in monetary terms on their balance-sheet, but can qualitatively state their views in terms of the relative level of the different obstacles. Nevertheless, even this type of qualitative information is difficult to obtain for several reasons. Firstly, beyond the previously mentioned need for an adequate classification of regulatory costs, it is necessary to set a scale to measure their intensity. However, the responses of firms inevitably involve a subjective assessment. Two similar firms operating in the same regulatory environment may post different answers in a survey. Secondly, it might be the case that a firm evaluates the level of obstacles associated with a given regulatory cost as high but also considers that such obstacle does not interfere significantly on its performance. For example, a firm can answer in a survey that there are high obstacles in the judicial system, but it may acknowledge that this is not important to its activity because it has no pending cases in court or litigation is typically reduced in its business. Conversely, a firm may claim that a specific barrier to internationalisation is a mild regulatory obstacle but it is very important to its activity because it has a large export intensity. Therefore, it is necessary to combine these two dimensions of firms' assessment: the *level of obstacles* in each domain and its *importance for firms' activity*.

The second step of the analysis explores the relationship between firms' qualitative assessments of regulatory costs and their performance. Most surveys that collect firms' evaluations of regulatory costs do not contain information on performance indicators, such as productivity or participation in international trade. Therefore, such information must be merged from balance-sheet and income statement databases by means of a common firm identifier.

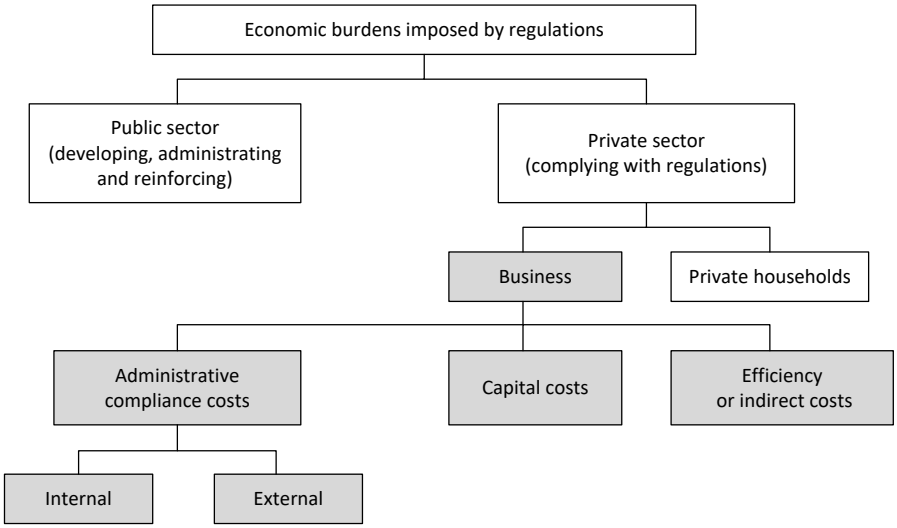


FIGURE 1: Main categories of regulatory costs

Source: OECD (1997), The OECD Report on Regulatory Reform.

In the methodological front, there are two additional points worth mentioning. Firstly, surveys often break down the assessment of a given area of regulatory costs along several questions, thus not providing a direct evaluation of each broad type of costs. In this case, it is necessary to aggregate multiple dimensions into a composite indicator. However, this procedure should go beyond a simple average of the individual answers, because each one of them can have a different information content relatively to the regulatory cost being studied. Secondly, endogeneity bias, mostly associated with simultaneous causality, makes it difficult to establish a robust causal effect of institutional constraints on firms' performance. Although it is more plausible that regulatory costs affect firms' performance than the reverse, some omitted variables may be the true drivers of both performance and assessment of regulatory costs.

In this article, we discuss the relation between several regulatory costs and two dimensions of firms' performance: labour productivity and export intensity. These two performance variables are also imperfect. Labour productivity does not account for the impact of capital, though the consideration of sector-specific effects can help reduce this problem. Nevertheless, high productivity can result from high prices emerging from low competition and not from efficiency in the utilisation of resources. In turn, export intensity does not necessarily relate with the creation of value added if the import content of production is high.

We use detailed data from the Business Costs of Context Survey (*Inquérito aos Custos de Contexto*, Portuguese acronym: IaCC) for 2014, a survey conducted by Statistics Portugal (INE), which is representative of the universe of Portuguese non-financial firms. The survey covers nine domains of regulatory costs ("starting activity", "licensing", "network industries", "financing", "judicial system", "tax system", "administrative burden", "barriers to internationalisation", "human resources") and comprises several questions on the current level of different obstacles within each domain. We apply methods of Item Response Theory (IRT) to aggregate the individual responses in each domain and obtain nine composite indicators (latent obstacle) of firms' evaluation of the level of obstacles associated with each regulatory cost. Additionally, the IaCC includes a complementary question on firms' assessment of the importance of each domain of regulatory costs to their activity.

The estimates show a negative link between firms' productivity and the perception of the importance of regulatory costs in the domains "starting activity", "administrative burden", "barriers to internationalisation", and "human resources". For export intensity, a negative relation is estimated for the importance of "starting activity", "licensing", and "judicial system". Moreover, the association of firms' labour productivity and export intensity with the level of latent obstacles tends to differ between firms that evaluate the domain of regulatory costs as important to their activity and those that do not. Finally, for productivity, only obstacles related to "human resources" are identified as having a significant and negative relation, while, for export intensity, the same result is observed for obstacles related to the "judicial system" .

We also analyse in more detail the responses on the current level of obstacles comprised in the domain of "barriers to internationalisation". We find that firms evaluating this domain as important to their activity tend to have lower productivity and higher export intensity. Moreover, significant negative links of firms' export intensity with the level of obstacles are estimated mostly for firms that perceive this domain as important and for obstacles not related with international trade.

The article is organised as follows. The next section briefly overviews some of the literature on the impact of institutional quality on economic performance, presenting some results for Portugal from surveys carried out by international organisations. Afterwards, we present the databases used and the main aggregate results of the survey on regulatory costs in Portugal. The following section estimates the relations between firms' perceptions of the level of obstacles associated with each regulatory cost, the importance of respective domain to their activity and the outcome variables, detailing the domain "barriers to internationalisation". Finally, we offer some concluding remarks.

Related literature

International organisations regularly conduct surveys targeted at collecting firms' assessment of the strength of different types of regulatory costs. These surveys convey information that goes beyond that of regulatory indexes strictly based on legislation (as, for instance, OECD (2014)) as they also reflect firms' evaluation of the enforcement of such laws. However, the sample of firms surveyed is typically small and not representative of the universe of firms in the respective economy. Well-known examples of this type of surveys are those run by the World Economic Forum (e.g., World Economic Forum 2017) and the World Bank (e.g., World Bank 2018), which offer both cross-country and temporal perspectives.

The Global Competitiveness Index (GCI) of the World Economic Forum assesses the factors and institutions identified by theoretical and empirical research as drivers of productivity and sustainable growth. It tracks the performance of around 140 countries on 12 pillars of competitiveness over time.[2] There are a total of around 100 indicators in the index, derived from a combination of data from international organisations as well as from the World Economic Forum's Executive Opinion Survey. This survey, which is associated with the GCI, collects the opinions of business leaders on a broad range of topics for which alternative statistics are unreliable, outdated, or non-existent. Nevertheless, the number of respondents per country is limited: for Portugal, the number of business leaders that responded in 2016 and 2017 was 220 and 140, respectively. Respondents to the Executive Opinion Survey are asked every year to identify and rank the five most problematic factors for doing business in their country. The scores for Portugal, calculated on the basis of 2017 data, are presented Figure 2. The strongest obstacles identified are "government bureaucracy" and "tax rates".

The Doing Business (DB) report conducted by the World Bank since 2003 measures aspects of business regulation and their implications for firm establishment and operation, surveying areas that are of close responsibility of policy makers.[3] At present, DB presents quantitative indicators on several business regulations that can be compared across 190 countries over time. The DB 2018 edition measures regulations affecting 11 broad areas and their indicators are used to analyse economic outcomes and to identify which past reforms have worked better. Figure 3 presents the distance to the frontier indicator (best practice) for some dimensions of the DB in Portugal during the last three years. The distance to the frontier is higher in terms of "access

2. See World Economic Forum (2017) for the 2017 edition of the Global Competitiveness Report and `http://reports.weforum.org/global-competitiveness-index-2017-2018/` for the historical data.

3. See World Bank (2018) for the 2018 edition of the Doing Business report and `http://www.doingbusiness.org` for the historical data.

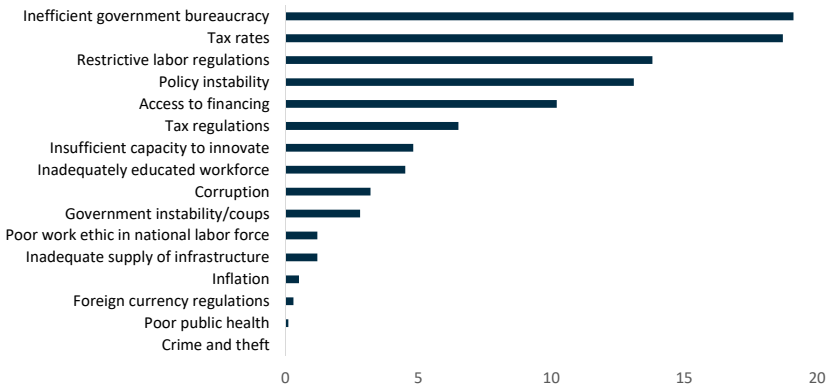


FIGURE 2: Most problematic factors for doing business, Portugal 2016-2017

Source: World Economic Forum, Executive Opinion Survey 2017.
Notes: From a list of 16 factors, respondents were asked to select the five most problematic for doing business in their country and rank them from 1 (most problematic) to 5. The results are then tabulated and weighted according to the ranking assigned by respondents. The score corresponds to the percentage of responses weighted according to their rankings.

to credit", "protecting minority investors" and "enforcing contracts", while Portugal is among the countries with best performance for "trading across borders".

The Business Environment and Enterprise Performance Survey (BEEPS) is another extensive economic survey undertaken as a joint initiative of the World Bank and the European Bank for Reconstruction and Development, covering several countries of Eastern Europe and Central Asia.[4] BEEPS surveys a sample of firms from the private sector and aims to understand firms' perceptions of the environment in which they operate. BEEPS covers a broad range of areas including access to finance, corruption, infrastructure, crime, competition, and performance measures. Its findings can be used to help policy makers better understand the business environment that the private sector is facing and identify, prioritise and implement reforms of policies and institutions that support efficient private economic activity. This survey has been carried out in five rounds with the latest being 2012-2016.

The theoretical and empirical academic research on the role of institutions as drivers of long-run economic growth is vast and growing. There are several extensive reviews of the literature on institutions and growth, for instance Acemoglu *et al.* (2005), Porta *et al.* (2008), Leite *et al.* (2014), Ogilvie and Carus (2014) and Lloyd and Lee (2016).

4. See `https://ebrd-beeps.com` for details on the methodology and access to the data.

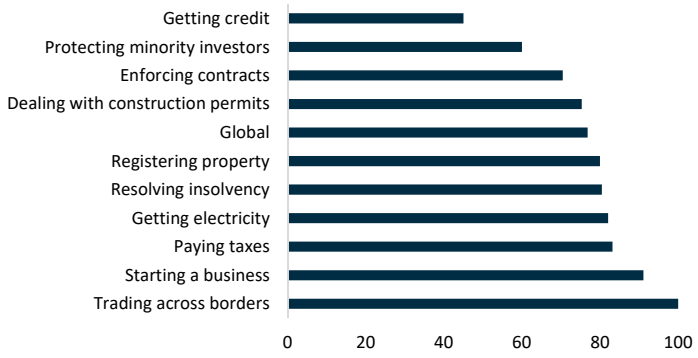


FIGURE 3: Distance to Frontier (DTF) on Doing Business (DB) topics, Portugal average 2015-2017

Source: World Bank.
Notes: The distance to frontier (DTF) measure shows the distance of each economy to the "frontier", which represents the best performance observed on each of the indicators across all economies in the sample since 2005. An economy's distance to frontier is reflected on a scale from 0 to 100, where 0 represents the lowest performance and 100 represents the frontier. For each of the 10 topics, the chart shows the simple average of each score as published in DB 2016, DB 2017, DB 2018 (scores refer to the previous year).

The micro-level empirical literature on the impact of regulatory costs on firms' performance is more limited, mostly due to data limitations. Some works relate country-level indicators of national institutions to firms' performance (e.g., Goedhuys and Srholec (2015) and Grosanu *et al.* (2015)), but the identification of causal effects is difficult in this framework. Other researchers examine the impact of various aspects of the business environment on firms' performance using micro-level data on domestic institutions. Commander and Svejnar (2011) use cross-country firm-level data from the BEEPS survey to analyse the performance effects of ownership, competition, export orientation, and the institutional environment. They find little evidence of a robust link between managers' perceived constraints on the business environment and firms' revenues, as country fixed-effects largely absorb that impact. On the contrary, also using data from the BEEPS survey, Gorodnichenko and Schnitzer (2013) find unambiguous evidence that financial constraints negatively affect a firm's innovation activities in non-OECD countries. Recently, the estimates of Bhaumik *et al.* (2018) show that there are large intra- and inter-country differences in the firm-level impact of institutional quality on performance, as measured by firms' productivity. This evidence suggests that the one-size-fits-all approach to changes in legislation may not have the expected impact at the micro-level.

In the case of Portugal, Arnold and Barbosa (2015) provide empirical evidence on links between the productivity of Portuguese manufacturing

firms and a number of regulatory costs between 2006 and 2011. Their results suggest that firms' productivity is negatively affected by higher administrative requirements for starting a business, by a more extensive coverage of collective wage bargaining agreements, by higher taxes and tax compliance costs, and by the number of procedures required to enforce a contract. Branstetter *et al.* (2014) use matched employer–employee data to evaluate the effect of a regulatory reform that substantially reduced the cost of firm entry in Portugal.[5] They find that entry deregulation had a positive effect on firm and job creation, but such impact was observed mostly among entrepreneurs who were near the margin in terms of the firm formation decision. In addition, these start-ups were smaller, headed by relatively inexperienced and poorly educated entrepreneurs, and operating primarily in low-technology sectors. In comparison to firms that entered in the absence of the reform, these marginal firms were also less likely to survive their first two years. Recently, Félix and Maggi (2019) use the same Portuguese entry deregulation reform as a natural experiment and conclude that the reform had a positive impact on firm entry and aggregate employment. They find that a substantial part of the increase in employment came from older incumbent firms expanding their size, in particular incumbents that were the most productive before the reform.

Domestic institutions can also have important effects on international trade. Nunn and Trefler (2014) review the literature on institutions as a source of comparative advantage, providing evidence that institutional sources are quantitatively as important as traditional sources of comparative advantage. In addition, they review the literature on the impact of international trade on domestic institutions, concluding that these impacts are strong.

Some of the recent empirical analysis on the link between institutions and international trade is based on the gravity model of trade. Álvarez *et al.* (2018) use a sectoral gravity equation to study the extent to which institutional quality affects aggregate and sectoral bilateral trade. They find that both the institutional conditions at destination and the institutional distance between exporting and importing countries are relevant for bilateral trade, confirming the hypothesis that it is easier to trade with partners with better institutions. A similar point is made by Gani and Scrimgeour (2016), which study exports of New Zealand to Asia. Martínez-Zarzoso and Márquez-Ramos (2019) use a gravity model of trade augmented with governance indicators to assess whether better governance facilitates the integration of the Middle East and North Africa (MENA) region into world trade. They show that improvements in five of the six governance indicators increase

5. In 2005, Portugal implemented the "On the Spot Firm" programme (*Empresa na Hora* in Portuguese) which established one-stop shops that simplified firm creation procedures. This reform significantly reduced administrative fees and the time delay of legal incorporation. See `http://www.empresanahora.mj.pt` for more details.

exports from MENA countries, whereas better governance in destination countries does not affect MENA exports. In addition, country-pair similarity in governance indicators has also a positive effect on exports of MENA countries. Söderlund and Tingvall (2014) use firm-level data on exports, combined with macro-data for countries, to investigate how institutional quality in destination countries affects Swedish exporting firms. Results show that weak institutions in recipient countries make exports to these countries less likely and characterised by relatively short duration and small volume.

Database and exploratory analysis

This article uses two firm-level databases merged through a unique firm identifier. The first database is the Integrated Enterprise Accounts System (*Sistema de Contas Integradas das Empresas*, Portuguese acronym: SCIE). This administrative database incorporates the Business Information Simplified (*Informação Empresarial Simplificada*, Portuguese acronym: IES), which includes annual balance sheet and income statement information, and is complemented with data for individual entrepreneurs and self-employed workers received from protocols established between Statistics Portugal (INE) and various bodies of the Ministry of Finance and Public Administration entities.

The second dataset corresponds to the responses of firms to the Business Costs of Context Survey (*Inquérito aos Custos de Contexto*, Portuguese acronym: IaCC) for 2014. INE (2015) provides an analysis of the main aggregate results and a detailed description of the methodology used in the survey. In 2018, INE published a second edition of the same survey (INE 2018) and the results of both vintages are very similar, as it will be shown below. In both editions of the IaCC, around five thousand non-financial firms were asked about their perceptions of the level of different regulatory obstacles. The IaCC is based on a stratified random sample by size-class (defined in terms of employment and turnover) and main sector of activity. Hence, the sample is representative of the structure of Portuguese non-financial firms. The stratification was made using 31 sectors and 4 dimension classes, resulting in 124 strata. For all firm-level regressions reported in the next section, we use weights based on ex-post sampling probabilities, in accordance with the design of the IaCC. More precisely, each firm is weighted according to the inverse of the probability that this observation was sampled using the weight of its stratum in terms of turnover.

The IaCC comprises several detailed questions on the levels of obstacles perceived by firms, which are organised into nine domains of regulatory costs: “starting activity”, “licensing”, “network industries”, “financing”, “judicial system”, “tax system”, “administrative burden”, “barriers to

internationalisation", and "human resources". There is also a complementary question on the importance of each of the nine domains to firms' activity.

The questions on the current level of obstacles have a qualitative nature, expressed in a scale of response with 5 levels: 1 - not an obstacle; 2 - very reduced obstacle; 3 - reduced obstacle; 4 - high obstacle; 5 - very high obstacle. For each individual question in the survey, an aggregate indicator (the obstacle indicator) is computed as the weighted average of all firms' responses along the 5 levels considered, thus ranging between 1 and 5. In addition, a composite indicator for each of the nine domains of regulatory costs is calculated as a simple average of the respective obstacle indicators. Finally, a global indicator is computed, taking into account the additional question that assesses the importance that firms assign to each of the nine areas of regulatory costs to their activity, as well as their weight in the corresponding stratum in terms of turnover. In fact, it can be the case that a firm assesses the *level of obstacles* in a given domain of regulatory costs as high, though, given its main activity or its characteristics, that domain is not *important for its activity*.

Figure 4 presents the composite indicators for each of the nine domains of regulatory costs in 2014 and 2017, as well as the global indicator. The latter indicator scored a value of 3.04 and 3.05 in 2014 and 2017, respectively, thus signalling an overall intermediate assessment of regulatory costs by Portuguese firms. In 2014, as for the domains of regulatory costs, the "judicial system" scores the highest composite index (3.7), followed by "licensing" and "tax system" (3.5 and 3.3, respectively).

The obstacle indicators for the 2014 and 2017 vintages of the IaCC are very similar (Figure 5). Therefore, although in the next section we use only information of the IaCC for 2014, the main results should hold for the most recent years. The linear correlation between the 2014 and 2017 obstacle indicators, measured by the Pearson correlation coefficient, is 99 per cent. This means that, from the perspective of firms, the underlying regulatory environment in Portugal has not changed in this period. However, it should be noted that a stable regulatory framework is sometimes beneficial. Firms face costs in adapting to new legislation, which may overturn the gains arising from changes in existing regulation.

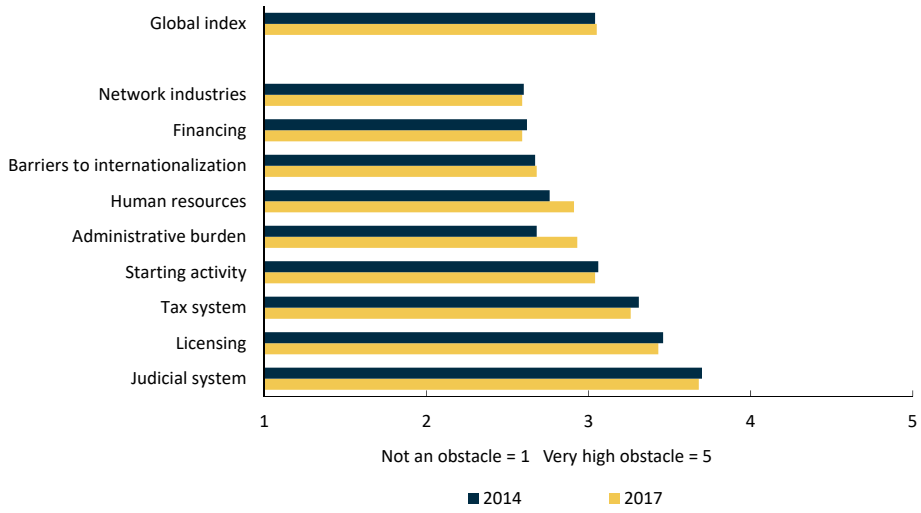


FIGURE 4: Composite indicators of the nine domains of regulatory costs in Portugal

Source: Statistics Portugal (INE).
Notes: The composite indicator for each of the nine domains of regulatory costs is computed as a simple average of the respective obstacle indicators. For more details, see INE (2015) and INE (2018).

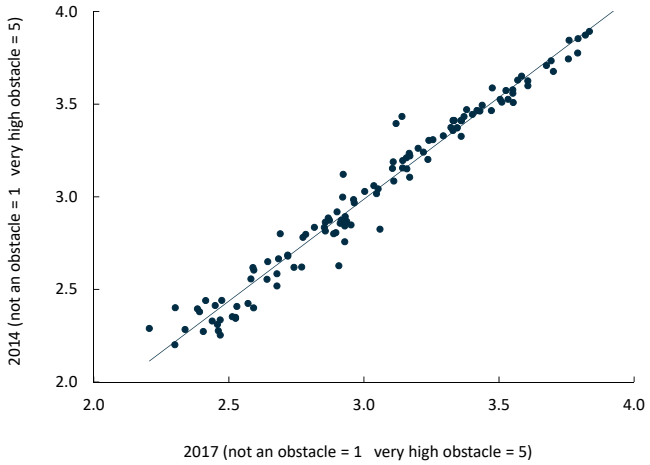


FIGURE 5: Correlation of the detailed obstacle indicators in 2014 and 2017

Source: Statistics Portugal (INE).
Notes: For each individual question in the survey, the obstacle indicator is computed as the weighted average of all firms' responses along the 5 levels considered, thus also ranging from 1 (not an obstacle) to 5 (very high obstacle). For more details, see INE (2015) and INE (2018).

Regulatory costs, labour productivity and export intensity

In this section, we move beyond the aggregate description of firms' evaluation of the regulatory environment in Portugal and link the individual responses of firms with two indicators of their performance, namely labour productivity and export intensity. Labour productivity is defined as gross value added per worker and export intensity equals the ratio of total exports of goods and services to turnover.

In the analysis, we pool information regarding firms' performance for several years (2010-2016). Although the IaCC refers to a specific moment and questions are asked in terms of firms' assessment of the obstacles in 2014, firms' performance cannot be correctly captured with information for a single year. For example, firms' turnover may not correspond to production carried out in that same year due to changes in inventories or breaks in the production process for reorganisation purposes. In addition, the relevance of exports for a firm's business is poorly assessed by data referring to a single year. For example, export intensity may be affected by specific shocks taking place in a destination market in a given year. Therefore, pooling information regarding firms' productivity and export intensity in different years offers a clearer picture of their performance. We consider the period 2010-2016, thus containing some years before and after the period that the survey refers to. Moreover, as mentioned above, in order to make the sample representative of the underlying population, for all the results reported below we use weights based on inverse sampling probabilities.

In the second part of this section, we detail a specific domain of regulatory costs, namely "barriers to internationalisation", and reassess its relation with firms' performance variables. The analysis of the several components of the regulatory costs associated with "barriers to internationalisation" is both an illustration of a more detailed analysis of the IaCC and it is important per se. In fact, it has been widely acknowledged that Portuguese growth prospects depend on an increased participation of firms in international markets. Therefore, knowing about firms' perceptions of "barriers to internationalisation" can be useful for policy purposes.

Nine domains of regulatory costs in Portugal

As previously mentioned, the structure of the IaCC comprises both several questions in each of the nine domains of regulatory costs and a complementary question on the importance of each domain to firms' activity. In order to associate the level of obstacles in each domain with firms' performance, we start by aggregating the answers of each firm in a composite variable using Item Response Theory (IRT). Most of the theoretical work on IRT originates in the fields of psychometrics and educational measurement, with seminal contributions by Rasch (1980) and Birnbaum (1968). In practice,

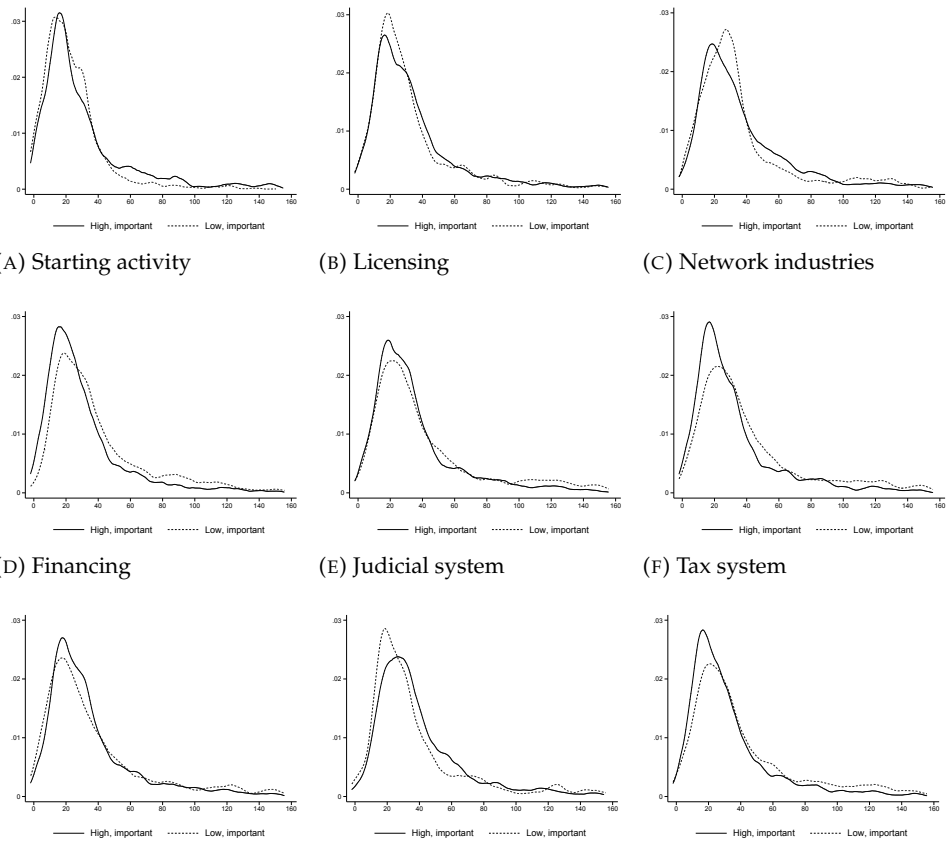
IRT is a method of analysing responses to tests or surveys with the goal of improving measurement accuracy and reliability. This methodology has been used extensively in the study of educational outcomes and household characteristics. The basic principle is that a composite variable can give a more reliable estimate of the quality being measured than any of the separate constituent variables. In our case, a firm's evaluation of the level of obstacles in a given domain of regulatory costs is better captured by the composite indicator (latent obstacle) than by the respective answers to each individual question in that domain. These methods improve upon the option of having, for instance, a simple average of the responses by each firm in each domain, while also accommodating cases of non-response and allowing for the weighting of observations.

We use an IRT procedure with a graded response model for ordered items and obtain the level of latent obstacle that is associated with each domain of regulatory costs for each firm. The distribution of the latent obstacle was standardised with mean zero and standard deviation equal to one. We drop observations for which all responses of a given domain are missing. In addition, in the "financing" domain, some of the questions are excluded from the IRT procedure due to the sparse number of responses.[6]

We implement also a partition of firms that corresponds to what they responded in the complementary question on the importance of each domain of regulatory costs to their activity. We group firms' responses to this question for each domain into two categories: "important", which corresponds to the two highest levels in the scale of answers (4 - important and 5 - very important); and "not important", corresponding to the remaining three levels (1 - not important, 2 - little importance and 3 - indifferent).

Figure 6 plots the kernel distributions of firms' labour productivity for each of the nine domains of regulatory costs, separating between firms whose level of latent obstacle stands above and below zero, which should be interpreted as the cases where the latent obstacle is perceived as high or low, respectively. In addition, the distributions include only firms in the category "important", hence comparing the distributions of labour productivity for firms whose latent obstacle is perceived as high and the regulatory cost is important to their activity with those for which the latent obstacle is perceived as low but the regulatory cost is also important. The reasoning for focusing the distributions on firms for which the regulatory cost is important drives from the presumption that the level of obstacles could have a higher association with performance for these firms.

6. We keep responses regarding obstacles in "short-term banking credit", "equity increase/shares issuance" and "government subsidies and support programs".



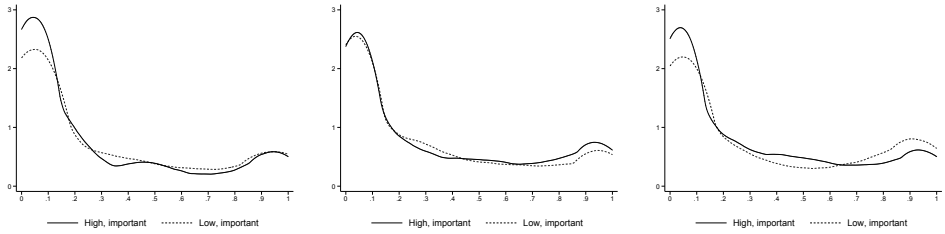
(A) Starting activity (B) Licensing (C) Network industries

(D) Financing (E) Judicial system (F) Tax system

(G) Administrative burden (H) Barriers to internationalisation (I) Human resources

FIGURE 6: Labour productivity (2010-2016) and perception of regulatory costs (2014)

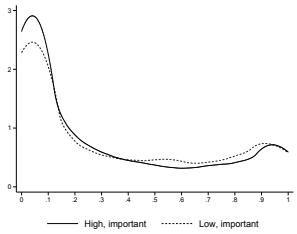
Notes: Labour productivity is gross value added over total employment in 1000 euros. The distributions exclude firms with productivity in the 5th and 95th percentiles. Kernel density estimates are weighted by inverse sampling probabilities. High refers to firms whose latent obstacle is positive, low refers to firms whose latent obstacle is negative, important refers to firms that evaluate the regulatory cost as important or very important to their activity. The latent obstacle associated with the level of obstacles in each domain of regulatory costs in 2014 is computed with an IRT graded response model.



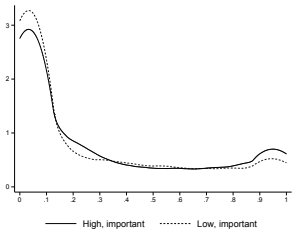
(A) Starting activity

(B) Licensing

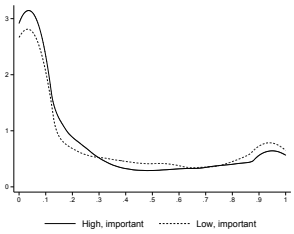
(C) Network industries



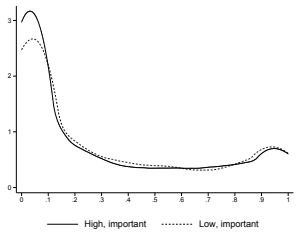
(D) Financing



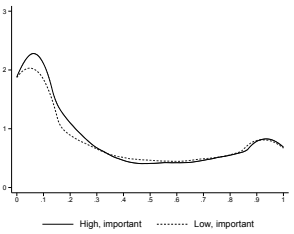
(E) Judicial system



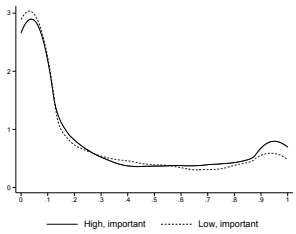
(F) Tax system



(G) Administrative burden



(H) Barriers to internationalisation



(I) Human resources

FIGURE 7: Export intensity (2010-2016) and perception of regulatory costs (2014)

Notes: Export intensity is total exports of services and goods over turnover. The distributions exclude firms with zero exports. Kernel density estimates are weighted by inverse sampling probabilities. High refers to firms whose latent obstacle is positive, low refers to firms whose latent obstacle is negative, important refers to firms that evaluate the regulatory cost as important or very important to their activity. The latent obstacle associated with the level of obstacles in each domain of regulatory costs in 2014 is computed with an IRT graded response model.

Although differences between the pairs of kernels in each panel of Figure 6 are not substantial, some facts stand out. For example, firms that assess the levels of obstacles in "judicial system" (panel E) as high and important are also those with a lower labour productivity. This could mean that more efficient firms are better equipped to deal with the judicial system. This result is clearer as regards the levels of obstacles associated with "financing" (panel D), "tax system" (panel F), and "human resources" (panel I). Conversely, for "barriers to internationalisation" (panel H), firms that consider the level of these obstacles as low are also those less productive. However, results in this domain should be read with some caution as the number of responding firms is smaller than in the other domains of regulatory costs. Around half of the firms considers this domain as "not applicable", because they are not directly engaging nor trying to initiate international activities.

Figure 7 replicates the analysis described above for firms' export intensity. Firms that assess "starting activity" (panel A) as a high obstacle are also those with relatively lower export intensities. This is also the case for "network industries" (panel C), "financing" (panel D), "tax system" (panel F), and "administrative burden" (panel G). On the contrary, firms that see obstacles in the "judicial system" (panel E) as low are also those with relatively lower export intensities. Finally, as regards "barriers to internationalisation" (panel H), the differences between distributions are small but there are more firms considering it a high obstacle amongst those with higher export intensities.

The simple visual comparison of pairs of kernel distributions for the different domains of regulatory costs, in the subset of firms that consider that type of regulatory costs as important for their activity, does not allow for a quantitative statistical assessment. Therefore, we run a set of descriptive regressions relating the regulatory obstacles with firms' performance. The regression for each of the nine domains of regulatory costs is:

$$logY_{it} = \alpha + \beta_0 d_i + \beta_1 X_i + \beta_2 X_i * d_i + \gamma_j + \gamma_t + \varepsilon_{it}, \quad (1)$$

where Y_{it} is the dependent variable of interest (labour productivity in logs or export intensity) of firm i in year t from 2010 to 2016. d_i is a dummy variable that takes the value one for firms responding that the domain of regulatory costs is important or very important to their activity in 2014 and zero otherwise, i.e., firms in the "important" category. X_i is the IRT latent obstacle that is associated with the respective regulatory cost for firm i in 2014. The interaction term in the regression allows for the link of the latent obstacle with the performance variable to differ between firms that consider the domain as important to their activity and those that do not. Sector and time fixed effects are included in γ_j and γ_t, respectively. The control for the main sector of activity of the firm is defined at the *Classificação Portuguesa das Actividades Económicas* (CAE) 2-digit level, comprising 77 different sectors. ε_{it} is an error term robust to heteroscedasticity using the Huber-White variance estimator.

Table 1 reports the results for weighted least squares regressions of Equation (1) using sampling weights, with labour productivity as the dependent variable. The coefficients of the importance dummy variable, β_0, measure the gap in average productivity levels between firms that consider the respective regulatory cost as important to their activity and those that do not, for a level of zero of the latent obstacle. For instance, the productivity gap between similar firms that differ only in their assessment of the importance of the regulatory cost to their activity is -18.78 per cent ($= 100 * (\exp(-0.208) - 1)$) in the case of "administrative burden" and -13.76 per cent for "barriers to internationalisation", evaluated at zero-levels of the respective latent obstacles. For "starting activity" and "human resources", the estimated coefficient is also negative, while the opposite happens for "network industries" and "tax system". The coefficient of the latent obstacle, β_1, is significant for all domains of regulatory costs except "licensing" and "barriers to internationalisation". In all significant cases with the exception of "starting activity" and "administrative burden", the coefficient is negative. This means that a higher level of the latent obstacle associates with lower average productivity for firms that do not consider the obstacle as important ($d_i = 0$). For example, an increase by one of the latent obstacle of "tax system" is associated with a decline of 15.63 per cent of the average productivity of firms that do not assess this regulatory cost as important.

	(1) Starting activity	(2) Licensing	(3) Network industries	(4) Financing	(5) Judicial system	(6) Tax system	(7) Administrative burden	(8) Barriers to internation-alisation	(9) Human resources
Importance dummy (β_0)	-0.167***	0.00892	0.101***	-0.0411	0.0302	0.227***	-0.208***	-0.148***	-0.136***
	(0.0380)	(0.0325)	(0.0308)	(0.0369)	(0.0309)	(0.0616)	(0.0447)	(0.0392)	(0.0478)
Latent obstacle (β_1)	0.0311*	0.00993	-0.0388*	-0.0825***	-0.0489**	-0.170***	0.178***	-0.0301	-0.124***
	(0.0181)	(0.0277)	(0.0227)	(0.0281)	(0.0238)	(0.0402)	(0.0281)	(0.0298)	(0.0389)
Interaction term (β_2)	0.0744**	0.0385	0.0726**	-0.0663**	0.0142	0.0526	-0.171***	0.0497	0.000280
	(0.0351)	(0.0328)	(0.0313)	(0.0311)	(0.0301)	(0.0428)	(0.0325)	(0.0370)	(0.0409)
Constant	9.728***	9.676***	9.579***	9.614***	9.691***	9.472***	9.838***	9.872***	9.757***
	(0.0678)	(0.0611)	(0.0644)	(0.0658)	(0.0678)	(0.0777)	(0.0673)	(0.0761)	(0.0676)
Observations	13,507	18,047	15,012	18,831	18,211	22,888	22,724	10,888	21,925
R^2	0.385	0.444	0.458	0.380	0.412	0.368	0.404	0.355	0.386

TABLE 1. Labour productivity (2010-2016), regulatory costs and their importance (2014)

Notes: Results of weighted least squares regressions using inverse sampling probabilities as weights. The reported number of observations refers to the unweighted count. The dependent variable is labour productivity defined as gross value added over total employment, in logs, in 2010-2016. The nine domains of regulatory costs are reported in the column headings. The importance dummy takes the value one for firms responding that the domain of regulatory costs is important or very important to their activity in 2014 and zero otherwise. The latent obstacle associated with the level of obstacles in each domain of regulatory costs in 2014 is computed with an IRT graded response model. All regressions include 2-digit sector and year fixed-effects. See the main text for more details. Stars indicate significance levels of 1% (***), 5% (**) and 10% (*).

The coefficient of the interaction term, β_2, captures the difference in the link of the level of the latent obstacle with productivity between firms that perceive the regulatory cost as important and those that do not. This coefficient is significant in four out of nine domains of regulatory costs. As for "starting activity" and "network industries" the coefficient is positive, while for "financing" and "administrative burden" it is negative. For example, in the case of "financing", a unitary increase in the latent obstacle is associated with an decline in average productivity of 7.92 per cent for firms that do not assess this domain as important and 13.83 per cent ($= 100 * (\exp(-0.0825 - 0.0663) - 1)$) for similar firms that consider it important.

The domain "human resources" is the only one that presents negative and significant coefficients in both the importance dummy variable and the latent obstacle (coefficients β_0 and β_1). This means that, firstly, firms considering this dimension as important for their activity are comparatively less productive and that, secondly, the perception of stronger obstacles in aspects related to the labour market is also associated with lower average productivity. This result is compatible with the conclusion based on the kernels in panel I of Figure 6. Therefore, as acknowledged in the literature, regulations on hirings and firings, security and health in the workplace and firms' access to specific competences and skills of workers seem to have a bearing on productivity. Although there have been substantial reforms in the Portuguese labour market legislation, there is still room for productivity enhancing reforms.

We replicate the analysis above using firms' export intensity as the dependent variable and the results are included in Table 2. Overall, the number of statistically significant coefficients is lower than in the case of labour productivity.

	(1) Starting activity	(2) Licensing	(3) Network industries	(4) Financing	(5) Judicial system	(6) Tax system	(7) Administrative burden	(8) Barriers to internation-alisation	(9) Human resources
Importance dummy (β_0)	-0.0311***	-0.0308***	0.00613	0.00488	-0.0186**	0.0304***	-0.000608	0.0656***	-0.0171
	(0.00652)	(0.00928)	(0.00635)	(0.00940)	(0.00895)	(0.00948)	(0.0112)	(0.0105)	(0.0124)
Latent obstacle (β_1)	0.0132**	0.0161**	0.00208	0.00691	-0.0185***	-0.0414***	0.00670	-0.0139*	0.0168*
	(0.00560)	(0.00707)	(0.00400)	(0.00607)	(0.00601)	(0.0109)	(0.00681)	(0.00739)	(0.0102)
Interaction term (β_2)	-0.00838	-0.0191**	-0.00751	-0.00976	0.0310***	0.0387***	-0.00340	0.00158	-0.0130
	(0.00696)	(0.00842)	(0.00627)	(0.00732)	(0.00781)	(0.0113)	(0.00788)	(0.00938)	(0.0107)
Constant	0.0812***	0.103***	0.0861***	0.0699***	0.0863***	0.0549***	0.0843***	0.153***	0.0938***
	(0.0128)	(0.0141)	(0.0133)	(0.0142)	(0.0145)	(0.0140)	(0.0145)	(0.0227)	(0.0151)
Observations	14,201	18,836	15,633	19,587	18,903	23,893	23,718	11,249	22,833
R^2	0.253	0.305	0.329	0.281	0.262	0.271	0.270	0.269	0.269

TABLE 2. Export intensity (2010-2016), regulatory costs and their importance (2014)

Notes: Results of weighted least squares regressions using inverse sampling probabilities as weights. The reported number of observations refers to the unweighted count. The dependent variable is export intensity defined as total exports of goods and services over turnover in 2010-2016. The nine domains of regulatory costs are reported in the column headings. The importance dummy takes the value one for firms responding that the domain of regulatory costs is important or very important to their activity in 2014 and zero otherwise. The latent obstacle associated with the level of obstacles in each domain of regulatory costs in 2014 is computed with an IRT graded response model. All regressions include 2-digit sector and year fixed-effects. See the main text for more details. Stars indicate significance levels of 1% (***), 5% (**) and 10% (*).

The estimated parameters for the importance dummy, β_0, are negative for "starting activity", "licensing", and "judicial system", and positive for "tax system" and "barriers to internationalisation". For instance, in the latter domain, firms that report these barriers as important to their activity have a 6.56 percentage points (p.p.) higher average export intensity than similar firms that don't, evaluated for the latent obstacle at a neutral level (zero).

The association between the level of the latent obstacle and the export intensity of firms that do not consider the respective regulatory cost as important is positive in three domains ("starting activity", "licensing", "human resources") and negative in three other domains ("judicial system", "tax system", "barriers to internationalisation"). On the contrary, the estimates for the interaction term, β_2, are positive for "judicial system" and "tax system" and negative for "licensing". Considering the sum of the coefficients β_1 and β_2, there are only two statistical significant relations between the level of the latent obstacle and export intensity for firms that state the regulatory domain as important to their activity. In the case of the "judicial system", the sign of the link between the level of obstacles and export intensity differs in the two categories of firms: an unitary increase in the latent obstacle for firms that do not consider this cost as important is associated with a 1.85 p.p. decline in their average export intensity, while for similar firms that report it as important there is an increase of 1.25 p.p. $(= 100 * (-0.0185 + 0.0310))$. On the contrary for "barriers to internationalisation", the relation is negative and significant for both categories of firms, meaning that irrespective of their assessment of the importance of this regulatory cost, a higher level of the latent obstacle is associated with lower export intensity.

As shown in Figure 4 of the previous section, among the composite indicators of the nine domains of regulatory costs, the main constraints to Portuguese firms' are identified in the "judicial system". The results of Table 2, with export intensity as the dependent variable, reveal that the domain "judicial system" is the only one that has significant and negative estimates for both the coefficients of the importance dummy variable, β_0, and the level of the latent obstacle, β_1. This suggests that judicial institutions may not only pose obstacles to firms' domestic activities but can also be related to firms' international operations. In fact, there is a growing body of literature that examines how judicial quality affects international trade. For instance, Levchenko (2007) and Nunn (2007) show that higher effectiveness and predictability of the judiciary system and better enforcement of contracts shift a country's comparative advantage towards products that are more dependent on good judicial quality. Other empirical studies with firm-level data also show that judicial quality affects firms' exports: Ma *et al.* (2010) and Wang *et al.* (2014) find that a good legal system significantly increases firms' exports of goods for which relationship-specific investments are most important, i.e. goods that are contract-intensive.

The case of "barriers to internationalisation"

In this section, we detail the study of one of the domains of regulatory costs, "barriers to internationalisation", as an illustration of a possible second layer of analysis within the IaCC. Moreover, the examination of this type of institutional cost is also relevant per se. In fact, it has been widely acknowledged that the internationalisation of Portuguese firms is a way of promoting the growth of the economy, while sustaining a balanced current account. Portuguese international trade in goods is regulated by the European Union (EU) Common Commercial Policy setting similar arrangements for imports from third countries, namely a customs tariff uniformly applied in all Member-States. Nevertheless, domestic regulations can affect other forms of participation of Portuguese firms in international markets and, also, the implementation of these common policies for trade in goods and services.

The questions on the current level of obstacles comprised in this domain of regulatory costs refer to the complexity of the procedures associated with eight distinct forms of internationalisation: "imports of goods - intra-EU", "imports of goods - extra-EU", "exports of goods - intra-EU", "exports of goods - extra-EU", "applications to international tenders", "opening of establishments abroad", "opening of subsidiaries abroad", "applications for EU operational programs and funds". As before, the responses to these questions are expressed in a scale from 1 to 5: 1 - not an obstacle; 2 - very reduced obstacle; 3 - reduced obstacle; 4 - high obstacle; 5 - very high obstacle.

Complementarily to what is done in the previous section, where the responses to these questions are aggregated to obtain the level of the latent obstacle associated with "barriers to internationalisation", now the regressions consider firms' answers to each question autonomously in the vector X_i of Equation (1). Apart from this difference, the specification of the regressions is the same, with d_i being a dummy variable that takes the value one for firms responding that the domain "barriers to internationalisation" is important or very important to their activity in 2014.

Table 3 presents the estimation results with labour productivity as the dependent variable, reporting each of the eight obstacles included in this domain in the column headings. In line with the results of the previous section, we find a negative relation between firms' productivity and their assessment of the importance of the domain "barriers to internationalisation" to their activity for almost all questions considered. The only exception is "applications to international tenders", where the coefficient of the importance dummy is not significant.

	(1) Imports intra-EU	(2) Imports extra-EU	(3) Exports intra-EU	(4) Exports extra-EU	(5) Applications international tenders	(6) Opening establish-ments abroad	(7) Opening subsidiaries abroad	(8) Applications EU programs and funds
Importance dummy (β_0)	-0.163*	-0.503***	-0.320***	-0.486***	-0.0941	-0.395**	-0.572***	-0.227*
	(0.0909)	(0.114)	(0.105)	(0.115)	(0.153)	(0.154)	(0.139)	(0.134)
Level of obstacle (β_1)	0.0290	-0.121***	-0.0850**	-0.111***	0.123**	0.0653	-0.0282	0.0602
	(0.0319)	(0.0375)	(0.0362)	(0.0379)	(0.0528)	(0.0508)	(0.0473)	(0.0417)
Interaction term (β_2)	-0.00806	0.118***	0.0953**	0.148***	-0.109*	-0.0115	0.0824	-0.0209
	(0.0378)	(0.0425)	(0.0417)	(0.0420)	(0.0595)	(0.0565)	(0.0535)	(0.0491)
Constant	9.799***	10.20***	9.995***	10.02***	9.705***	9.831***	10.02***	9.669***
	(0.101)	(0.123)	(0.118)	(0.128)	(0.174)	(0.171)	(0.162)	(0.150)
Observations	9,906	8,735	9,216	8,566	4,828	4,413	4,424	6,281
R^2	0.376	0.378	0.389	0.348	0.450	0.455	0.456	0.399

TABLE 3. Labour productivity (2010-2016), level of obstacles to international activities and their importance (2014)

Notes: Results of weighted least squares regressions using inverse sampling probabilities as weights. The reported number of observations refers to the unweighted count. The dependent variable is labour productivity defined as gross value added over total employment, in logs, in 2010-2016. The eight obstacles included in the domain "barriers to internationalisation" are reported in the column headings. The importance dummy takes the value one for firms responding that the domain "barriers to internationalisation" is important or very important to their activity in 2014 and zero otherwise. The level of the obstacle refers to firms' responses to each question in a scale from 1 (not an obstacle) to 5 (very high obstacle). All regressions include 2-digit sector and year fixed-effects. See the main text for more details. Stars indicate significance levels of 1% (***), 5% (**) and 10% (*).

In the previous section, we find no statistically significant relation between the level of the latent obstacle associated with "barriers to internationalisation" and firms' productivity for either category of firms. However, the detailed estimates of Table 3 show significant links between productivity and some of the obstacles of this domain. Starting with firms that do not consider this domain as important to their activity, there is a negative relation between productivity and the level of obstacles in "imports extra-EU", "exports intra-EU", "exports extra-EU", while for "applications to international tenders" the relation is positive. The results differ for firms that consider this domain as important: all significant coefficients associated with the interaction term have the opposite signs.

The results of a similar exercise for firms' export intensity are presented in Table 4. Overall, the significant coefficients of the different variables are mostly concentrated in the obstacles not directly connected with international trade (columns 5 to 8). This points to some complementary of the different forms of internationalisation of a firm, as there is a relation between firms' export intensity and their assessment of obstacles related to foreign direct investment (FDI) and other international activities.

Starting with the estimates of the importance dummy, the significant coefficients are positive as found in the previous section, signalling that firms which consider "barriers to internationalisation" as important to their activity tend to be those with higher export intensities.

With the exception of "imports intra-EU", there is no significant association between firms' perception of the level of the different obstacles and their export intensity for firms that do not assess this domain as important. Looking at the estimated parameters of the interaction term, the link between average export intensity and the level of some obstacles is distinct for firms in the "important" category. In particular for the obstacles not related with international trade, namely "applications to international tenders", "opening of establishments abroad", "opening of subsidiaries abroad", "applications for operational programs and EU funds", there is a negative relationship with export intensity for firms that consider "barriers to internationalisation" as important to their activity. A plausible interpretation of this result is that firms that attribute importance to this domain of regulatory costs are those relatively more engaged in export activities, but a higher level of obstacles could possibly limit their export intensity.

	(1) Imports intra-EU	(2) Imports extra-EU	(3) Exports intra-EU	(4) Exports extra-EU	(5) Applications international tenders	(6) Opening establish-ments abroad	(7) Opening subsidiaries abroad	(8) Applications EU programs and funds
Importance dummy (β_0)	0.0255	0.0544**	0.0367	0.0658*	0.199***	0.250***	0.214***	0.161***
	(0.0252)	(0.0272)	(0.0312)	(0.0348)	(0.0365)	(0.0404)	(0.0406)	(0.0343)
Level of obstacle (β_1)	-0.0185**	-0.00931	-0.0137	-0.00416	0.00675	0.0110	0.0162	-0.00199
	(0.00903)	(0.00813)	(0.0117)	(0.0110)	(0.0111)	(0.00984)	(0.00989)	(0.00851)
Interaction term (β_2)	0.0121	0.00204	-0.00511	-0.00965	-0.0419***	-0.0525***	-0.0446***	-0.0354***
	(0.0102)	(0.00995)	(0.0128)	(0.0129)	(0.0132)	(0.0128)	(0.0128)	(0.0107)
Constant	0.194***	0.177***	0.268***	0.153***	0.0350	0.0473	0.0400	0.135***
	(0.0303)	(0.0327)	(0.0380)	(0.0381)	(0.0381)	(0.0415)	(0.0415)	(0.0372)
Observations	10,177	8,961	9,442	8,779	4,987	4,557	4,571	6,531
R^2	0.283	0.276	0.280	0.259	0.259	0.280	0.269	0.317

TABLE 4. Export intensity (2010-2016), level of obstacles to international activities and their importance (2014)

Notes: Results of weighted least squares regressions using inverse sampling probabilities as weights. The reported number of observations refers to the unweighted count. The dependent variable is export intensity defined as total exports of goods and services over turnover in 2010-2016. The eight obstacles included in the domain "barriers to internationalisation" are reported in the column headings. The importance dummy takes the value one for firms responding that the domain "barriers to internationalisation" is important or very important to their activity in 2014 and zero otherwise. The level of the obstacle refers to firms' responses to each question in a scale from 1 (not an obstacle) to 5 (very high obstacle). All regressions include 2-digit sector and year fixed-effects. See the main text for more details. Stars indicate significance levels of 1% (***), 5% (**) and 10% (*).

Concluding remarks

Regulatory costs exist in all economies and are perceived as a blockage to firms' performance. As regulatory costs impact on firms' decisions, policy makers should design legislation such that negative effects are minimised, while public objectives are achieved. Implementing the best international practices can be a good approach but only if they are adapted to the domestic reality. In addition, frequent changes in the institutional framework impose a burden on firms as they use resources in the adjustment process.

Micro-level studies on the relation between institutional costs and firms' performance are still relatively scarce and only rarely causal relations are established. In this article, we examine firms' responses to the Business Costs of Context Survey (IaCC) for 2014, a representative survey conducted by Statistics Portugal (INE) on nine domains of regulatory costs: "starting activity", "licensing", "network industries", "financing", "judicial system", "tax system", "administrative burden", "barriers to internationalisation" and "human resources". The survey includes several questions on the current level of different obstacles within each domain. We obtain the latent obstacle associated with the level of obstacles in a given domain of regulatory costs in 2014 applying an Item Response Theory (IRT) graded response model. In addition, the survey contains a complementary question on firms' evaluation of the importance of each of the nine domains of regulatory costs to their activity.

The IaCC complements other surveys that assess framework conditions and identifies the "judicial system", "licensing" and "tax system" as the three main regulatory barriers for Portuguese firms. The article provides a description of the relations between firms' evaluation of the different domains of regulatory costs and two performance variables, namely labour productivity and export intensity. The comparison of the kernel distributions of these two performance variables for different groups of firms classified according to their answers to the survey gives some initial indications on the association between regulatory costs and firms' performance. To complement this information, we estimate several descriptive regressions that relate both the level of latent obstacles and firms' perception of the importance of each domain with firms' labour productivity and export intensity.

We find a negative relation between firms' productivity and the evaluation of the importance of regulatory costs in the domains "starting activity", "administrative burden", "barriers to internationalisation" and "human resources". Regarding export intensity, a negative link is estimated for the importance of "starting activity", "licensing" and "judicial system". Moreover, the association of firms' labour productivity and export intensity with the level of latent obstacles tends to differ between firms that evaluate the domain of regulatory costs as important to their activity and those that do not. Finally, two domains of regulatory costs stand out in terms of the significant

negative relations estimated for both the importance for firms' activity and the level of the latent obstacle: "human resources" for labour productivity and "judicial system" for export intensity.

The article details the analysis in the domain "barriers to internationalisation", and finds that to consider these costs as important to firms' activity tends to be associated with lower productivity and higher export intensity. For export intensity, significant negative links with the level of obstacles are estimated mostly for firms that consider this domain as important and for obstacles not directly connected with international trade, namely FDI-related costs and those associated with applications to international tenders and programs.

Since the last economic and financial crisis, increased attention has been paid to productivity developments and obstacles to Portuguese potential growth. Although the accumulation and quality of inputs plays a major role in this process, the overall institutional framework is key. In this article, we show that there are aspects of regulatory costs that have a significant relation with firms' performance. However, evidence is still limited and further firm-level data and empirical research are necessary to better inform policy-decisions.

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Euro area credit market: who contributed to the recent recovery?

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Abstract
The dispersion of bank lending conditions in the euro area has increased substantially with the sovereign crisis. What is the importance of the close links between sovereign and banks during the recent credit recovery period, in the context of deepening the banking union? In this article, we examine the recent evolution of euro area bank credit according to some characteristics of the banks that are often associated with their vulnerabilities, and bearing in mind that links with their sovereign can stress such vulnerabilities. Apparently, banks perceived to be the most vulnerable seem to have experienced weaker lending developments in the private sector relative to the remaining ones. When control factors are included, the results suggest that country-specific factors, including the position in the business cycle, are relevant for the supply of credit and correlate with the degree of vulnerability of banks. The conclusions should be read with due caution, in particular conclusions on causation can not be drawn. (JEL: E58, E65, G20)

Bank lending growth in the euro area was more heterogeneous during the recent crisis period. In fact, there was a geographical fragmentation, in which the evolution of credit in the countries considered as vulnerable was much lower than in the countries with high credit rating. Fragmentation was associated with the close links between the sovereign and the country's banking system. Beyond this factor, the individual characteristics of banks may also be related to the heterogeneity observed in the evolution of euro area bank lending. In fact, banks with capital or balance sheet restrictions will be expected to have their ability to provide credit limited. For example, there is evidence that smaller, less capitalized and less liquid banks respond more strongly to a monetary policy impulse (Stein and Kashyap 2000). These banks will be less able to replace sources of financing and will therefore be more vulnerable to shocks.

This article explores this theme in the euro area over the last few years, trying to understand the relationship between the evolution of loans and some banks' characteristics, including some indicators of how the market perceives

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them and factors associated with the home country. The analysis focuses on the recovery period of the euro area banks credit market, using data from January 2014 to December 2018. It is therefore sought to understand whether the recovery of lending in the euro area was due most to banks regarded as more robust per se, trying to separate the vulnerability related to country risk. The main source of data consists of an individual confidential database of Eurosystem banks (Individual Balance Sheet Items - IBSI), crossing it with individual report data (SNL) on bank characteristics. The results obtained can be justified in the light of some hypotheses about the transmission mechanisms. Banks with characteristics closer related to robustness, such as higher regulatory capital levels or higher credit ratings, would have contributed relatively more to the recovery of lending in the euro area. These are banks that would have lower balance sheet restrictions and lower financing costs, and thus would be able to transmit more favourable credit conditions. Nevertheless, these characteristics are closely related to country-specific factors, which is in line with recent studies on the amplification effects of sovereign-banking nexus in face of adverse conditions.

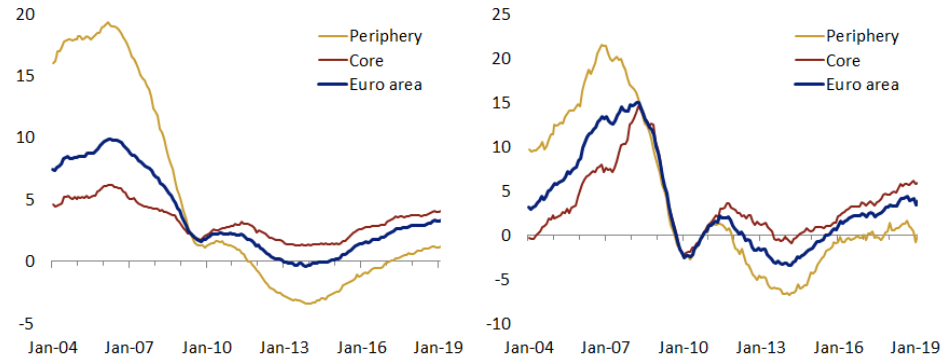
The conclusions of this article should be read with due caution, since the analysis focuses on correlations between growth of bank loans and banks' characteristics, without proper control over other factors, in particular on the demand side of credit, not being due conclusions on causality effects.

The article begins with a brief description of the evolution of the banking lending market in the euro area over the past few years, and then goes on to characterize the banking system according to a set of bank indicators. In the third section, a graphical analysis is presented on the correlation between the evolution of bank credit and these characteristics. This assessment is further elaborated in the fourth section with an econometric analysis in which some factors are better controlled, although we are still unable to distinguish supply and demand factors for credit. The article ends with some final considerations.

How have bank loans developed in the euro area?

The growth of bank lending in the euro area began to slow at the beginning of the second half of the 2000s, showing a sharp decline with the onset of the financial crisis in 2008 (Figure 1). With the sovereign crisis, the growth of bank credit reached minimum rates of change in early 2014, having even contracted in several countries, in particular those more vulnerable to the sovereign crisis (referred to in this article as the periphery)[1], and more pronouncedly for non-financial corporations.

1. Throughout the article, this group of countries is referred to as the periphery and consists of Portugal, Spain, Italy, Ireland, Greece and Cyprus. The group of core countries consists of Germany, France, the Netherlands, Finland, Austria and Luxembourg. The banks from the



(A) Loans to households (B) Loans to non-financial corporations

FIGURE 1: Euro area bank loans and by groups of countries | Annual rate of change, percentage

Source: ECB (author calculations).
Note: Annual growth rates based on the outstanding amount of loans to households and non-financial corporations adjusted for sales of loans, securitization and notional cash flows. Rates of change by region correspond to the averages weighted by the outstanding amounts of the respective country loans.

The recovery phase of bank credit in the euro area started from the end of 2013/early 2014, first on loans to households. In 2018, bank lending to households grew 3.3%, while loans to non-financial corporations grew 4%. However, there has been a considerable degree of dispersion in these growth rates between countries. Core countries continue to show stronger credit growth, while credit growth in peripheral countries remains fairly subdued, with growth rates close to 1%.

How are euro area banks characterized?

Table 1 presents the average values for a set of variables relevant to the characterization of the euro area banking system in the period under review. To this end, confidential data on banks balance sheet items relevant for monetary and financial statistics (IBSI) was merged with individual information on bank characteristics.[2] Table 1 shows, based on balance sheet items, the average number of banks available in the database, the size of

remaining countries are a very small group, accounting for 4% of total loans to non-financial corporations and households in the euro area.

2. The sample of banks in the IBSI accounts for about 80% of the total assets of the euro area banking system.

the bank from total main assets and an outlook on loan portfolio based on the share of loans to households and non-financial corporations over total main assets and the share of loans to non-financial corporations. To further characterize the banks, the following indicators, available in the SNL database, were considered:

- Common Equity Tier 1 (CET1)
- Problem loans, measured as the ratio of non-performing loans, impaired, or other problematic loans over risk-weighted assets
- Credit rating, measured as the average credit rating available between the three major agencies (Moody's, Fitch and Standard & Poor's)
- Monthly average of the price-to-book ratio

The first three columns of this table present the statistics for the overall sample, and then disaggregated according to the group in which the banks conform to their characteristics. The groups based on CET1 and the problem loans ratio were defined according to the CET1 median and the problem loans ratio, respectively, that is, if the respective bank ratio in each year is below the median in the same year, this is assigned to the 'low' group. The rating-based groups are defined in relation with the bank average credit rating of the three agencies in each year, if it is investment grade (above BBB+) or high yield (lower or equal to BBB+). The groups of banks based on the price-to-book ratio are defined according to the median of this ratio in January 2014. [3] Finally, the groups of core vs. periphery banks are defined according to the home country of the institution. The data resulting from the merge of the different information does not cover the entire sample because not all banks are listed, not all banks have a credit rating from the three agencies and not all banks have data available at SNL. In order to understand the importance of these groups of banks, the last two lines of table 1 show the percentage of the outstanding lending amount of each group in the total number of banks available at IBSI.

The average size of the banks as measured by total main assets decreased at the beginning of the period and recovered from 2016, so that the average bank in 2018 is slightly larger than the average bank in 2014. Despite this evolution of the total balance sheet, banks consistently increased their non-financial private sector lending portfolio to an average of 44% in 2018. This increase was made at the expense of household loans, although loans to non-financial corporations continue to account for more than half of their loan portfolio. Banks' vulnerability indicators have also shown improvements over the past few years. In fact, the average bank capital ratio has increased while the proportion of problem loans has declined since the peak reached in 2013.

3. In this case, the sample of banks in each group is constant over time, while it is variable for the three types of previous groups.

In general, banks that can be perceived as more vulnerable (low CET1, low problem loans, low rating, low price-to-book, resident in the periphery) present values for the different types of indicators that consistently point to greater vulnerability, although the differences are less marked according to the bank's capital level. For example, banks with higher problem loan ratios show lower capital ratios, ratings and price-to-book ratios. Banks in peripheral countries also have values in these indicators that point to greater vulnerability.

There are some differences also in the size of the banks according to the groups, although apparently not associated with their vulnerability. Banks with lower capital ratios, higher credit ratings and from core countries tend to be larger banks and are more likely to be listed banks. The comparison of the loan portfolio among the groups of banks also reveals some interesting differences. Banks with a relatively smaller portfolio of private sector loans tend to have higher capital ratios and ratings, less problem loans and are more likely to be located in core countries.

	All banks			Groups of banks throughout 2014-2018									
	2014-2018	2014	2018	Low CET1	High CET1	Low PL	High PL	Low rating	High Rating	Low PB	High PB	Core	Periphery
Average number of banks	307	313	290	66	66	61	61	55	57	20	20	166	94
Total main assets (TMA)	77 652	75 493	82 517	135 000	60 529	106 000	101 000	98 533	131 000	219 000	104 000	101 000	62 989
Loans to households + NFC / TMA	43.2%	42.3%	44.3%	47.6%	43.9%	40.3%	50.7%	47.0%	39.3%	37.4%	53.6%	38.3%	48.2%
Share NFC	52.6%	53.9%	52.3%	49.3%	47.1%	51.9%	46.0%	49.1%	51.%	58.2%	46.6%	53.8%	53.2%
CET1	16.0%	14.4%	17.7%	11.8%	20.1%	16.4%	14.6%	15.5%	15.4%	13.6%	13.5%	16.0%	14.8%
Problem Loans (PL) / RWA	13.1%	14.6%	11.8%	13.5%	13.1%	3.6%	22.7%	18.5%	4.8%	21.0%	15.2%	5.4%	24.7%
Rating	BBB+	BBB+	BBB+	BBB+	BBB+	A	BBB-	BBB-	A+	BBB	BB+	A	BB+
Price-to-book (PB)	77.7%	100.0%	72.9%	80.5%	70.9%	86.6%	72.1%	74.3%	77.6%	61.5%	97.3%	78.3%	67.8%
Loans to households / total sample				34.1%	17.3%	19.3%	29.7%	24.3%	21.8%	9.9%	13.4%	67.7%	28.2%
Loans to NFC / total sample				38.9%	17.1%	23.6%	31.0%	26.9%	25.3%	15.0%	13.7%	63.1%	33.0%

TABLE 1. Descriptive statistics by groups of banks

Source: ECB and S&P Global Market Intelligence (SNL) (author calculations).
Note: Total main assets in millions of euros. The rating is given by the average of the credit ratings of the three major agencies (Moody's, Fitch and Standard & Poor's), that are converted into an ordinal scale equivalent between the three agencies. Loans to households (NFC) / total sample is the percentage of the amount of loand to household (NFC) of the respective group of banks in the total sample.

Is there a relationship between the evolution of bank loans and the characteristics of banks?

This section presents a graphical analysis of the relationship between recent developments in bank lending in the euro area and the characteristics of the banks referred to in the previous section. It is therefore sought to determine whether there is a differentiated behaviour between banks that may help explaining the contributes to the recovery of bank credit supply in the euro area, although it is not possible to distinguish possible effects on the demand side of credit.

There is already some discussion in the economic literature about the influence of different characteristics of banks on the supply of credit, which will be briefly presented below.

In principle, a higher capital cushion allows the bank to absorb negative shocks in its balance sheet with less need to reduce its assets, particularly the loan portfolio. Alternatively, banks may seek to keep the capital ratio constant, thus managing assets in order to achieve this goal. According to some studies on the effect of capital ratios and regulatory requirements on lending, less capitalized banks are more vulnerable to negative shocks and more susceptible to restrict credit, although the level of capital per se does not appear to be a relevant determinant in credit granting (Berrospide and Edge 2010; Gambacorta and Mistrulli 2004).

Another of the internal indicators considered is the ratio of problem loans as a percentage of risk-weighted assets. Indicators such as these related to the level of non-performing loans have gained attention in recent years, raising frequent questions about their possible impact on credit supply and economic activity (Aiyar *et al.* 2015). A bank with more non-performing loans not yet written down in the assets may need to deleverage, which may limit its ability to provide credit. Their prospects for future profitability may also be more contained. Thus, banks with these characteristics may be subject to higher financing costs, which may limit their lending activity. Correctly identifying the effect of non-performing loans on credit supply is difficult, since weak economic activity also leads to lower demand for credit and an increase in defaults. The studies on these effects are meager and arrive at different conclusions. In particular, Cucinelli (2015) finds a negative effect of the level of non-performing loans (NPL) on the credit supply, whereas cite Accornero17 find a negative effect of the NPL variation but not its level . Related to these effects, Segura and Suarez (2019) recognize that delaying the recognition of NPL prevents the granting of new credit, although the optimal solution is located at an intermediate point that reduces the possibility of bank resolution.

The capital ratio and the problem loan ratio are internal indicators of the bank's "quality", not revealing external perception about the bank. The way a bank is perceived by the market also influences its capacity and its financing costs, affecting its ability to grant credit. The main mechanism for assessing

the importance of these indicators in terms of lending is thus via the financing costs of banks. A bank with a higher credit rating should benefit from more favourable terms. A bank with a lower market capitalization will have higher financing costs, which may limit its ability to provide credit.

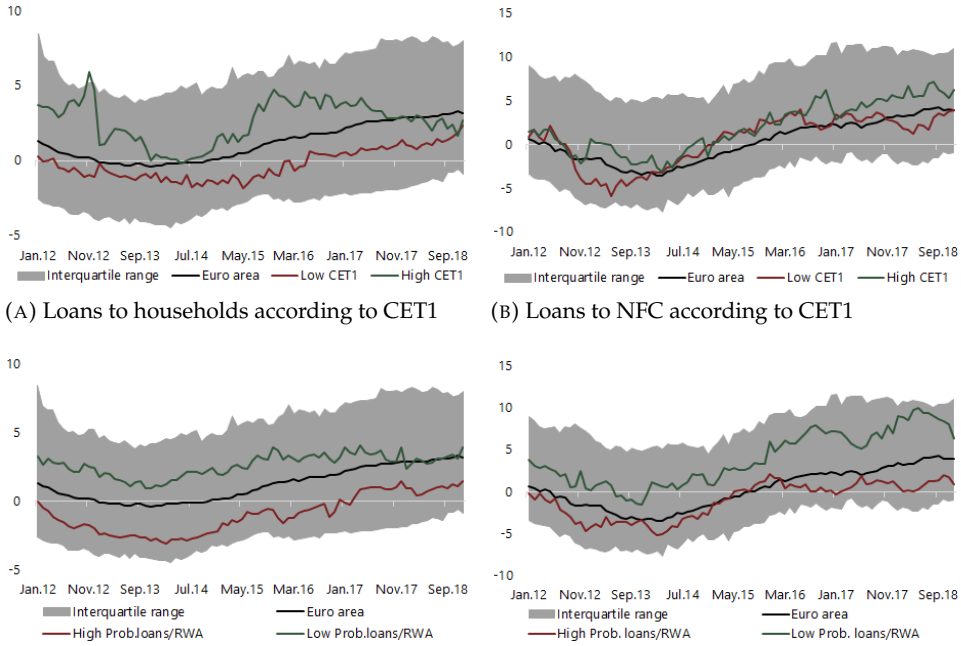
Figure 2 shows charts with the evolution of bank loans according to banks' internal indicators. Graphs (A) and (B) show the evolution of loans according to the banks' capital level. The more capitalized banks appear to have expanded loans to households more than the less capitalized banks, but in the case of loans to non-financial corporations there appears to be no distinction between the two groups. It could be argued that the relevant distinction should be based on the distance between the observed ratio and the regulatory limit rather than on the ratio itself. However, within the available sample, the number of observations in which the capital ratio is close to the minimum requirements in terms of the CET1 ratio is very small, with no requirements for Pillar II being considered.[4]

The graphs (C) and (D) of Figure 2 panel show the relationship between the evolution of bank loans and the share of problem loans. By dividing the banks into two groups, below and above the median, there is a weaker growth in lending, both for households and for non-financial corporations, for banks with a higher ratio. The difference between the median annual rate of change in loans between the two groups is around 4 pp, both for loans to households and for non-financial corporations. Although this relationship appears to be in line with concerns about the effect of recognizing or not non-performing loans in banks' balance sheet, the ratio also likely reflects weak credit demand, especially in countries where the crisis had stronger effects and led to higher levels of defaults.

The graphs in Figure 3 show the evolution of bank loans according to the bank's external indicators. Charts (A) and (B) show the evolution of credit according to banks' credit rating and support the hypothesis that a bank with a higher credit rating benefits from lower financing costs, allowing it to granting of credit. Over the period under review, the median lending growth for both households and non-financial corporations in the group of high-rated banks was around 5 pp higher than the median growth of the high yield banks.

Finally, the evolution of bank loans was assessed according to the market valuation of each bank (charts (C) and (D)). In this case, it should be recalled that there may be some bias in the sample since it only includes listed banks. In this period, it appears that the growth of loans to households was slightly lower in banks with lower market value. In the case of loans to non-financial corporations, there appears to be no significant relationship between the price-to-book ratio and loan growth.

4. Total capital ratio was also tested for and the conclusions remain.



(A) Loans to households according to CET1

(B) Loans to NFC according to CET1

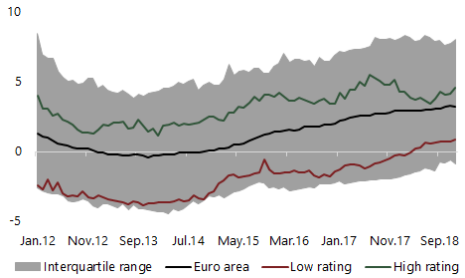
(C) Loans to households according to the problem loans ratio

(D) Loans to NFC according to the problem loans ratio

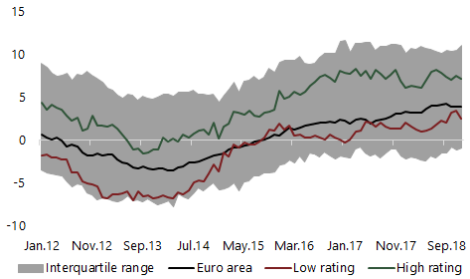
FIGURE 2: Bank loans in the euro area according to internal indicators | Annual rate of change, percentage

Source: ECB and S&P Global Market Intelligence (SNL) (author calculations).
Note: The annual rates of change for the euro area are calculated on the basis of the adjusted outstanding amount of loans to households and non-financial corporations. In the individual data, annual rates of change of unadjusted balances are used; loans to non-financial corporations have a maturity of more than one year. The interquartile range of individual annual rates of change is based on 245 banks with loans to households and 259 banks with loans to non-financial corporations. CET1 low (high) corresponds to the median of the rate of change for an average group of 72 (71) banks with a smaller capital ratio (higher) than the median in each year. PL/RWA high (low) corresponds to the median of the rate of change for an average group of 64 (64) banks with the ratio above (below) the median in each year.

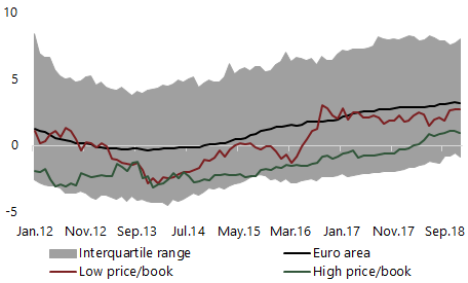
The information presented suggests that the aggregate evolution of lending in the euro area hides a high degree of heterogeneity, which may be related to the type of bank, its business model, its balance sheet or the constraints it may face, as well as factors related to the country where it is located. It appears that in the euro area, banks perceived to be the most vulnerable seem to show a weaker trend in lending to the private sector than the remaining banks. It should be recalled, however, that no potential effect from the demand side is taken into account in this analysis. In the next section, we look for a more detailed analysis on the relevance of these characteristics together with factors associated to the country.



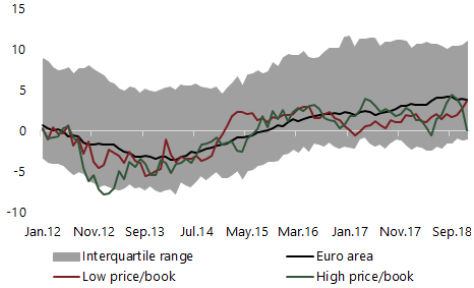
(A) Loans to households according to the rating



(B) Loans to NFC according to the rating



(C) Loans to households according to the price-to-book ratio



(D) Loans to NFC according to the price-to-book ratio

FIGURE 3: Bank loans in the euro area according to external indicators | Annual rate of change, percentage

Source: ECB and S&P Global Market Intelligence (SNL) (author calculations).
Note: The annual rates of change for the euro area are calculated on the basis of the adjusted outstanding amount of loans to households and non-financial corporations. In the individual data, annual rates of change of unadjusted balances are used; loans to non-financial corporations have a maturity of more than one year. The interquartile range of individual annual rates of change is based on 245 banks with loans to households and 259 banks with loans to non-financial corporations. Low rating is the median of the rate of change for an average group of 56 (61) banks with the average credit rating of the three major agencies less than or equal to BBB + in each year. Low (high) price-to-book corresponds to the median of the rate of change for an average group of 22 (22) banks with a ratio below (above) the median in January 2014.

Were the characteristics of the banks relevant to the recovery of bank credit?

As mentioned earlier, there appears to be some association between the country of origin of the bank and its degree of vulnerability, as banks resident in peripheral countries appear to be more vulnerable. At the same time, it is also on the periphery that the growth of bank lending has been weaker since the start of the financial crisis. This association is in line with the close links between banks and sovereign that has been explored in the literature. Dell'Ariccia *et al.* (2018) identify three channels of liaison between

banks and sovereigns, namely via banks' exposure to sovereign debt, via government guarantees on banks and via the common macroeconomic effects on banks and sovereign. In adverse environments such as that of the euro area sovereign crisis, the vulnerabilities of the two sectors are reinforced by feedback effects that amplify and accelerate the negative consequences (Farhi and Tirole 2018). According to Altavilla *et al.* (2017), during the eurozone sovereign crisis, banks more exposed to troubled sovereigns cut more credit during periods of stress and granted more credit when the tension in the markets eased. Evidence suggests that there is indeed a strong correlation between bank vulnerabilities and sovereign vulnerability that should significantly affect the supply of credit. In addition, demand for credit is also influenced by the macroeconomic conditions of the country and, consequently, by the sovereign.

In this context of strong factors interconnection, this section seeks to analyse the relationship between banks' vulnerabilities and the evolution of bank credit during the favourable context of recovery, aiming at partly isolating the effect of country factors. If during the crisis the fall in credit was stronger in the most vulnerable countries partly due to the sovereign-banks nexus, as measures were introduced that seek to mitigate these links, can credit developments be less dependent on country factors and more related to idiosyncratic factors of the banks?

For this purpose, panel regressions were estimated using as a dependent variable the change of the logarithms of the outstanding amount of loans to non-financial corporations and households and, as independent variables, the banks indicators evaluated previously, interacting properly with the region (core or periphery). Several fixed effects are included in the analysis in a progressive way. First, fixed time and country effects are included to capture the specific macroeconomic conditions across countries over the business cycle. Secondly, we include fixed-effects at the bank level to try to control for other bank characteristics that may influence their credit granting behaviour.[5] Thus, the results of the regressions should be interpreted as the effect of the independent variable for the same bank over time after withdrawing the effect of the particular economic cycle of the country. The standard errors of the regressions are clustered by country, based on the assumption that errors may be correlated between banks in the same country, being a more demanding approach to data. The results presented below follow a line of reasoning from a general viewpoint to an individual one, i.e. it begins with the relationships for the euro area for total loans to the non-financial private sector, to then disaggregate by counterpart of loans and by region.

5. It should be noted that the specification with fixed effects by bank may be too demanding for relatively small samples by absorbing too much variability of the data.

Table 2 presents the results of regressions on the annual rate of change of loans without distinction by geographical region, in three sets of columns for total loans to the non-financial private sector, loans to non-financial corporations and loans to households. The first column of each set shows the coefficients for a linear regression without any control other than the simultaneous inclusion of the capital ratio, the problem loans ratio and the credit rating. There is a positive correlation between the growth of bank credit and the level of regulatory capital of banks, that is, banks with a larger capital cushion were those with stronger credit growth, and this behaviour is due to the dynamics of corporate lending. This result contrasts with the previous graphical analysis, which points to the relevance of other characteristics of the banks. Banks with higher credit ratings have also had stronger credit growth since 2014, again from the dynamics of corporate credit. [6]

6. Remember that credit rating is transformed into a numeric variable decreasing with the rating grade.

	NFC + Households				NFC				Households			
CET1	0.128***	0.030	0.344	0.196	0.188***	0.265	1.448*	1.536	0.043	0.023	0.172	0.014
	(0.039)	(0.205)	(0.251)	(0.357)	(0.071)	(0.180)	(0.750)	(1.000)	(0.072)	(0.109)	(0.288)	(0.179)
Prob. loans	0.016	-0.091**	-0.064	-0.006	0.040	-0.138***	-0.061	-0.115	0.071***	-0.050	-0.034	0.039
	(0.016)	(0.038)	(0.072)	(0.033)	(0.030)	(0.042)	(0.079)	(0.096)	(0.027)	(0.042)	(0.049)	(0.038)
Rating	-0.382***	-0.156	1.092	0.866	-0.711***	-0.275	0.990	0.609	0.056	0.148	0.819	0.707
	(0.075)	(0.535)	(0.915)	(0.743)	(0.136)	(1.229)	(2.373)	(2.140)	(0.122)	(0.365)	(0.658)	(0.572)
Fixed effects	N	Country-Year	Bank	Bank and Country-Year	N	Country-Year	Bank	Bank and Country-Year	N	Country-Year	Bank	Bank and Country-Year
Cluster std. errors	N	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y
Nº obs.	5,344	5,344	5,344	5,344	5,314	5,314	5,314	5,314	5,234	5,234	5,234	5,234
R^2	0.009	0.172	0.298	0.381	0.008	0.123	0.355	0.410	0.003	0.097	0.299	0.350

TABLE 2. Results of panel regressions for bank characteristics

Note: Panel regression having as a dependent variable the 12-month change in the logarithm of the loans outstanding amount (to non-financial corporations and / or households) and as independent variables the 12-month lagged level of the following variables: capital ratio CET1 of the bank, the bank's problem loan ratio as a percentage of the risk-weighted assets (Prob. Loan) and the bank's credit rating as the average rating available of the three major credit rating agencies. The rating is set from 1 to 18, where 1 is the highest rating (AAA) and 18 is the lowest rating (CCC or DDD). Standard deviations in the second row between brackets grouped by country when indicated. Regression excludes banks from countries not included in either of these two regions. Period: January 2012 to December 2018. *, ** and *** represent significance levels of 10 %, 5 % and 1 %, respectively.

	NFC + Households				NFC				Households			
CET1												
Core	0.210***	0.121	0.533**	0.308	0.349***	0.328**	2.340*	2.216	0.088	-0.070	0.379	0.044
	(0.048)	(0.084)	(0.209)	(0.489)	(0.088)	(0.120)	(1.144)	(1.609)	(0.079)	(0.096)	(0.263)	(0.139)
Periphery	0.042	0.007	0.093	0.012	-0.036	0.514*	0.203	0.658	0.111	0.425***	-0.177	-0.239
	(0.053)	(0.500)	(0.517)	(0.518)	(0.096)	(0.271)	(0.441)	(0.489)	(0.121)	(0.104)	(0.594)	(0.475)
Prob. loans												
Core	-0.130***	-0.042	-0.339*	0.013	-0.285***	-0.114	-0.471	-0.590	-0.100	-0.057	0.017	0.380***
	(0.047)	(0.048)	(0.171)	(0.184)	(0.084)	(0.163)	(0.394)	(0.931)	(0.076)	(0.119)	(0.156)	(0.069)
Periphery	0.018	-0.110**	-0.049	-0.004	0.072**	-0.167***	-0.034	-0.090	0.063**	-0.057	-0.033	0.031
	(0.018)	(0.049)	(0.064)	(0.032)	(0.032)	(0.046)	(0.063)	(0.077)	(0.029)	(0.035)	(0.050)	(0.033)
Rating												
Core	-0.847***	-0.939**	2.344***	0.775	-0.889***	-2.230*	3.574***	2.586**	-0.675***	-0.265	1.074**	-0.865**
	(0.149)	(0.399)	(0.346)	(0.582)	(0.280)	(1.093)	(0.535)	(0.937)	(0.247)	(0.413)	(0.437)	(0.304)
Periphery	-0.427***	0.519	0.401	1.092	-0.585***	1.717	0.222	0.309	-0.244	0.740**	0.793	1.887***
	(0.092)	(0.424)	(0.888)	(1.101)	(0.166)	(1.712)	(2.017)	(2.283)	(0.160)	(0.321)	(1.130)	(0.336)
Fixed effects	N	Country-Year	Bank	Bank and Country-Year	N	Country-Year	Bank	Bank and Country-Year	N	Country-Year	Bank	Bank and Country-Year
Cluster std. erros	N	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y
Nº obs.	5,344	5,344	5,344	5,344	5,314	5,314	5,314	5,314	5,234	5,234	5,234	5,234
R^2	0.016	0.178	0.301	0.381	0.014	0.137	0.364	0.413	0.009	0.100	0.299	0.351

TABLE 3. Results of panel regressions for bank characteristics by region

Note: Panel regression having as a dependent variable the 12-month change in the logarithm of the loans outstanding amount (to non-financial corporations and / or households) and as independent variables, the 12-month lag level of the following variables for each of the regions: the bank's capital ratio CET1, the bank's problem loan ratio as a percentage of risk-weighted asset (Prob. loans) and the bank's credit rating as the average rating available of the three major credit rating agencies). The rating is set from 1 to 18, where 1 is the highest rating (AAA) and 18 is the lowest rating (CCC or DDD). Standard deviations in the second row between brackets grouped by country when indicated. Regression excludes banks from countries not included in either of these two regions. Period: January 2012 to December 2018. *, ** and *** represent significance levels of 10 %, 5 % and 1 %, respectively.

As previously seen, banks in the core countries tend to be banks with a higher level of regulatory capital and with higher credit ratings than banks in peripheral countries. Thus, the relationships identified in the first column may simply reflect this link between bank vulnerabilities and country factors. This hypothesis is supported by the results of the second column, which includes fixed country-year effects to try to control for it, in addition to the possibility of different phases of the economic cycle per country. In fact, the coefficients on the capital ratio and credit rating are no longer significant by including these fixed effects (and the treatment of standard errors by country). On the other hand, the coefficient on the problem loan ratio becomes significant, in the sense that banks with a larger proportion of problem loans will have shown weaker credit growth, mainly through loans to non-financial corporations. Even so, this effect disappears when fixed effects of banks are added. This means that, for the same bank, the changes in these indicators analyzed over time is not related to changes in the pace of lending activity to the non-financial private sector, even after controlling for different macroeconomic conditions over time and between countries.

It can then be concluded that, for the euro area as a whole, credit recovery in the period 2014 to 2018 was differentiated between euro area countries, stronger in the relatively more robust banks in terms of capital and credit rating, which tend to have in common the home country, and in banks with a lower proportion of problem loans, but these are not related to the country where they are located.

Given the strong differentiation between the two groups of countries, with most peripheral countries subject to adjustment programs, it is important to analyze whether the characteristics of the banks help to explain different loan concession between the two regions. To do this, we proceed to the same regressions, but now interacting with the region where the bank is located. It is therefore of interest to understand whether the capital ratio, for example, correlates differently with the growth of credit in the core than in the periphery. The results of these regressions are presented in the table 3.

The results of the first regression, without any fixed effect, are in line with the overall results, in the sense that higher capitalized banks with higher credit ratings showed stronger credit growth, mainly from loans to non-financial corporations and from core countries. In this group of countries, one also obtains a negative correlation with the problem loans ratio, that is, banks from the core with a higher problem loans ratio showed weaker credit growth compared to the peripheral banks. By including the fixed effects by country-year (second column) this negative relation becomes significant for the countries of the periphery, maintaining the relationship with the rating for the countries of the core. This means that, among the banks from the periphery, banks with a higher ratio of problem loans expanded less credit compared to the banks of the same country in the same year and, among the banks of the core, banks with higher credit ratings expanded more credit

compared to banks in the same country in the same year. Again, these behaviours were mainly due to the dynamics of lending to non-financial corporations.

When including controls for other non-observable characteristics of banks that do not vary over time (third column), we obtain some different conclusions, in particular the positive relation with the capital ratio and the relationship with an opposite sign for credit rating for countries of the core. For a particular bank, downward revisions in the credit rating are associated with a credit acceleration. This is a counterintuitive result, but it is related to the economic cycle, since the result disappears when the country-year fixed effects are added again. In this last, more demanding specification, none of the characteristics of banks is relevant to the growth of total credit to the non-financial private sector of the euro area. However, when analysing the breakdown by loans to non-financial corporations and households, some different conclusions are obtained. In the case of non-financial corporations, after controlling for the bank and the macroeconomic conditions by country, only a significant signal is obtained for the credit rating in the core, which means that banks that saw the credit rating revised down one notch showed a stronger growth of these loans by 2.5 pp compared to the other banks. In the case of loans to households, this relationship with the credit rating holds for the banks from the periphery (down revision of one notch associated with a growth of 1.9 pp). In banks from the core, the relationship is the opposite, ie, higher rating associated with higher loan growth (up revision of one notch associated with an increase in the credit growth rate by 0.9 pp) . In addition, there is also a positive relationship with the problema loans ratio for the banks from the core, ie, a bank in this region with an increase of 1 pp in this ratio would have had an increase in loan growth of 0.4 pp relative to peripheral banks.

In general, there are some significant differences between the behaviour of banks in the core and the periphery, in particular as regards credit rating. There is no relevant effect on the periphery of banks' vulnerability measures, suggesting that in fact the main vulnerabilities that may be relevant to the credit supply are related to the vulnerabilities of the sovereign. This result seems to be in line with Altavilla *et al.* (2017) which conclude that the banks more exposed to the sovereign were the ones that cut more credit at the peak of the sovereign crisis, but also were the ones that showed a stronger recovery after the period of market tensions.

It was still tested the relevance of these indicators in separate regressions for each one, since there must be some correlation between them and since there is no data for all indicators for all banks. The results are generally consistent with those shown in the tables 2 and 3. The only indicator that was not included in these tables was the price-to-book ratio, since in this case the sample is much more restricted and includes only listed banks. The results of the regressions, following the same order, for this variable only suggest a

slight negative correlation between price-to-book and credit growth, common to the entire area. This negative correlation is maintained by including fixed effects in the regression. In other words, for the same bank and controlling for macroeconomic conditions per country, a 10 pp reduction in the price-to-book ratio is associated with an increase of 10 bp in the growth of total credit to the non-financial private sector, significantly only for banks from the (Chart 4). Thus, it does not seem that a more negative perception of the bank by investors is associated with a weaker credit supply in the recent period.

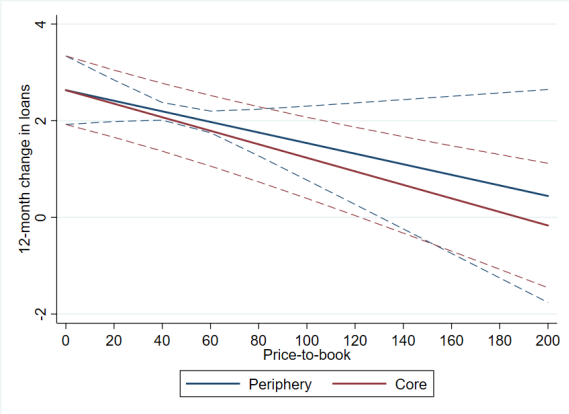


FIGURE 4: Relationship between the price-to-book ratio and loan growth | Percentage

Note: Results of a panel regression having as a dependent variable the 12-month change of the logarithm of the loans outstanding amount (to non-financial corporations and households) and independent variable the price-to-book ratio for each region, including fixed effects per bank and country-year. Period: January 2012 - December 2018. The coefficient for the periphery is not significant, while the coefficient for core is significant at 99%.

Final remarks

The present article analysed the evolution of bank loans in the euro area, in particular during the recent recovery period, according to some characteristics of the banks that are usually associated with their vulnerabilities and taking into account that the nexus with the respective sovereign can emphasise such vulnerabilities. Recent developments in the euro area hide a high degree of heterogeneity, firstly among euro area countries, which is related with country factors, but that may also be related to the type of bank, its business model, its balance sheet or the restrictions it may face. Apparently, banks perceived to be more vulnerable seem to have experienced a weaker evolution in loans to the private sector than the other banks. However, when one controls for bank-specific factors or for macroeconomic conditions at the level of its country of residence, such conclusion changes. The relationship with the capital level

and the credit rating weakens when one takes into account the specific factors of banks or the business cycle, which points to the relevance of country determinants. The behaviour of banks from the core countries of the euro area seem to have been slightly different from the behaviour of the peripheral banks, especially when looking at the breakdown by type of loans. There is no relevant effect on the periphery of measures of banks' vulnerabilities, suggesting that in fact the main vulnerabilities that may be relevant to the credit supply are related to the vulnerabilities in the sovereign. Lastly, it does not seem that a more negative perception of the bank by investors, ie a lower price-to-book ratio, is associated with a weaker credit supply in the recent period.

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The import content of final demand in Portugal: Nominal and real evolution

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Abstract
The aim of this article is to assess the import content of final demand components in Portugal since the beginning of the euro area. Besides documenting the heterogeneity across the main aggregates of final demand, we also distinguish the evolution in nominal terms from the corresponding behavior in real terms. Despite the relative stability of the import content of final demand in nominal terms, the results suggest an upward trend in real terms, most notably in investment and exports. (JEL: C67, D57, F15)

Introduction

With the development of international trade, the interdependence among the economies has been growing significantly. Naturally, the deepening of trade relations has implications on the analysis of the evolution of a given economy. In particular, the heterogeneity regarding the import penetration across final demand components translates into differentiated impacts on the domestic economy.

Therefore, it becomes crucial to determine the import content of the various final demand components. Such an assessment is key for understanding the evolution of imports and corresponding econometric modelling (see, for example, Laxton *et al.* (1998), Herzberg *et al.* (2002), Cardoso *et al.* (2013), Bussière *et al.* (2013)). In particular, Bussière *et al.* (2013) highlight the role played by the composition of final demand in explaining the trade collapse observed in 2009. In fact, although world real GDP decreased less than 1 per cent, world trade declined by more than 10 per cent. Such a behavior can be justified by the fact that the final demand components that decreased the most were precisely the ones that have highest import content.

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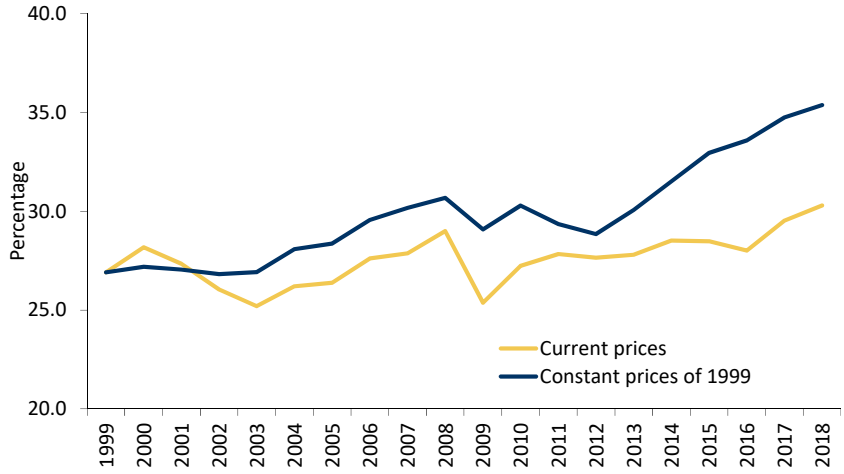

FIGURE 1: The import content of final demand in Portugal

The distinction between the external and domestic content also plays a key role in the literature regarding global value chains (see, for example, Koopman *et al.* (2010) and Johnson and Noguera (2012)). In particular, the level of integration in the global value chains is associated with the import content of exports.

Furthermore, particular attention has been given to this topic in the development of dynamic stochastic general equilibrium (DSGE) models. In order to capture more adequately the interconnections with the rest of the world and to describe more properly the transmission of shocks in open economies, the theoretical underpinning of DSGE models has been modified to take into account the import content of exports. For instance, within the Eurosystem, Coenen and Vetlov (2009) extended the NAWM model developed by Christoffel *et al.* (2008) and Brzoza-Brzezina *et al.* (2014) modified the EAGLE model proposed by Gomes *et al.* (2012).

For Portugal, the import penetration on exports has been studied by Amador and Cabral (2008) for the period 1980-2002 and by Amador and Stehrer (2014) for the period 1995-2011. See Cardoso *et al.* (2013) for the analysis of the import content of the various final demand components covering the period 1980-2008.

In this article, we intend to assess the evolution of the import penetration in the different final demand components in Portugal since the beginning of the euro area. However, in contrast with previous literature, besides determining the import content in nominal terms, we also quantify the import content at constant prices. The importance of such distinction is highlighted in

Figure 1.[1] In fact, while the import content of final demand in nominal terms has been relatively stable, there has been a noteworthy increase of import penetration in volume terms. Besides analyzing final demand as a whole, it is important to assess to what extent such dichotomy holds for the several final demand components.

The article is organized as follows. In the subsequent sections, a description of the data is provided, the methodology is outlined and the results are discussed. Finally, we end with some concluding remarks.

Data

The analysis of the import content of the final demand in the last two decades was based, firstly, on the information available at current prices that allows to compute the import content in nominal terms. Subsequently, drawing on some assumptions for the evolution of the deflators, the import content for each component of final demand at constant prices has been computed using a level of disaggregation identical to the one used for the analysis in nominal terms. As the aim is to analyze developments since the start of the euro area, the import content in volume terms has been calculated considering 1999 as the reference price year.

Current prices data

The analysis at current prices is based on the input-output matrices, which convey information on the intermediate consumption and final uses by product in the economic territory, coming from both imports and domestic production. These matrices, also called symmetric input-output matrices, include the domestic output matrix at basic prices, the matrix of imports, the matrix of distribution margins, and the matrix of taxes less subsidies. This information corresponds to a breakdown of the supply and use tables of annual national accounts but is not available with the same frequency. The data considered corresponds to the years for which symmetric input-output matrices are available in the period under study, namely 1999, 2005, 2008, 2013 and 2015. For the most recent period, in particular 2013 and 2015, data has been compiled and published by Statistics Portugal (see INE (2016, 2018)), whereas for the previous period its compilation was under the responsibility of the *Departamento de Prospetiva e Planeamento* (see Martins (2004), Dias (2008) and Dias and Domingos (2011)). With such detailed information it is possible

1. The import content of final demand as a whole can be computed as the ratio between total imports and total final demand using the national accounts data regularly released by INE. For the components of final demand, one has to resort to more detailed information as mentioned in the next section.

to compute the import content per unit of final demand (see methodology in the next section). It should be noted that the non-import content corresponds to the impact on GDP and includes taxes less subsidies.

The level of disaggregation of the symmetric matrices released has changed throughout the period considered from about 60 products/branches of activity in 1999 and 2005 to more than 80 in the following years. In addition, there have been changes in the product nomenclature of the national accounts. Thus, to ensure comparability over time, the matrices were aggregated, keeping as much detail as possible, resulting in 49 products/branches of activity. In this way, we obtained intermediate consumption and imports matrices with 49 products/branches of activity, as well as the corresponding final uses for each final demand component, coming directly from imports and from domestic production.

It should be noted that for the main aggregates, the import content at current prices may differ slightly from those previously reported by INE and DPP (see INE (2016, 2018) and Dias (2010, 2016)) due to the above-mentioned aggregation of products. However, the differences between the import content of the main aggregates of final demand reported in this article and those obtained with the highest detail available are negligible.

Constant prices estimates

As previously mentioned, the information available and officially released only allows to compute the import content in nominal terms. However, in this article we intend to analyze its behavior and composition in volume terms, given the different nominal and real evolution observed for final demand as a whole (Figure 1). To accomplish this, it is necessary to obtain estimates of the import content at constant prices for the same years for which figures are available at current prices. Thus, the import content of the various components of final demand have been calculated with the previously mentioned detail of 49 products at both current and constant prices.

The quantification of the import content at constant prices resorts to the same methodology that is used at current prices, with all the data, namely intermediate consumption matrices both imported and produced domestically, previously deflated and converted into values at constant prices of the reference year. Thus, it has been necessary to compute deflators, with a disaggregation level of 49 products, for the following set of input-output matrices: matrix of imported intermediate consumptions; matrix of domestic output used as intermediate consumption; vectors for each component of the final demand directly imported; vectors for each component of the final demand directly coming from domestic production; final demand vectors at purchasers' prices; vectors of trade margins implicit in the final demand at purchasers' prices.

To obtain deflators for such detail it has been necessary to make some assumptions. All deflators have been obtained from the annual national accounts, taking into account for each year the deflators implicit in comparable national accounts data at current prices and at prices of the previous year. In order to ensure the degree of disaggregation considered, it was necessary to resort to several annual national accounts bases. In this way, the cumulative price change, starting in 1999, has been obtained for each year under analysis allowing to calculate estimates at constant prices of 1999.

For the final demand vectors at purchasers' prices, the deflators have been obtained directly from the annual national accounts (supply and use tables), by accumulating the annual price changes over the periods in consideration (from 1999 up to 2005, 1999 up to 2008 and so on).

The remaining deflators have been obtained assuming the following hypotheses. In the case of imports (i.e. imported intermediate consumption matrices and vectors of final demand directly imported), we assumed, for each product, the import price variation of the corresponding product in national accounts. Hence, it is assumed that the import price evolution of each product is identical regardless of the type of use. Equivalently, in the case of intermediate consumption matrices and final demand vectors of domestic production, it is assumed, for each product, the price change of production at basic prices of each product implicit in the annual national accounts. The deflator of the trade margins by product for each component of the final demand corresponds to the total deflator of the trade margins per product implicit in the national accounts, being assumed as in the case of production and imports that are identical, regardless of the type of use.[2]

Naturally, the estimates at constant prices are conditional, on the one hand, on the assumptions regarding the deflators and, on the other hand, on the relative price structure of the reference year. It should also be noted that the total values at constant prices (imports, domestic production and final demand components) have been obtained by summing up the values by product, so the aggregate deflators may differ from those resulting from the accumulation of the price changes for the corresponding aggregates implicit in annual national accounts, which are based on the values at the previous year prices.

In order to assess the sensitivity to the reference year, the main aggregates have been calculated at constant prices of 2015, which are reported in the Annex. Although the level of the import content in volume terms depends naturally on the reference year, the evolution is not qualitatively different from

2. An alternative approach to obtain input-output matrices at constant prices would consist of estimating complete symmetric matrices using the RAS method, which would imply assuming additional assumptions and constraints on aggregates (see, for example, Hoen (2002)). However, given the specific goal of this study, it has been decided to deflate only the components required to compute the import content.

the one obtained with 1999 as the reference year. Thus, in the analysis of the import content in volume, the focus is on the behavior over time and not on the respective level. We now proceed to the description of the methodology used to calculate the import content both at current and constant prices.

Methodology

Let us consider N products and K final demand components. The domestic ouput of each product can be used as intermediate consumption in the production of other products or to satisfy final demand, that is,

$$x_i = \sum_{j=1}^{N} z_{ij}^d + \sum_{k=1}^{K} y_{ik}^d \tag{1}$$

where x_i corresponds to domestic output of product i $(i = 1, ..., N)$, z_{ij}^d denotes the domestic output of product i used as intermediate consumption by branch of activity j $(j = 1, ..., N)$ and y_{ik}^d corresponds to the domestic output of product i used to satisfy the k final demand component $(k = 1, ..., K)$. The final demand encompasses private consumption, public consumption, investment and exports. Defining $a_{ij}^d = \frac{z_{ij}^d}{x_j}$, one obtains for the N products, in matrix terms,

$$X = A^d X + Y^d 1 \tag{2}$$

where

$$X = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_N \end{bmatrix} \quad A^d = \begin{bmatrix} a_{11}^d & a_{12}^d & \cdots & a_{1N}^d \\ a_{21}^d & a_{22}^d & \cdots & a_{2N}^d \\ \vdots & \vdots & & \vdots \\ a_{N1}^d & a_{N2}^d & \cdots & a_{NN}^d \end{bmatrix} \quad Y^d = \begin{bmatrix} y_{11}^d & y_{12}^d & \cdots & y_{1K}^d \\ y_{21}^d & y_{22}^d & \cdots & y_{2K}^d \\ \vdots & \vdots & & \vdots \\ y_{N1}^d & y_{N2}^d & \cdots & y_{NK}^d \end{bmatrix} \tag{3}$$

and 1 is column vector $K \times 1$ with all elements equal to 1. Solving (2) for X one obtains

$$X = \left(I - A^d\right)^{-1} Y^d 1 \tag{4}$$

where I is an identity matrix $N \times N$ and $\left(I - A^d\right)^{-1}$ is the well-known inverse Leontief matrix.

In a similar fashion, imports of each product may be used as intermediate consumption in the production of other products or used to satisfy final demand, that is,

$$m_i = \sum_{j=1}^{N} z_{ij}^m + \sum_{k=1}^{K} y_{ik}^m \tag{5}$$

where m_i corresponds to the imports of product i, z_{ij}^m denotes the imports of product i used as intermediate consumption by branch of activity j and y_{ik}^m corresponds to the imports of product i used to satisfy directly the k final demand component. Defining $a_{ij}^m = \frac{z_{ij}^m}{x_j}$, one can write in matrix form, for the N products,

$$M = A^m X + Y^m 1 \tag{6}$$

where

$$M = \begin{bmatrix} m_1 \\ m_2 \\ \vdots \\ m_N \end{bmatrix} \quad A^m = \begin{bmatrix} a_{11}^m & a_{12}^m & \cdots & a_{1N}^m \\ a_{21}^m & a_{22}^m & \cdots & a_{2N}^m \\ \vdots & \vdots & & \vdots \\ a_{N1}^m & a_{N2}^m & \cdots & a_{NN}^m \end{bmatrix} \quad Y^m = \begin{bmatrix} y_{11}^m & y_{12}^m & \cdots & y_{1K}^m \\ y_{21}^m & y_{22}^m & \cdots & y_{2K}^m \\ \vdots & \vdots & & \vdots \\ y_{N1}^m & y_{N2}^m & \cdots & y_{NK}^m \end{bmatrix} \tag{7}$$

Substituting (4) in (6) one obtains

$$M = A^m \left(I - A^d\right)^{-1} Y^d 1 + Y^m 1 \tag{8}$$

Therefore, total imports can be decomposed into indirect imports, $M^{ind} = A^m \left(I - A^d\right)^{-1} Y^d$ and direct imports, $M^{dir} = Y^m$. Hence, the direct import content of the k final demand component is given by

$$C_k^{dir} = \frac{\sum_{i=1}^{N} m_{ik}^{dir}}{\sum_{i=1}^{N} y_{ik}} \tag{9}$$

and the indirect import content of the k final demand component can be expressed as

$$C_k^{ind} = \frac{\sum_{i=1}^{N} m_{ik}^{ind}}{\sum_{i=1}^{N} y_{ik}} \tag{10}$$

where m_{ik}^{dir} and m_{ik}^{ind} denote the i,k element of M^{dir} and M^{ind}, respectively, and $y_{ik} = y_{ik}^d + y_{ik}^m$. The direct import content reflects the imports used to satisfy directly the k final demand component whereas the indirect import content reflects the imported intermediate consumption required for domestic production used to satisfy the k final demand component.

The total import content of the k final demand component is the sum of the direct and indirect import content, that is, $C_k = C_k^{dir} + C_k^{ind}$. It represents the amount of imports, both direct and indirect, needed to satisfy a unit of the k final demand.

Results

In Table 1 we report the import content of final demand, as a percentage of final demand, at current prices and constant prices of 1999. It is also presented the corresponding decomposition in direct and indirect import content. It should be noted that, in spite of the national accounts revisions and the above-mentioned issues related with the disaggregation level and deflators, the values and evolution of the import content of the final demand, both at current and constant prices, are similar to those displayed in Figure 1, which are based on the latest vintage of the national accounts.

From Table 1 it can be seen that, in nominal terms, the total import content of the final demand remained relatively stable in the period as whole, from 1999 to 2015, although it has increased between 2005 and 2008 followed by a decrease in the period between 2008 and 2013. Concerning the decomposition of the import content in direct and indirect, the indirect import content is higher than the direct one throughout the whole period.

	1999	2005	2008	2013	2015
Current prices					
Total	27.7	26.7	29.4	27.2	27.8
Direct	11.5	9.4	10.2	8.6	9.9
Indirect	16.2	17.2	19.2	18.5	17.9
Constant prices of 1999					
Total	27.7	28.5	31.5	29.5	32.0
Direct	11.5	11.0	12.7	11.5	13.0
Indirect	16.2	17.5	18.8	18.0	19.0

TABLE 1. The import content of final demand (percentage)

Regarding the components of final demand, those with the highest import penetration are Gross Fixed Capital Formation (GFCF) and exports while public consumption presents the lowest figure (Figure 2). Despite the relative stability of the import content in the period between 1999 and 2015, it should be mentioned the increase in exports and the slight decrease in private consumption and GFCF. It should also be noted that, behind the relatively stable import content of final demand in nominal terms over the period as a whole, it is visible an increase in volume, most notably in exports and GFCF.

Figure 3 displays the decomposition of the change in the import content of final demand in nominal terms (i.e. the change of the percentage of the import content of final demand between two years) in a volume effect (measured by the change in the import content at constant prices) and a price effect (measured as the difference between the change at current prices and the change at constant prices). In the period under analysis, the volume effect contributed to an increase in the import content, with the exception of the

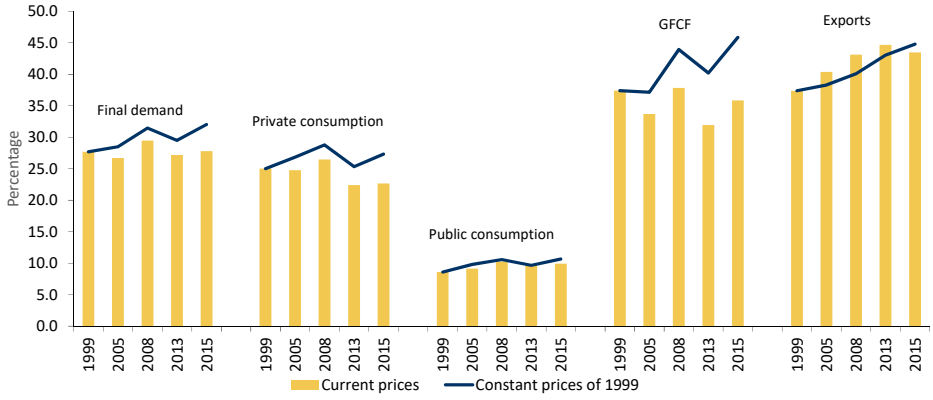

FIGURE 2: The import content of final demand components

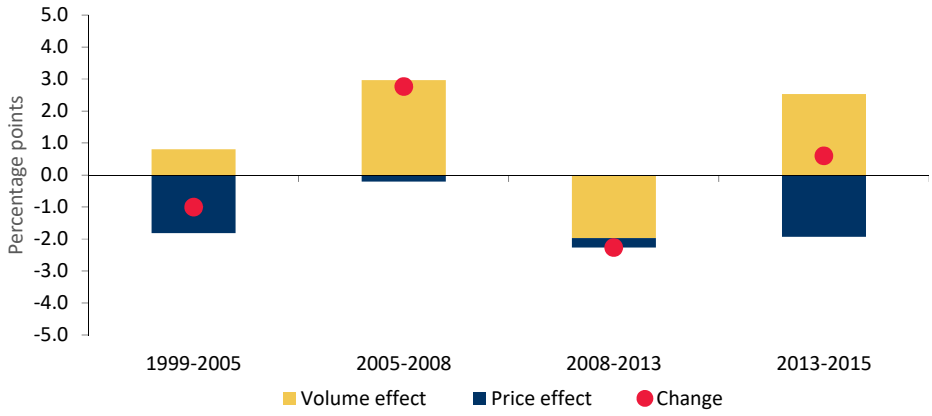

FIGURE 3: Decomposition of the change in the import content of final demand

period between 2008 and 2013, where it was observed a negative contribution. In fact, during this period, marked by the economic and financial crisis, imports decreased more substantially than final demand in accumulated terms, reflecting the fact that the components of demand with higher import content were the ones that recorded the most pronounced declines given the higher sensitivity to the economic cycle. Underlying the relative stability of the import content in nominal terms, there was a negative contribution of the price effect, of variable magnitude, reflecting the fact that the change in the import deflator has been lower than that of final demand.

In order to better understand the evolution of the import content of final demand, the import content of its main components is now analyzed.

Final consumption

In Table 2 we present the import content (total, direct and indirect), both at current and constant prices, for private consumption and its main aggregates and for public consumption.

In the case of total private consumption, the import content in nominal terms stood at around 25 per cent in the period under analysis, with similar importance of direct and indirect import content. Considering the main aggregates of private consumption, import content is higher in the consumption of durable goods than in non-durable consumption [3]. Furthermore, in the case of durable goods, the direct import content is clearly dominant while for non-durable consumption, the indirect is more important, in particular for the non-food non-durable consumption where services have a larger weight.

Figure 4 displays the contribution of the main components to the import content of private consumption, reflecting not only the import content of each component but also the structure of private consumption expenditure. Although the import content of durable consumption is higher, it is non-food non-durable consumption that, given its large weight in consumer spending, contributes the most to the import content of private consumption.

In nominal terms, after a slight increase until 2008, it has been observed a decline in the import content of private consumption between 2008 and 2013, while recovering in 2015. For the period as a whole, there has been a decrease in the import penetration in private consumption in nominal terms, in contrast with the increase observed in volume terms.

Figure 5 conveys, analogously to Figure 2 but for the case of private consumption, the decomposition of change of the import content in its volume and price effects. In this case the volume effect reflects the change of the import content of private consumption at constant prices and the price effect captures the relative behavior between the deflator of the imports driven by consumption, directly or indirectly, and the change of private consumption deflator.

3. Recall that the import content is as percentage of expenditure at purchasers' prices, which also includes margins and taxes on products. In this respect, the case of autos should be highlighted, where the amount of taxes, included in the value of consumption expenditure but not in the respective value of imports, has a significant weight, which translates into a lower import content than one would expect.

	Total					Direct					Indirect				
	1999	2005	2008	2013	2015	1999	2005	2008	2013	2015	1999	2005	2008	2013	2015
Current prices															
Private consumption	25.0	24.8	26.5	22.4	22.6	13.3	12.2	12.5	10.5	11.6	11.7	12.6	14.0	11.8	11.0
Durable consumption	60.0	54.6	56.4	52.3	55.1	56.0	50.1	51.3	47.7	51.2	4.0	4.5	5.1	4.6	3.9
Autos	58.3	55.4	59.2	56.0	58.2	55.6	53.5	56.6	53.8	56.2	2.7	2.0	2.7	2.2	2.0
Other durables	63.9	53.2	52.1	48.4	50.3	57.0	44.5	43.2	41.4	43.4	6.9	8.7	8.9	7.1	6.8
Non-durable consumption	20.8	22.1	23.9	20.8	20.5	8.1	8.8	9.2	8.6	8.9	12.7	13.3	14.7	12.2	11.5
Food	31.7	33.1	38.3	34.3	34.1	14.1	16.8	19.1	17.3	17.9	17.7	16.2	19.1	17.0	16.3
Non-food non-durable consumption	17.7	19.6	20.5	17.4	17.1	6.4	7.0	6.8	6.4	6.7	11.3	12.6	13.7	11.0	10.4
Public consumption	8.6	9.2	10.3	9.6	9.9	1.5	1.6	1.5	1.8	1.9	7.1	7.6	8.7	7.8	8.0
Constant prices of 1999															
Private consumption	25.0	26.8	28.8	25.3	27.3	13.3	14.3	15.5	13.6	15.2	11.7	12.6	13.3	11.7	12.1
Durable consumption	60.0	58.6	60.5	55.3	56.1	56.0	53.7	54.9	50.5	51.7	4.0	4.9	5.6	4.8	4.3
Autos	58.3	59.6	61.1	59.9	61.4	55.6	57.4	58.3	57.3	58.8	2.7	2.2	2.8	2.7	2.5
Other durables	63.9	57.3	59.7	52.2	51.3	57.0	48.5	50.5	46.1	45.3	6.9	8.8	9.2	6.1	6.0
Non-durable consumption	20.8	23.7	25.3	23.0	24.4	8.1	10.3	11.2	10.8	11.5	12.7	13.3	14.1	12.2	12.9
Food	31.7	34.8	38.3	35.9	36.7	14.1	18.4	20.2	19.0	19.7	17.7	16.4	18.1	16.9	17.0
Non-food non-durable consumption	17.7	20.8	21.9	19.3	21.1	6.4	8.3	8.8	8.4	9.3	11.3	12.5	13.0	10.9	11.8
Public consumption	8.6	9.8	10.6	9.7	10.7	1.5	1.8	1.7	2.0	2.2	7.1	8.0	8.8	7.7	8.5

TABLE 2. The import content of final consumption (percentage)

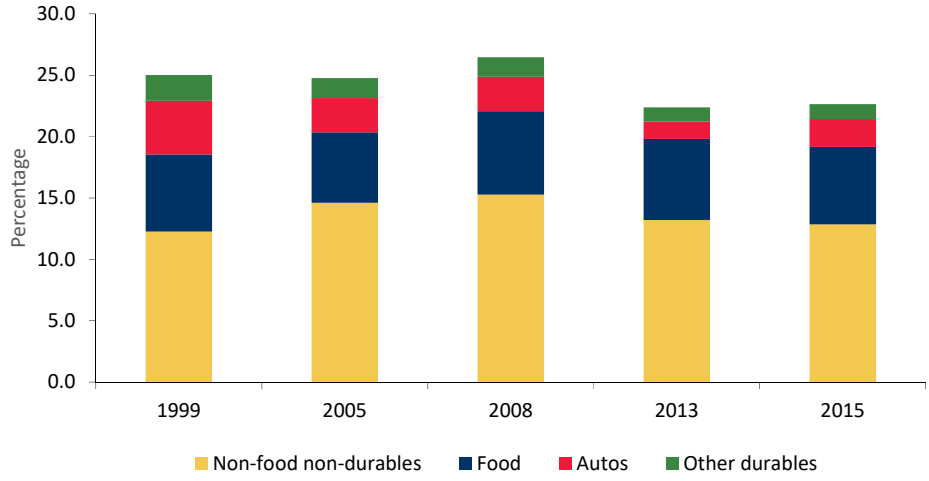

FIGURE 4: Decomposition of the import content of private consumption

In general, a positive volume effect is observed along with a negative price effect over the period. It should be noted that this price effect reflects not only a different composition between imports for consumption and consumption expenditure but also an import prices rate of change lower than the one recorded for private consumption deflator. The positive contribution in volume reflects the increase in the import content of non-durable consumption at constant prices, both food and non-food, in particular the direct content. The negative contribution in real terms between 2008 and 2013 reflects, to some extent, a composition effect given that the weight of consumption of

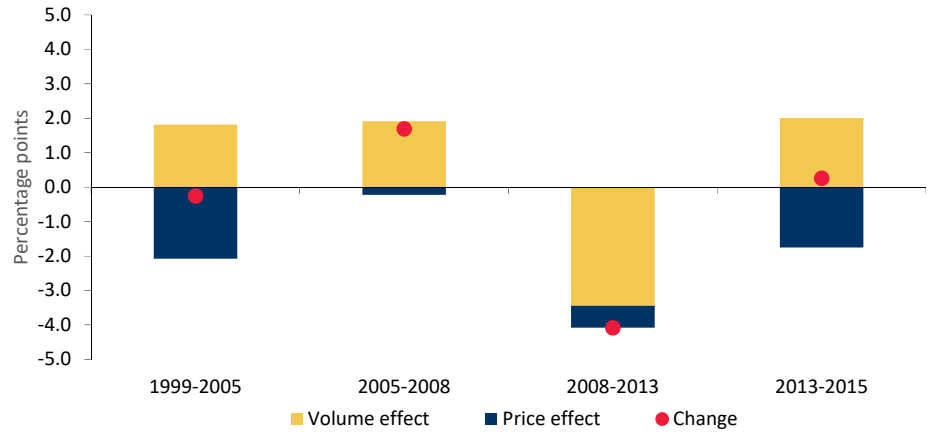

FIGURE 5: Decomposition of the change in the import content of private consumption

durable goods, especially that of autos, decreased significantly as a result of the financial and economic crisis, due to its more procyclical behavior. However, the reduction of the import content in volume during this period was observed in both durable and non-durable consumption.

Public consumption, on the other hand, has a relatively low import content, of around 10 per cent, which is related to the predominance of services in this type of expenditure, particularly non-tradables,. The import content is essentially indirect, through the goods and services used as intermediate consumption in the production of these services. In terms of evolution, the import content of public consumption has remained relatively stable over time both in nominal and real terms.

Gross Fixed Capital Formation

GFCF is one of the demand components with higher import content, being the one in which the direct import content is more relevant (Table 3). However, the level of external dependence is heterogeneous by type of investment.

Machinery and equipment and transport equipment are the items with the highest import content at around 70 per cent. In contrast, construction and other products have much smaller values. The direct import content is dominant in the cases of machinery and equipment and transport equipment in sharp contrast with construction, where the import content is only indirect.

Such heterogeneity is reflected in the contributions of the components to the import content of GFCF. In fact, although the GFCF of machinery and equipment and transport equipment accounts for only a third of the total GFCF, these components largely determine the import content of GFCF since they account for two-thirds of GFCF imports (Figure 6).

Although the GFCF import content in nominal terms has not substantially changed between 1999 and 2015 (despite some fluctuations over the period), there has been an upward trend in real terms, particularly in the case of the direct content.

The increase in the import penetration in real terms is relatively broadly based across the main components of GFCF, reinforced by the fact that construction has been losing weight in GFCF compared to the other components. Given that construction is one of the components of GFCF with lower import content, such a weight reduction translates into an increase in the ratio between imports for GFCF and the total amount of GFCF.

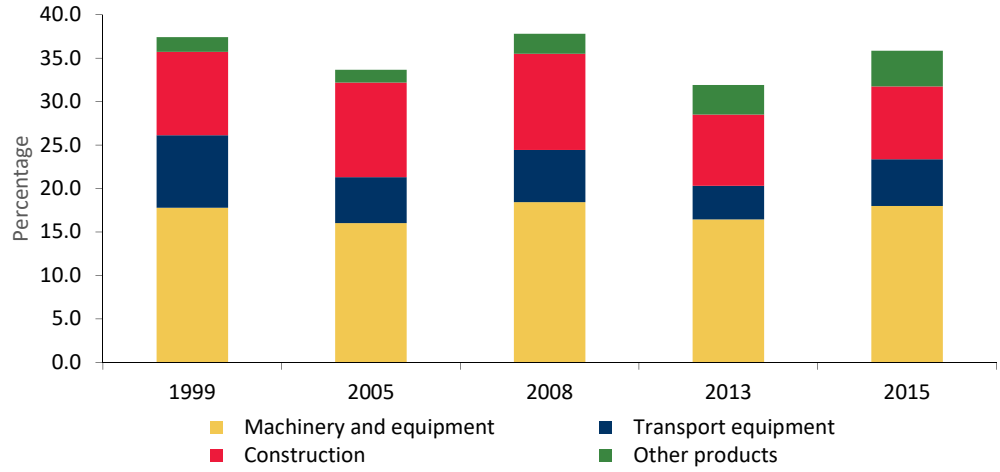

FIGURE 6: Decomposition of the import content of GFCF

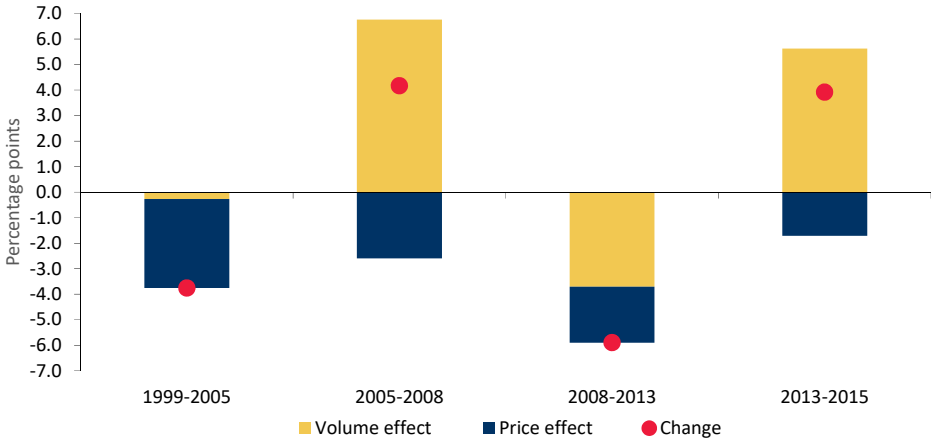

FIGURE 7: Decomposition of the change in the import content of GFCF

	Total					Direct					Indirect				
	1999	2005	2008	2013	2015	1999	2005	2008	2013	2015	1999	2005	2008	2013	2015
Current prices															
GFCF	37.4	33.7	37.8	31.9	35.8	24.0	17.8	21.6	19.5	22.9	13.4	15.8	16.3	12.4	12.9
Machinery and equipment	71.6	68.4	68.4	72.7	73.2	62.3	54.7	54.9	63.7	64.8	9.3	13.7	13.5	9.0	8.5
Transport equipment	74.1	68.2	78.2	73.2	72.8	67.5	57.2	72.8	68.6	70.6	6.6	11.0	5.4	4.6	2.2
Construction	17.6	18.6	20.3	16.5	18.1	0.0	0.0	0.0	0.0	0.0	17.5	18.6	20.2	16.5	18.1
Other products	18.4	14.1	21.6	15.3	19.0	10.2	5.7	10.9	6.6	8.4	8.2	8.5	10.7	8.8	10.6
Constant prices of 1999															
GFCF	37.4	37.2	43.9	40.2	45.8	24.0	21.5	28.2	27.8	32.1	13.4	15.6	15.7	12.4	13.7
Machinery and equipment	71.6	69.2	71.1	74.8	77.0	62.3	56.4	59.4	67.4	69.8	9.3	12.8	11.6	7.4	7.2
Transport equipment	74.1	71.5	81.6	78.8	77.7	67.5	60.1	76.2	73.7	75.0	6.6	11.3	5.4	5.1	2.7
Construction	17.6	19.0	21.4	18.5	22.7	0.0	0.0	0.0	0.0	0.0	17.5	19.0	21.4	18.5	22.7
Other products	18.4	15.0	23.8	17.3	21.5	10.2	6.2	12.6	7.5	9.3	8.2	8.8	11.2	9.9	12.3

TABLE 3. The import content of GFCF (percentage)

Regarding the decomposition of the change of the GFCF import content, similar to what is observed for private consumption, there is a negative price effect (Figure 7). This effect reflects not only a different composition between GFCF imports and GFCF expenditure but also a change of import prices over the period lower than the change in GFCF deflator. It should be noted that the component of machinery and equipment presented price changes substantially lower than the other components and even negative ones, that together with its different weight in GFCF and in the imports oriented towards GFCF, contributed significantly to a negative price effect. This price effect is offset by the aforementioned volume increase in the period as a whole. It should be noted that the negative contribution of the volume effect to the change of the import content in the period between 2008 and 2013 partially reflects the change in the European System of Accounts, with the entry into force of the ESA 2010, which led to the inclusion of R&D activities in GFCF (in particular, GFCF other products) that have a much lower import content than the remaining GFCF components.

Exports

Exports correspond to the final demand component with the highest import content, reaching over 40 per cent in most of the years under analysis, reflecting almost totally indirect imports (Table 4).[4]. Furthermore, exports of goods present a higher import content than exports of services, reflecting naturally a greater integration in international trade.

Figure 8 displays the import content of exports by main product groups in 1999 and 2015. The highest values are attained by fuels with an import content of around 90 percent followed by the transport equipment with about 70 percent in 2015.

In terms of evolution, one can see that there has been an increase in the import content of exports in nominal terms between 1999 and 2015, both in goods and services. One should note that excluding fuels the finding is qualitatively similar. In the case of goods, the increase is visible in most goods, signaling a greater integration in global value chains. In services, there has been also an increase in the import content, largely reflecting the behavior of transport services, notably air transport, suggesting an increasing international integration of this type of services. It should be noted that air transport services are the component of services with the highest import content (49 per cent in 2015, which is well above the average in exports of services, which is around 20 per cent).

4. The direct import content is of little importance in the case of exports and corresponds to re-exports and to the so-called triangular trade.

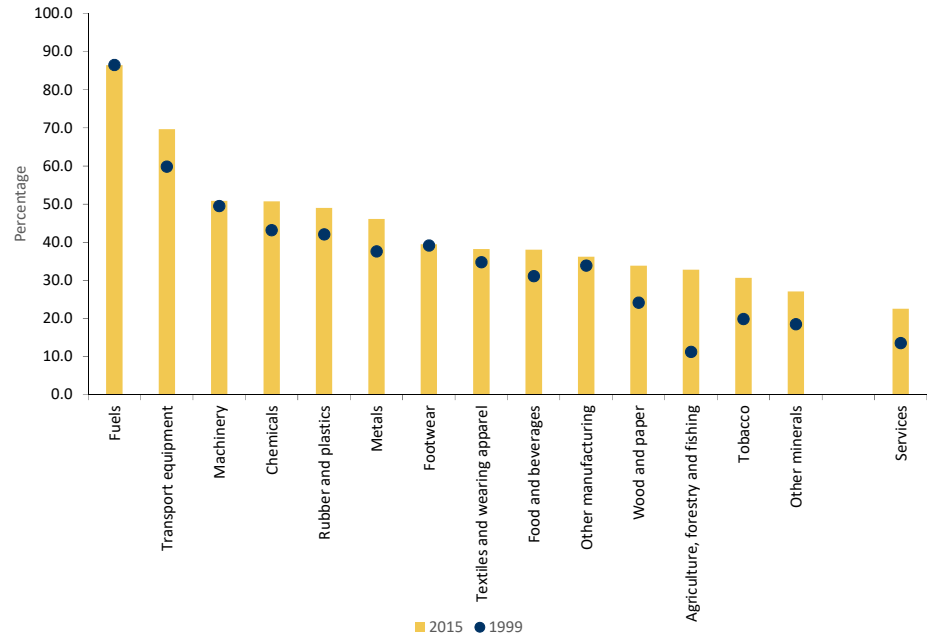

FIGURE 8: The import content of exports by products in nominal terms

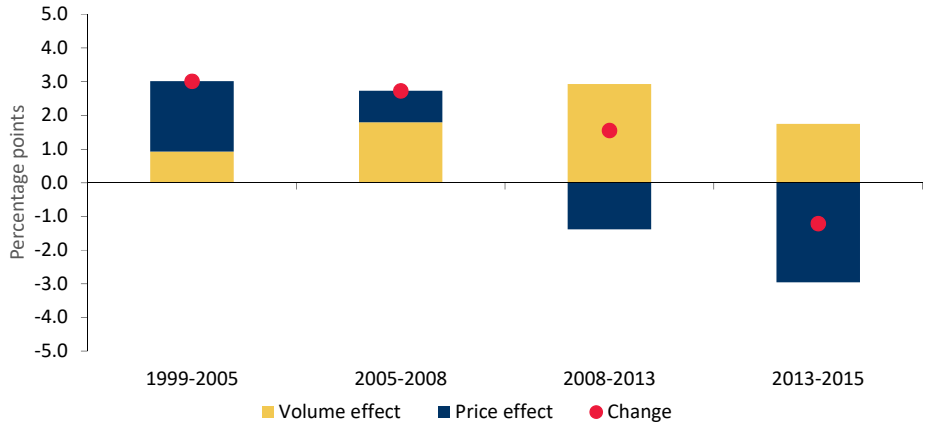

FIGURE 9: Decomposition of the change in the import content of exports

	Total					Direct					Indirect				
	1999	2005	2008	2013	2015	1999	2005	2008	2013	2015	1999	2005	2008	2013	2015
Current prices															
Exports	37.4	40.4	43.1	44.7	43.5	0.0	1.0	1.7	4.2	4.1	37.4	39.4	41.4	40.5	39.3
Goods	41.5	44.8	48.5	50.6	49.0	0.0	1.2	2.2	5.2	5.2	41.5	43.7	46.3	45.4	43.8
Fuels	86.5	95.7	87.6	93.1	86.5	0.0	0.1	0.0	2.2	1.5	86.5	95.5	87.5	90.9	85.0
Goods excluding fuels	40.6	42.9	46.5	46.0	46.0	0.0	1.2	2.3	5.6	5.5	40.6	41.7	44.2	40.4	40.5
Services	13.6	18.9	23.8	21.7	22.5	0.0	0.0	0.0	0.1	0.1	13.6	18.9	23.8	21.6	22.5
Constant prices of 1999															
Exports	37.4	38.3	40.1	43.0	44.8	0.0	0.8	1.6	5.2	5.2	37.4	37.5	38.5	37.8	39.5
Goods	41.5	42.4	45.2	49.5	50.8	0.0	1.0	2.0	6.5	6.5	41.5	41.4	43.2	42.9	44.3
Fuels	86.5	99.0	90.5	99.6	92.1	0.0	0.1	0.0	2.4	1.6	86.5	98.9	90.4	97.1	90.5
Goods excluding fuels	40.6	41.4	44.5	48.0	49.4	0.0	1.0	2.0	6.7	6.7	40.6	40.5	42.5	41.3	42.7
Services	13.6	16.4	19.2	17.1	20.4	0.0	0.0	0.0	0.0	0.1	13.6	16.4	19.2	17.1	20.4

TABLE 4. The import content of exports (percentage)

The import content of exports in real terms recorded an upward trend throughout the period, which translates into a positive contribution of the volume effect to the change in the import content of exports in nominal terms (Figure 9).

Between 2008 and 2013, the increase of the import content of exports, in volume, partly reflects the increasing importance of fuel exports. In fact, as a result of the expansion in the capacity of Portuguese refineries, fuel exports registered a very strong real growth in 2012 and 2013. The larger volume effect observed in the most recent period, between 2013 and 2015, reflects, to a large extent, the increase in the weight of exports of transport equipment (which have a high import content), and, to a lesser extent, the increase in the import content of air transport services.

In contrast with the volume effect, the sign of the contribution of the price effect to the change in the nominal import content has changed over the period. Between 1999 and 2005, there was a significant positive price effect largely due to the increase in fuel prices along with the fact that this product weighs more on imports oriented towards exports than on exports. The fuel price effect is usually associated with the different relative weight of fuels in exports and in the corresponding imports and not with price differentials given that Portugal is a price-taker in this market. In the period between 2013 and 2015, the opposite was observed, i.e. a negative contribution given the significant drop in fuel prices.

Concluding remarks

In this article, we analyzed the import content of the main components of final demand in Portugal since the beginning of the euro area. Besides the evolution in nominal terms, we complemented the analysis with volume estimates for the import content.

The results point to a notable heterogeneity of the import content across final demand components. Exports and investment are the components with the highest import content and public consumption has a relatively low external content.

In nominal terms, the import content of the final demand has not changed substantially between 1999 and 2015, although there was an increase in the import penetration in the case of exports and a slight decrease in the other main components of domestic demand.

However, behind the relative stability in nominal terms, the analysis at constant prices reveals a clearly upward trend in the import content of final demand. Even though it is broadly based across final demand components, it is more pronounced in investment and exports. In the case of GFCF, some important composition effects are observed, namely the effect of the decrease in the relative weight of GFCF in construction over the period under analysis.

On the other hand, the higher import content of exports seems to reflect a generalized increase of the import content by products, suggesting an increasingly integration in global value chains.

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Appendix

	1999	2005	2008	2013	2015
Private consumption	21.1	22.8	23.9	20.8	22.6
Durable consumption	57.0	55.8	57.6	53.8	55.1
Autos	55.6	56.7	58.1	56.8	58.2
Other durables	62.2	54.0	56.7	50.4	50.3
Non-durable consumption	17.9	20.4	21.3	19.1	20.5
Food	31.0	33.1	36.1	33.3	34.1
Non-food non-durable consumption	14.8	17.6	17.9	15.6	17.1
Public consumption	8.7	9.4	9.8	9.0	9.9
GFCF	30.7	29.7	35.1	30.8	35.8
Machinery and equipment	67.8	67.5	67.8	71.7	73.2
Transport equipment	70.6	67.8	76.9	73.9	72.8
Construction	16.5	16.9	17.8	15.0	18.1
Other products	16.5	13.8	21.9	15.2	19.0
Exports	36.8	37.8	38.7	41.5	43.5
Goods	41.3	42.0	43.8	47.9	49.0
Fuels	86.5	94.9	87.5	95.1	86.5
Goods excluding fuels	39.4	39.8	42.1	44.7	46.0
Services	15.0	18.4	20.8	18.3	22.5
Final demand	23.9	24.3	27.0	25.3	27.8

TABLE A.1. Total import content at constant prices of 2015 (percentage)

Economics Synopsis
Business models and firm performance

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Introduction

Economists have long puzzled over the large differences in performance between firms and countries, both in terms of productivities, market shares, and participation in the export market. The industrial organization literature has demonstrated that differences in productivity are huge, even when comparing firms that belong to very narrowly-defined industries. The international trade literature has shown that measures of performance in the export market are also widely different across firms and countries, and are significantly, but not exclusively, related—in both directions—to differences in productivity measures.

This article is built around five key issues in the economic literature on managers, management practices, corporate reorganizations and firm performance. First, we document the large difference in performance across firms within narrowly-defined industries, and argue that this heterogeneity at the firm-level is relevant for policy purposes since it translates into large differences in performance at the country-level, and in differential learning opportunities for workers. Second, we claim that economic research can provide solid answers to the question of how these large differences in performance arise, thereby representing an essential tool for policymakers. Third we document the large heterogeneity in management practices across firms and countries, the frequency and characteristics of corporate reorganizations, and the transition of managers across firms with different internationalization status. Fourth, we discuss the key issue of establishing a causal relationship from management practices, managers' quality, and firms' organization to firms' performance. Finally, we provide a list of policy-relevant takeaways.

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Large differentials in performance across firms

In the first part of this article we summarize the existing evidence on the heterogeneity of firms, by comparing firms at a given moment in time—the cross-sectional distribution—, by following them along the life-cycle, and by measuring their success in the export market. Firm-level patterns are important to understand differences at the aggregate level, like differentials in income per capita across countries, and the resilience of countries to international crises.

Cross-sectional differences in productivity. The cross-sectional distribution of firms or plants reveals that differences in the level of productivity are huge: using disaggregated data on four-digit U.S. manufacturing industries (e.g. "Bakeries and Tortilla Manufacturing" or "Plastics Product Manufacturing") from the 1977 Census of Manufactures, Syverson (2004) found that plants at the 90th percentile produced four times as much as plants in the 10th percentile on a per-employee basis.[1] Only about half of this difference in labor productivity could be accounted for by differential inputs, such as capital intensity: considering total factor productivity instead of labor productivity, the average 90-10 percentile productivity ratios across industries are about 2 to 1 or 2.7 to 1, depending on the measure of total factor productivity used. These large differences in productivity exist even for goods that are very homogeneous—for which we do not expect to see significant differences in quality: Foster *et al.* (2008) show large differences in total factor productivity even within very homogeneous goods industries such as production of boxes and block ice.

Life-cycle dynamics. New firms tend to be small in size and, conditional on survival, grow substantially as they age. Hsieh and Klenow (2014) show that in the United States, the average 40-year-old plant employs more than seven times as many workers as the typical plant 5 years or younger. Similarly, Cabral and Mata (2003), using data from the Portuguese matched employer-employee dataset *Quadros de Pessoal*, find that the average size of Portuguese firms with 30 or more years is at least seven times larger than the average firm with 4 years or less.[2] The pattern of firm dynamics in developing countries

1. A key distinction that is made in the productivity literature is between quantity-based productivity (or physical productivity or TFPQ) and revenue-based productivity (or TFPR). The distinction is crucial since the first measures how effective is a firm in transforming inputs and factors—like capital, intermediate goods and labor—into output, while the other measures how effective is a firm in transforming inputs and factors into sales, and therefore also measures any price variation, perhaps related to markups, that results from market power.

2. Cabral and Mata (2003) estimate an extended generalized gamma distribution, a very flexible distribution that can capture both positively skewed, symmetric, and negatively-skewed distributions. They document that the firm size distribution is quite positively-skewed (long

seems to be quite different: In India and Mexico the ratio between the size of 40-year-old and 5 year-old or younger plants is only 2, suggesting lower investments in process efficiency, quality, and in accessing markets at home and abroad.
One reason for this differences in size growth between developed and developing countries could be associated to education. Queiró (2018), using data for Portugal, finds that only highly educated entrepreneurs are able to undertake those innovation activities (e.g. new production techniques, management practices, organizational design, product upgrading...) that can enhance productivity and spur firm growth. The author finds that when comparing firms whose entrepreneurs have 15 or more years of schooling with those whose entrepreneurs have 6 or less years of schooling, the former are 23 percent larger at entry, and 75 percent larger after 20 years.

Productivity or Demand? Is the increasing age-size profile that we observe mostly in developed countries associated to higher productivity of older firms (or plants)? Foster *et al.* (2016) find that the difference in size between young and old firms is not associated to significant differences in measures of physical productivity. Young firms are as productive as old firms, but they have not built a large customer base yet. A recent paper, Forlani *et al.* (2016), paints a more nuanced picture pointing to a trade-off between product appeal and physical productivity. In Forlani *et al.* (2016) the authors develop a new procedure to jointly estimate firms' product appeal, quantity-based productivity and markups without imposing, unlike the previous literature, any correlation between the three variables.[3] Using Belgian data at the firm-year-product level, they find a strong negative correlation between TFPQ and product appeal. They provide a very neat example, to explain this finding, based on the car industry where:

"...there is the co-existence of manufacturers (like Nissan) producing many cars for a given amount of inputs...and manufacturers (like Mercedes) producing much less cars for a given amount of inputs...At the same time,

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tail at the right) for new firms, and then becomes more symmetric—almost approaching a log-normal distribution— as firms age.

3. Most of the literature on productivity estimation relies on the so-called "proxy-variable approach". The key endogeneity issue that the econometrician has to face when estimating a production function is omitted variables: the firm observes and takes decisions based on productivity shocks that are unobservable to the econometrician. As suggested in Olley and A. (1996), the econometrician can resort to observable firm decisions—like investments—that do not impact productivity today and that can, under certain conditions, be used as a proxy for productivity shocks. This proxy variable approach has been further developed in Levinsohn and Petrin (2003), Wooldridge (2009), Ackerberg *et al.* (2015) and De Loecker *et al.* (2016). Forlani *et al.* (2016) depart from the "proxy-variable approach" by introducing demand heterogeneity and exploiting both the revenue and quantity equation.

however, Mercedes produces cars of a higher quality...and so the equilibrium price of Mercedes will be higher than the Nissan price...Mercedes and Nissan face very different demands which leads to different prices as well as different markups. Both plants are profitable and perhaps generate a very similar revenue productivity...Yet, their business model is quite different..." (Forlani *et al.* (2016))

Export Performance The international trade literature of the last 20 years has focused on firm heterogeneity. Participation in the export market is a rare and concentrated activity: only 4 percent of U.S. firms were active on the foreign market in 2000 and, among these, the top 10 percent accounted for 96 percent of U.S. exports (Bernard *et al.* (2007)). International trade is dominated by very large firms: Intel is the largest industrial employer in both Oregon and New Mexico and accounts for 20 percent of Costa Rica's exports (Melitz and Trefler (2012)). Participating in the export or import markets is a difficult task. In Portugal, the exit rate of new exporters is particularly high in the first year of life, as almost one out of three exits foreign markets. The ratio of exports per firm increases on average about 70 per cent in the first year of the cohort, meaning that those that survive strongly increase exports (Amador *et al.* (2017)). Forlani *et al.* (2016) show that the dividing line between firms that import and firm that do not is positively associated to the scale of the firm—larger firms are more likely to be importers—to firms' physical productivity, and to the appeal of their products.
The literature on gains from trade focuses on three sources of gains: 1) love for variety associated to intra-industry trade, 2) allocative efficiency gains associated to shifting production inputs from less productive to more productive firms, and 3) productivity gains associated to trade-induced innovation activities (Melitz and Trefler (2012)).
Both the participation in the foreign market, and the sources of gains from trade can then be linked to differences in firms' characteristics.

A better understanding of the sources of firm performance, both in the domestic and the foreign market, is important not just in itself but also for, at least, two other reasons: first, differences in firms' performance may turn into differences in performance at the country-level; second, differences in firms' performance may map into differential learning opportunities for their workers. We elaborate on both aspects here below.

Aggregate effects. Large differences in performance across firms may map into large differences in performance across countries. Based on their evidence about the steeper age-size profile of plants in the U.S. compared to Mexico and India, Hsieh and Klenow (2014) find that, in simple general equilibrium models, the difference in life cycle dynamics could lower aggregate manufacturing productivity on the order of 25 percent in India and Mexico relative to

the United States.
Caliendo *et al.* (2015a) show that corporate reorganizations are tightly linked to firms' productivities, and account for more than 100 percent of the overall change in productivity of expanding and downsizing firms. Failure to reorganize in order to grow can, therefore, result in an inability to exploit available productivity improvements. This would imply that firms remain inefficiently small, as has been documented in some developing countries (Hsieh and Klenow (2014)).
Differences in productivity at the aggregate level are of utmost interest for policy-makers: Hall and Jones (1999) and Jones and Romer (2010) show how the stark differences in productivity across countries account for a substantial fraction of the differences in average per capita income; Dias *et al.* (2018) show that the heterogeneity in productivity across firms may lead to a cleansing effect during financial crises. Using Portuguese firm-level data for both the manufacturing and services sectors, they find that (i) the crises reduced the probability of survival of both low and high productivity firms, but more than proportionally for the former; (ii) reallocation of resources improved among surviving firms.

Different firms offer different learning opportunities. Differences in firms' growth rates can also reflect differences in learning opportunities for their workers. Lagakos *et al.* (2018) show a pattern in the labor market that parallels the one documented by Hsieh and Klenow (2014):[4] experience-wage profiles—the worker's return on experience—are on average twice as steep in rich countries than in poor countries. Their results are consistent with lower learning over the life cycle, and higher search frictions in poor countries labor markets, preventing workers to climb the job ladder.
Mion *et al.* (2018) delve deeper into this topic and suggest that part of the relationship may be explained by differential characteristics of firms in rich and poor countries. They show that—and explain why—the experience-wage profile in internationally-active firms is quite steeper than that in domestic firms. In their sample of Portuguese firms, young managers that change firm and are employed by domestic firms have a 20 percent probability of moving to internationally-active firms. On the contrary, young managers that already are in internationally-active firms have a 60 percent probability of moving to domestic firms. The wages of managers that are employed by internationally active firms rise much faster than those of comparable managers employed by domestic firms. There are a number of potential explanations why wages of managers rise faster in internationally active firms: internationally active firms may rely more on performance-pay remuneration policies, they may

4. The author thanks Veronica Rappoport (http://personal.lse.ac.uk/rappopor/) for pointing out this parallelism.

employ more educated managers, or managers with higher bargaining power, or they may offer a steeper wage schedule with a lower entry wage, or they may reward more tenure. Finally, internationally-active firms may simply be bigger than domestic firms, and as such put in place more investments or innovations that create faster wage growth. Mion *et al.* (2018) show that the steeper experience-wage profile in internationally active firms is robust to all these explanations, and they suggest that the participation in the international market, either via exporting, or importing, or multinational status, offers more learning opportunities to managers. Distinguishing between experience in international vs. domestic firms becomes then crucial to evaluate the "quality" of a manager. Mion *et al.* (2018) show that international experience contributes to explaining roughly as much variation in the cross-sectional distribution of wages as standard individual variables like experience, education, and tenure combined together.

How economic research can help

Given the extent of firm heterogeneity in terms of productivity, market share, and foreign market performance it seems crucial to adopt a micro perspective to understand better why some firms, and therefore some industries and countries, are more efficient and grow faster than others.

In the popular business and management press, as well as in the academic management literature, there are numerous articles on "corporate reorganization", managers, and management practices. These articles provide anedoctal evidence of the determinants and consequences of corporate reorganizations and management practices, as well as on the impact of managers. While certainly useful and interesting, these are often case studies, they are not based on the systematic collection of empirical data, and therefore lack econometric rigour and cannot be used to test an internally consistent theory. It is then difficult to draw conclusions that are not tied to a specific firm or episode, and sometimes it is not scientifically possible to understand not only the magnitude but also the direction of the effects. As a consequence, it is not possible to gain meaningful lessons for public policy.

A recent strand of the economic literature uses firm-level cross-sectional and panel data to study how managers, management practices, and firm reorganizations affect the performance of firms, and how important these effects are at the industry or country-level. The importance of these studies relies on the quality of the data used, the identification strategy, and the connection with economic theories. It is then sometimes possible to scientifically avail the presence of a cause-effect relationship between quality of the managers, quality of the management practices, and corporate reorganizations on one side, and measures of firm performance, like revenue- and quantity-based productivity or export market performance on the other

side. It is also possible to properly evaluate the strength of such an effect. Finally, when a structural approach is adopted, it is also possible to evaluate, within the realm of an economic theory, the effects of alternative policies aimed at improving firm and country performances.
In order to do all of the above, it is necessary to measure differences, across firms and countries, in terms of managers' quality, management practices, and the occurence of corporate reorganizations, as well as differences in terms of firms' performance. This poses two main challenges: first, it is necessary to access detailed information on firms' and their workers over long periods of time. Second, it is necessary to establish a causal link—a cause-effect relationship—between differences in manager's quality, in management practices, in firms' organizations on one side, and differences in firms' productivities or market performance on the other side.
While the latter challenge is often a matter of ingeniousness of researchers, the former is a matter of data availability. Portugal is a very good example of a country where researchers have access to high quality micro data that allow them to, potentially, produce research that can be useful for policy purposes, that is, to improve the country's performance and well-being of its residents. Micro datasets like *Quadros de Pessoal*, the *Informação Empresarial Simplificada*, the *Inquérito Anual à Produção Industrial*, and the *Microdados do Comércio Internacional*, that provide detailed information on firms' characteristics and their performance in the domestic and foreign markets, are precious resources for the whole country. Just like clinical trials for new drugs, economic theories and econometric testing can take advantage of detailed micro data to provide important insights into the potential effects of specific economic policies, as well as evaluate existing policies.

Management practices, managers' skills, firms' organization as drivers of firms' performance

Management practices and firms' performance

Measuring differences in management practices. Measuring the quality of management practices across firms and countries is not an easy process. Bloom and Van Reenen (2007) develop a new methodology to measure the quality of management practices in a cross section of about 6,000 firms across many countries and industries. They score 18 management practices, covering three broad areas: monitoring, targets and incentives. MBA students carry on interviews of plant managers under a "double-blind" approach, designed to reduce possible biases: managers are not told that they are going to be scored, and interviewers are not told in advance about the firm's performance. The authors randomly sample medium-size firms, employing between 100 to 5,000 workers. These firms are big enough for management practices to matter,

and they are small enough to be unknown to interviewers, so that the risk of preconceptions is minimal.
Bloom and Van Reenen (2010) summarizes the results. When comparing patterns of management across countries, they find that the United States has the highest management score, followed by Germany, Japan, Sweden, and Canada and then followed by a block of mid-European countries (France, Italy, Ireland, the United Kingdom, and Poland) and Australia. At the bottom of the score are countries in southern Europe like Greece and Portugal, along with developing countries like Brazil, China, and India. When separating the overall score into the monitoring, target, and incentives broad categories, the U.S. has the highest score in incentives, while Sweden and Germany lead the target and monitoring categories. These rankings could be explained by the relatively lighter labor market regulations in the U.S. which enable firms to promote highly-performing workers and remove poorly-performing ones. When analyzing the within country distribution of management scores over firms, it is clear that the main difference between the top countries and the others is the larger share of poorly performing firms in the latter group: countries like Greece and Portugal, for example, have a thicker tail of badly managed firms. A possible explanation for this is the high frequency of family businesses.[5] Bloom and Van Reenen (2010) show that family-owned firms that are managed by a chief executive officer (CEO) that is a member of the family are characterized by a distribution of management practices with a large tail of badly managed firms. On the contrary, family-owned firms with an external CEO have a distribution of management practices that is very similar to that of firms with dispersed shareholders—the most common ownership category in the United States.

Are better management practices the source of better firms' performance? Bloom and Van Reenen (2010) show that their measure of the quality of management practices is positively correlated with a number of measures of firm performance, like labor productivity (sales per employee), the return on capital employed, Tobin's q (the ratio of the firm's stock market value to its capital stock), the growth rate of sales, and firm survival. Similarly, Statistics Portugal's recently published "Management Practices Survey" shows that Portuguese firms with more structured management practices present higher profitability ratios, turnover and gross value added growth rates, and investment rates during the 2010-2016 period.[6]
Differences in management practices can be even more important for firms

5. According to European Family Businesses `http://www.europeanfamilybusinesses.eu/` about 75 percent and 80 percent of the companies in Portugal and Greece, respectively, are family businesses.

6. The digital publication "Management Practices Survey" (*Práticas de Gestão 2016*) can be found at https://www.ine.pt

that aim at penetrating foreign markets. Artopoulos *et al.* (2013) describe how management practices differ between domestic and international firms, and how they diffuse from firm to firm. The authors—relying mostly on an extensive set of interviews that they carried on with the relevant actors—describe four case studies of export emergence in differentiated-good sectors in Argentina, namely wine, television programs, motorboats, and wooden furniture. The authors find that consistent exporters to developed countries adopt business practices that are radically different from those that prevail in the domestic market. These practices include adapting products to foreign demand and establishing information channels to keep up to date about its evolving patterns; upgrading production processes to improve quality; complying with stringent requirements of foreign distributors, and seeking to establish long-term relationships with them to secure up-to-date information about foreign markets. The authors also find that in all the industries except wooden furniture the new business practices diffuse through each industry thanks to the role of an export pioneer who possessed tacit knowledge about the foreign markets.

While providing strong insights, the management practices analyses discussed above are based on cross-sections of firms, or on case studies, and cannot make strong claims of causality: their results can only suggest (even though in a credible way) that better management practices lead to better firm performance. We will return to the issue of causality in the next section.

Two more drivers of firms' performance: managers' skills and firms' organization

Managers' experience, foreign market, and resilience to crises. Besides productivity, export market performance is another measure of firm success that is at the center of the public debate. Mion and Opromolla (2014) and Mion *et al.* (2016) study how the export performance of Portuguese firms is determined by the presence of managers with export experience. They use a matched employer-employee dataset, *Quadros de Pessoal*, to build a history of experience for every worker. Then they focus on those managers that were employed, in the past, in exporting firms, and therefore gained export experience, possibly related to a particular destination (e.g. France), or product (e.g. shoes). In the sample they use in their analysis about 8 percent of the firms have at least a manager with export experience, and about 5 percent of the firm have a manager with experience that matches the set of destinations that the firm exports to, or the set of products exported by the firm. Exploiting a natural experiment—the sudden and clear-cut end of a civil war that lasted for almost three decades—Mion *et al.* (2016) show that the presence of a manager with experience in exporting to Angola substantially helps firm entering into the Angolan market. The policy takeaway from this clear-cut result is that experience gained in international firms can, to some extent, be carried along to other

firms, as the manager changes employer, pointing to a sort of multiplier effect. Policies that solve market failures that prevent firms to access the international market, or that facilitate the flow of workers from firm to firm can enhance this performance multiplier.
The correct mix of managerial skills can also be crucial for firms that face large, unexpected, negative shocks. Sazedj *et al.* (2018) study the experience of Portuguese firms during the sovereign debt crisis of 2011-2013, when firms had to decide if to react to a large negative shock by choosing a CEO from within the firm, or by hiring a newcomer. The relevant trade-off faced by firms was that of balancing ready-to-use knowledge of the firm—possessed by an internal CEO—with openness to new business practices—associated to a newcomer CEO. Sazedj *et al.* (2018) shows that firms that hired a CEO from the external labor market perform better during the crisis, both in terms of gross value-added and in terms of sales. External CEOs seem to be better able to access credit, and to increase the presence of the firm on the foreign market.

Firms' organization and productivity. Caliendo *et al.* (2015a) study how the productivity of firms is affected by the firms' decision to reorganize. A firm is seen as a hierarchy of workers and managers distributed over different layers. Workers and managers are endowed with time and knowledge and communicate among themselves in order to solve the problems that come up during the production process. This combination of number of layers, number of workers within each layer, and knowledge of each worker is an endogenous object—that is, it is the outcome of a decision process by the firm's management—which replaces the usual, exogenous, wage bill used in the literature on productivity estimation. Caliendo *et al.* (2015a) find that, in their sample of Portuguese firms, reorganization are fairly frequent as about 20 percent of the firms reorganize from one year to the next by adding or dropping layers of management. The authors show that when firms grow without restructuring they increase the number of workers, and pay higher wages, in every layer of management. However, when firms grow so much that a reorganization becomes profitable they reduce the number of workers, as well as the average wages, in the pre-existing layers, and they leverage on the knowledge of the additional top layer of management. These results mirror those that Caliendo *et al.* (2015b) report for French firms. In the next section we will discuss how Caliendo *et al.* (2015a) are able to establish a causal link between corporate reorganizations and different measures of firm productivity.

Establishing a Causal Link

As mentioned above, one of the main contribution that a social science like economics can bring to the table is more convincing ways to establish

causal relationships. We review next a number of recent papers that point to strong causal relationships between corporate reorganizations, management practices, and managers' quality and firm performance.

Corporate reorganizations and firm productivity. As discussed above, Caliendo *et al.* (2015a) studies how the productivity of firms is affected by the firm's decision to reorganize. The issue that the authors have to face is that firms might reorganize following demand or cost shocks that are not observable to the researchers. If that were the case, the relationship between corporate reorganization and firm productivity might be spurious. Caliendo *et al.* (2015a) tackles this issue in two ways. First, they employ an instrumental variable approach that relies on their ability to construct measures of a firm's past productivity, demand, and markup shocks that are not correlated with current shocks, and can be used to instrument a firm's reorganization. They also experiment additional, more traditional, instruments based on real exchange rates and a firm's export and import patterns. They find that when a firm reorganizes and adds a layer of management quantity-based productivity rises by 8 percent (while revenue-based productivity drops by 7 percent, following a reduction in prices). Finally, Caliendo *et al.* (2015a) goes a step further and uses the quota removals in sub-industries of the Textile and Apparel sector, that resulted from China's entry into the WTO, as an instrument for a firm's reorganization. Exploiting this clearly exogenous negative shock, the authors find that the relationship between firm reorganization and productivity is confirmed. The authors also provide a series of case studies that confirm the more general results obtained in the econometric analysis.

Incentive-based pay and firm productivity. One of the findings of Bloom and Van Reenen (2007) that we highlighted above was that some top performing countries like the United States score very well in terms of management practices that introduce incentive-based remuneration policies, aimed at promoting outperforming workers and relocating or dropping underperforming ones. Lazear and Oyer (2007) describe studies that add a stronger causality flavor to this finding. For example, Bandiera *et al.* (2007) focus on the productivity of managers in a U.K. farm. The fruit pickers in the farm are paid on a piece rate system, but the farm made an unannounced switch in the middle of one season linking the pay of the managers to the productivity of the fruit pickers. When that happened the productivity of the average picker increased by 21 percent. The authors show that half of the change in productivity can be associated to managers targeting their effort toward the most able workers, and half due to managers selecting out the least able workers.

Managers and firm export performance. Mion and Opromolla (2014) and Mion *et al.* (2016) show that the export experience gained by managers in previous firms leads their current firm towards higher export performance,

and commands a sizable wage premium for the manager. The authors use several strategies to account for the possible endogeneity problems, including the sudden end of the Angolan civil war in 2002. The Angolan civil war, after almost three decades, suddenly ended in February of 2002 with the death of Jonas Savimbi, the *União Nacional Para a Independência Total de Angola* (UNITA) leader. The event was completely unexpected and represents an exogenous conflict-related event in which one party gained an unambiguous victory over the other and restored order. Mion, Opromolla and Sforza compare the entry into the Angolan market right after the end of the war of Portugal-based firms that happened to employ a manager with experience in exporting to Angola hired before the end of the war, with the entry performance of otherwise comparable firms that did not employ such a manager. They find that the presence of a manager with export experience to a specific destination (Angola) significantly improves the chances of firm entry into that same destination.

Management practices and firm productivity. Bloom *et al.* (2013) adopt another approach to establish causality. They run a field experiment on 28 plants and 17 large textile Indian firms that consisted in providing free consulting on management practices to randomly chosen treatment plants, and comparing their performance to that of a set of non-treated, control, plants. They find that the adoption of new management practices by the treated plants led to a 17 percent increase of productivity in the first year through improved quality and efficiency and reduced inventory, and within three years led to the opening of more production plants. This stark result leads to the question of why did these plants not adopt new management practices before. The authors suggest two possible answers: informational barriers, and the fact that competition forces were not sufficient to drive badly managed firms out of the market, due to insufficient supply of managerial time.

How can countries improve firms' performance?

The main lesson that comes out of the economic literature presented in this article is that improvements in firms' business models—and the capacity of adjusting the business model to the current (or prospective) environment—can be crucial for guaranteeing the continued existence, and a better performance, of firms. In this article we analyzed three dimensions of a firm's business model: managers, management practices, and firms' reorganizations. Drawing on Bloom and Van Reenen (2010) and the other papers discussed above we identify six policy takeaways that may contribute to creating an environment better apt to foster firm and country growth.

Product market competition. The removal of obstacles to product market competition can improve average management practices both through a selection effect—by inducing badly-managed firms to exit—and through the provision of stronger incentives to improve management practices: competition may "raise the stakes" of the adoption—or lack of adoption—of a better business model either because efficiency improvements may have a larger impact on shifting market share or because managers may be more fearful of losing their jobs.

Labor market regulations. Labor market regulations that constrain the ability of managers to hire, fire, pay, and promote employees could reduce the quality of management practices, by making it more difficult to introduce incentive-based mechanisms. At the same time, labor market regulations that constraint the ability of firms to reorganize or the ability of establishing a match with a more suitable manager may prevent firms to exploit growth opportunities.

Family-owned firms. Family-owned firms with a family CEO are usually managed less efficiently than comparable firms with different ownership and management structure. Family-owned firms also have less debt and are therefore less vulnerable to product-market competition forces that, as mentioned above, may increase the incentives of adopting better management practices.[7] Removing subsidies to family-owned firms may reduce their number and increase average productivity.

Foreign market exposure. Exporters and multinational firms seem to be better managed, and they seem to expose managers to more complex tasks and learning opportunities. Facilitating the export activity of domestic firms could increase productivity, and—to the extent that managers' experience can be carried on to other firms—this could have a positive spillover effect on other firms through labor market flows.

Education and experience. Firms with better educated or highly experienced CEO and/or workforce are better managed, and a more knowledgeable workforce can contribute to a firm's productivity.[8]

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7. A recent paper, Chen and Steinwender (2019), provides some evidence that family-managed firms might be more resilient to increases in import competition as the manager—who is a member of the family—exerts a stronger effort to increase productivity and keep the firm alive. The rationale is that a family manager has a private benefit from the existence of the (family) firm. As such, initially unproductive family-managed firms—more at risk from an increase in import competition—experience increases in productivity following a tariff reduction, unlike more productive family-managed firms and firms managed by a professional.

8. A recent paper, Jarosch *et al.* (2019) shows that learning from coworkers is significant, and that between 4 and 9% of total worker compensation is in the form of learning.

Information. Information diffuses slowly. Providing consultancy advice may help firms, and increase productivity.[9]

Final Remarks

Overall, productivity and market share differentials, both in terms of levels and growth rates, and between developed and developing countries, are large and still not well understood. In this article we review a recent body of evidence that suggests that differences in the "quality" of managers, in the quality of management practices, and in the ability of firms to reorganize to adapt to the changing environment can play an important role in explaining these differences in firm performance. This recent economic literature provides a number of important insights, both for researchers, policy-makers and business executives, and is bound to increases in the near future: there are more dimensions of what defines a firm's business model that need to be studied and may prove to be important to better understand differentials in firms' performances.

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9. A recent paper, Atkin *et al.* (2017), reminds us that technology adoption—as well as the effectiveness of consultancy advice—may be hindered by a misalignment of incentives within the firm. Providing firms with advice and key information may not be enough if the organizational structure, the compensation schemes, the competitive forces within the firm, are not conducive to the effective adoption and implementation of new technologies or management practices.

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