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Product Market Review 2013

Financing the real economy

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European Commission

Directorate-General for Economic and Financial Affairs

Product Market Review 2013: Financing the real economy

ABBREVIATIONS

AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
EL	Greece
ES	Spain
FI	Finland
FR	France
HU	Hungary
IE	Ireland
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
MT	Malta
NL	Netherlands
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia
UK	United Kingdom

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EXECUTIVE SUMMARY

The bi-annual Product Market Review (PMR) published by the Directorate-General for Economic and Financial Affairs of the European Commission focuses on the role of product market reforms⁽¹⁾ in fostering growth and improving competitiveness and adjustment capacity. This edition's focus is on the interaction between the real economy and the financial sector, asking the question: to what extent does the crisis in the financial sector cast a shadow on economic activity?

The methodological novelty of the report is its multifaceted approach to understand the relationship between access to finance and economic activity. This relationship is examined from a firm-, sector- and macro-level perspective, using various indicators on access to finance. While each of the data sources used has its strengths and weaknesses, which are addressed in the various chapters, when used in combination with each other, they allow nuancing the problem and the policy challenges at stake.

This executive summary places the PMR in the broader policy context, presents its relevance for the current policy debate, and summarises its key findings.

Policy context

In the aftermath of the economic and financial crisis, policymaking became more geared towards structural reforms to support the process of economic recovery, steered at the EU level through the reinforced economic governance. While there are signs of economic recovery in the EU, growth prospects are modest and further reforms remain necessary in order to restore productivity and reach the Europe 2020 targets. Priorities for the EU include, inter alia, restoring normal lending to the economy and promoting growth and competitiveness for today and tomorrow.

The results of the analyses presented in the PMR confirm the relevance of the current policy focus and provide additional insights for policy initiatives in the context of recovery from the economic and financial crisis.

⁽¹⁾ Labour market reforms are discussed in the Labour Market Review.

Entry and exit of firms (also known as "firm dynamics") is essential to improve productivity. This requires well-functioning financial markets in the sense that resources are channelled from less productive to more productive firms. In normal times firm birth and death rates are positively related, but in the current crisis a decrease in the birth rate and an increase in the death rate are observed. Such decoupling of entry and exit frustrates an efficient reallocation of resources, and thereby the process of economic recovery.

Policy efforts to revitalise entrepreneurship and investment are of paramount importance to absorb the productive sources in the form of people and capital that have become idle during the crisis. A failure to do so will result in non-trivial social and economic costs, and permanent damage in the form of depreciated human capital due to prolonged spells of unemployment. Intensified competition through market entry would lead to welfare gains for consumers in terms of lower prices and/or increased quality of goods and services.

Firm dynamics are intimately connected with the business environment and the quality of public institutions. Structural reforms in general, and more particularly those affecting the market functioning in the non-tradable sector (in light of the relatively low allocative efficiency measured in services) and general framework conditions related for example to the formalities to start a business, the quality of the judicial system, insolvency regulation, red tape, innovation etc., should therefore continue to be implemented.

A key policy action is to make sure that banks resume their role as financiers of new business activities and lenders to viable firms, in particular in those parts of the corporate sector that rely mostly on bank funding (obviously without compromising the financial sector's competencies to select the most promising projects). This would improve firm-level productivity and the company's chances to penetrate foreign markets, and would facilitate efficient allocation of productive resources.

The role of the financial sector in supporting the recovery in the EU is acknowledged at the EU level through various ongoing policy initiatives addressing financial fragmentation and the health

of the banking system. More stringent banking regulation and the build-up of a Banking Union are paramount priorities. Policymakers also continue to be engaged in initiatives that could facilitate SME lending in the short term. A further development of bond and equity markets as alternative funding channels for the corporate sector would enable industries dependent on external funds in time of crisis to shift away from a temporarily impaired channel towards other market channels, thereby increasing the resilience of the corporate sector.

Key issue: Relationship between the financial sector and the real economy

This PMR investigates how access to finance influences the real economy. The issue is tackled from the following viewpoints. Firstly, a broader perspective is taken by looking at how productive resources are allocated within sectors, with a specific focus on the role of market entry and exit in this process and the potential influence of credit constraints as an impediment to efficient resource allocation. Then the analysis goes deeper into the performance of firms, and explores how credit constraints affect export status, both directly and indirectly, through the impact on productivity. Thirdly, the PMR assesses the reallocation of capital from non-tradable to tradable sectors and inquires whether investments are hampered by financing difficulties. Fourthly, the growth performance of sectors is related to their dependence on external finance and the development of the financial sector, and the extent to which this relationship has been altered during the crisis is analysed. Finally, the PMR turns to the perceptions of firms regarding access to finance, how these perceptions depend on firm characteristics, and how the perceptions interact with macroeconomic developments and key features of the financial sector.

The main findings of the PMR can be summarised as follows.

Inefficient allocation of resources in services

The productivity performance of sectors is to a large extent determined by the within-sector allocation of resources. Allocative efficiency is defined as the degree to which the most productive firms also have the highest market shares. Chapter

1 presents a measure of allocative efficiency, and highlights that allocative efficiency in service sectors is lower than in manufacturing, possibly related to differences in exposure to international competition and excessive regulation of professional services.

Firm entry and exit increases allocative efficiency

The indicator of allocative efficiency enables a further investigation on how policy interventions feed through the economy. In particular the potential gains from product market reforms may be underestimated when within-sector productivity differences of firms are ignored. Business dynamics, i.e. the process of entry and exit of firms in markets, is shown to influence the level of allocative efficiency. Interestingly, it is not only the firm birth and death rates that matter, but also the average firm size at birth and death. These aspects determine the extent to which productive sources are allocated towards their most efficient use in the economy.

Credit supply supports firm-level productivity and exporting

If the financial sector facilitates an efficient allocation of resources in the economy, one would expect a relationship between the functioning of the financial sector and the performance of firms. Chapter 1 in part II in this PMR is about the role of the banking sector and credit supply conditions for firm-level total factor productivity and exporting status.

It finds that the financial environment of the country in which a firm is located is an important determinant of its productivity level. Countries with a stronger financial development and higher supply of bank loans have higher average firm-level total factor productivity. Also, larger and financially healthier firms with lower indebtedness and a stronger ability to repay interests are typically more productive.

Firms became less productive during the crisis

The financial crisis of 2008 has lowered average total factor productivity of surviving firms. This decrease in average measured productivity during the crisis years coincides with deteriorating health of the banking sector in the country in which firms

operate and with falling domestic demand. The growth rate of credit supply decreased, while credit standards and non-performing loans held by banks rose substantially. The crisis period also coincides with falling consumer sentiment and rising unemployment rates. Measured firm-level productivity was negatively hit both by the change in credit supply conditions and the faltering domestic demand.

Exports increase when domestic demand falls during the crisis

Chapter 1 in part II finds that highly productive firms are more likely to be exporters. However, little evidence is found that financial conditions at country level influence exporting status beyond the effect that financial conditions have on productivity. The exporting status of a firm does not appear to be directly influenced by the financial environment in which it operates. The role of domestic demand is found to be more important: when domestic demand falls, firms are more likely to export. This points at a countercyclical response of exports to domestic demand.

Relative profitability of firms in tradable sectors has recently been restored

At the heart of the policy debate is the question on how macroeconomic imbalances can be corrected, pointing to the likely need of capital reallocation into tradable sectors in vulnerable Member States. It appears that the relative profitability of firms in tradable sectors has recently been restored in most vulnerable MS, correcting the pre-crisis bias that encouraged excessive resource allocation to the non-tradable sectors.

Problems regarding access to finance hamper capital reallocation into tradables

There has, however, not yet been a significant relative increase in tradable sectors' fixed investment. Chapter 2 in part II shows that companies in tradable sectors of vulnerable Member States under-invest compared to their peers in non-vulnerable Member States, even after taking into account their current operating performance and financial health. Firms that are similar (in terms of some key characteristics) invest differently depending on whether they are

located in a vulnerable Member State or not. Also, the analysis reveals that the degree of firm underinvestment is significantly related with financing difficulties. Supply factors in credit markets appear to be partly behind the underinvestment in the tradable sectors.

More developed financial markets helped in mitigating the crisis effect on financially dependent sectors

The PMR also looks at whether growth in sectors that are more dependent on external funding has been more adversely affected during the sharp downturn of 2008-09 and whether the crisis effects have been more lasting, lingering into 2010-11. The analysis presented in Chapter 3 in part II shows that in the euro area more developed financial markets have helped to mitigate the impact of the crisis on growth in externally dependent sectors. However, this effect varies depending on the phase of the crisis. In particular, well-developed markets for bank loans seem to have been a supporting factor in the early stages of the crisis, but not over the more recent 2010-11 period.

Weak balance sheets of monetary and financial institutions have magnified the crisis effect on industrial growth in the core euro-area economies

The link between the pre-crisis balance sheet structure of financial intermediaries and post-2009 growth performance is clearly different in the core euro area countries and in the periphery. In the former, a higher leverage of the financial sector and a higher degree of diversification of MFIs' asset portfolio away from traditional loan lending before the crisis has had a more negative impact on post-2009 growth in industries which are more dependent on external funding than in industries mostly relying on internal funds. In contrast, in the euro area periphery post-2009 growth is negatively affected by the highly-leveraged financial sector with no significant differentiated effect on sectors which are more dependent on external funding.

Growth of non-tradable sectors that are dependent on external funds has been less affected by developments in financial intermediation

Despite a higher dependence on external funding, the market services sectors seem to have been less

affected than the manufacturing sector from the impairment of the market funding channels. Market services industries seem to have attracted most of the available credit in the euro area during the boom years. Yet, since the crisis, industrial growth in these sectors has been mostly influenced by country-specific characteristics such as domestic demand shocks and not by their higher dependence on external funds.

Firms' financial constraints are most pressing in Greece, Ireland, Portugal, Slovenia and Spain

Lack of access to finance can hamper firms from realising their growth potential and can lead to wasteful destruction of structurally viable and sound companies. In Chapter 4 in part II firms' perceptions regarding access to finance are studied. To that end, results from the SAFE survey from the ECB/European Commission are used. Not surprisingly, firms' financial constraints are most pressing in Greece, Ireland, Portugal, Slovenia and Spain.

The analysis searches for determining factors of perceived bank credit difficulties. Part of the understanding of perceptions is found in the firms' characteristics. In particular the firm's age, size and its growth performance are important explanatory variables. For example, the phenomenon of the discouraged borrower is predominantly observed among young, small firms with negative recent growth of their turnover. Also, product innovation does not seem to help escaping financial constraints, which may imply that innovation is delayed and the process of creative destruction in which young innovative firms replace inefficient firms is impaired.

Weaknesses in the banking sector reduce lending to the corporate sector

The financial health of the banking sector plays a role in perceived credit difficulties. A lower return on equity of banks corresponds for example with an increased probability to mention access to finance as the most pressing problem for the firm. This may also be symptomatic of the increased fragmentation of the financial system along national borders, with a retrenchment of financial activities to domestic markets as mentioned in the Annual Growth Survey 2013.

INTRODUCTION

The theme of this Product Market Review (PMR) is the interrelationship between access to finance and economic activity, a timely issue at the current juncture with signs of economic recovery but also persistent fragilities in the financial system which may slow down economic growth. By doing so, the PMR builds forth on the work presented in the previous issue (Product Market Review 2010-11).

The impact of external financing difficulties on the real economy is studied in the context of the need for structural reforms, particularly in product markets. Guidance to policy makers is provided by EU's Europe 2020 strategy, and the accompanying European Semester process where the EU institutions and the Member States work together to achieve smart, sustainable and inclusive growth. This Review aims to provide robust economic analyses to further underpin the ongoing policy discussions in the Member States and at EU level.

Reading guide

The chapters in this PMR each highlight the central research question on access to finance and the real economy from a different perspective, are logically related to each other, but can be read stand-alone.

Chapter 1 in part I starts with a description of the process of business dynamics (i.e. market entry and exit of firms) in the EU, and then links this process to allocative efficiency (based on a newly developed indicator to measure allocative efficiency using publicly available sector data from Eurostat). Birth of new firms has strongly fallen during the crisis, possibly related with access to finance difficulties, and this hampers an allocation of productive resources to their most efficient use. The potential benefits from product market reforms seem especially large in service sectors, which typically suffer from low allocative efficiency.

Chapter 1 in part II is about the role of the banking sector for firm-level productivity and exporting status. Countries with a stronger financial development and higher supply of bank loans, have higher average firm-level total factor productivity. The exporting status of a firm is largely explained by firm productivity levels, and thus indirectly by the financial conditions under which firms operate. In addition, when domestic

demand turns weak, firms are more likely to be exporters. This may explain why in countries where the crisis hit particularly hard, like Spain, more firms were encouraged to export.

Chapter 2 in part II investigates capital reallocation into tradable sectors in the vulnerable Member States (Greece, Spain, Cyprus, Ireland, Portugal, Slovenia and Italy). While the relative profitability of firms in tradable sectors has recently been restored in most vulnerable MS, there has, however, not yet been a significant relative increase in tradable sectors' fixed investment. The chapter shows that companies in tradable sectors of vulnerable Member States under-invest compared to their peers in non-vulnerable Member States, even after taking into account their current operating performance and financial health. The degree of firm underinvestment is significantly related with the estimated probability of facing financing difficulties.

Chapter 3 in part II studies the question whether growth in sectors that are more dependent on external funding has been more adversely affected during the sharp downturn of 2008-09. In the euro area more developed financial markets (as measured by the size of bank loans, bond markets or equity markets) have helped to mitigate the impact of the crisis on growth in externally dependent sectors. However, this effect varies depending on the phase of the crisis. In particular, well developed markets for bank loans seem to have been a supporting factor in the early stages of the crisis, but not over the most recent 2010-11 period. In countries where the monetary and financial institutions have entered the crisis with a higher degree of diversification of balance sheets away from traditional bank lending and a higher leverage, the impact of the crisis on the growth of industries more dependent on external funding has been magnified during the second phase of the crisis.

Finally, Chapter 4 in part II searches for determining factors of firms' perceived bank lending difficulties. In particular the firm's age, size and its growth performance are important explanatory variables. Also the financial health of the banking sector plays a role in the formation of perceptions. In particular the return on equity of the banking sector turns out to be a relevant explanatory factor. Firms operating in countries

where the banks' return on equity is relatively low more often face external financing difficulties. This may signal some form of systemic failure within the banking industry.

Part I

Business Dynamics

1. BUSINESS CHURN, SECTORAL PERFORMANCE, AND ECONOMIC POLICY

1.1. INTRODUCTION: BUSINESS DYNAMICS AND ALLOCATIVE EFFICIENCY

The contemporaneous policy debate on the process of economic recovery stresses the central role of structural reforms, i.e. reforms in product and labour markets to improve competition and the general business climate, in order to restore productivity growth.⁽²⁾ Competition brings about reallocation of output from less efficient to more efficient firms (Boone, 2008). More intense competition is brought about by increased market entry of new firms or more aggressive interaction among existing firms. According to Schumpeter's creative destruction, the birth of new, innovative firms challenges the incumbent enterprises. The most productive firms expand their market shares, and attract resources in the form of people, knowledge and capital at the expense of the less productive ones.

Product market reforms are meant to accommodate and intensify the aforementioned process of business dynamics, i.e. the birth, growth, decline, and death of companies. Therefore, in order to further understand how structural reforms impact on sectoral performance, one has to look deeper into the anatomy of markets and explore the process of business dynamics. Graph I.1.1 illustrates how product market reforms feed through the economy, where a distinction is made between allocative efficiency, productive efficiency and dynamic efficiency. Allocative efficiency is connected with reallocation of resources within the firm or between firms. Productive efficiency is improved when firms have incentives to reduce slack or under-utilised resources via better production methods. Dynamic efficiency is gained when firms step up innovation efforts to develop new products and processes.

Differently from most academic studies and policy documents in this area – focusing on the direct empirical links between some performance indicator (such as labour productivity) and a policy intervention (e.g. reducing product market regulation) – in this chapter we aim to establish the

relationship between business dynamics (i.e. the entry and exit of firms) and allocative efficiency. The idea here is that business dynamics reflect market selection, in the sense that less productive businesses are more likely to exit and more productive businesses are more likely to survive (cf. Haltiwanger's chapter in EIB (2011)).

In a nutshell, the storyline is as follows. A well-known finding from the productivity literature using firm-level data is that there exists substantial within-industry heterogeneity across firms in terms of productivity levels. In a competitive environment we expect a relationship between productivity of the firm and its market share: competition would increase the market share of the most productive firms, at the expense of the less productive ones. The extent to which productive factors are allocated towards their most efficient use is referred to as allocative efficiency. The dispersion of productivity levels is, at least to some extent, related with firm size: in the presence of scale economies, bigger firms tend to be more productive (until diseconomies of scale take over, for example associated with higher coordination costs). This suggests that next to birth and death rates, also the firm size at birth and death may play a role in market selection. In this chapter we empirically investigate the relationship between business dynamics and allocative efficiency in the EU.

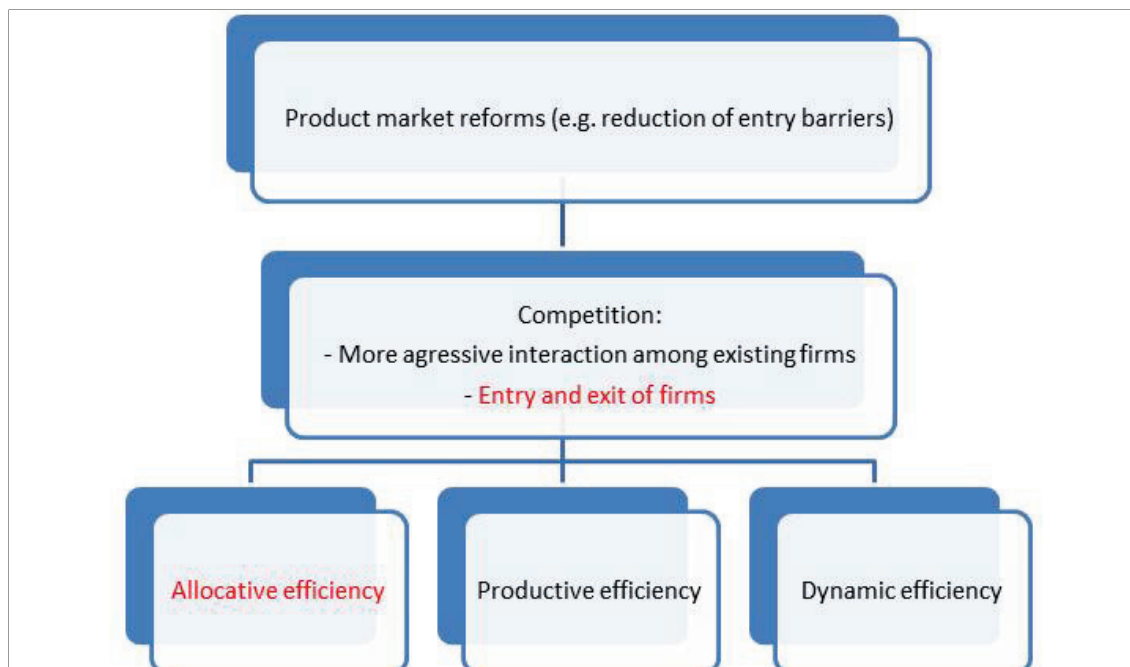
We present some first regression results in which we aim to study the interdependence between the above-mentioned dimensions of business dynamics and AE. Employment at birth and employment at death turn out to be very important explanatory variables for allocative efficiency. A one point increase in either employment at birth or employment at death is associated with an increase in allocative efficiency of about 1-2%.

The analysis in this chapter fits into a broader research agenda within the Commission services on the impacts of structural policies.⁽³⁾

⁽²⁾ See for example the Europe 2020 strategy (European Commission, 2010).

⁽³⁾ See for example the chapter "The impact of structural reforms on competition and labour productivity growth" in the previous edition of the Product Market Review (European Commission, 2010), investigating the relationship between reform efforts (using ECFIN's

Graph I.1.1: Impact of product market reforms on economic performance and its transmission channels



Source: Adapted from Nicodème and Sauner-Leroy (2004).

Box I.1.1: Data

We use industry-level data available from Eurostat, covering the time period 2000-2010 and including most EU countries (data on Greece and Malta is very limited). We combine NACE Rev. 2 and NACE Rev. 1.1 data for sectors in which there is a (close to) one-to-one correspondence in the sectoral classification systems, and only use NACE Rev. 2 data if such unique correspondence does not exist. The data set is used to empirically implement the decomposition of labour productivity as proposed by Olley and Pakes (1996). This yields an easily interpretable indicator for allocative efficiency (AE) for country-year-sector combinations.

This sector-level data enable us to capture within-sector heterogeneity of labour productivity across groups of firms classified by size, but we cannot capture heterogeneity at the level of individual firms. We are therefore not able to investigate for example the role of the age of the firm, which is found to be an important determinant of a firm's productivity level (because for example learning effects along the lines of Jovanovic (1982)), and different growth dynamics of young versus more mature firms (as in Haltiwanger et al. (2013)).

In the context of the CompNet activities the ECB is building a new database that will provide measurement of allocative efficiency using firm-level data for a group of EU countries (cf. Lopez-Garcia et al., 2013). This will allow comparison of both measurements of allocative efficiency.

It complements the ongoing work based on general equilibrium models, by explicitly considering

heterogeneity in productivity performance across firms and its relationship with business dynamics.⁽⁴⁾⁽⁵⁾ Related work includes Andrews and Cingano

MICREF database) and the intensity of competition. The chapter also addresses the impact of business environment reforms on entry and exit of firms.

⁽⁴⁾ In such models, product market reforms are typically modelled as parameter shocks, yielding transition dynamics to a new balanced growth path. A recent example is In 't Veld and Varga (2013), who study the potential effects of

(2012) and Cincera and Galgau (2005).⁽⁶⁾ Andrews and Cingano (2012) calculate allocative efficiency using firm-level data from ORBIS, and relate this efficiency indicator to framework policies such as the administrative burdens on start-ups, the cost to close a business, and employment protection legislation. Cincera and Galgau (2005) study the relationship between market entry and exit and various indicators of product market reforms, and also the relationship between business dynamics and macroeconomic outcomes. They conclude that "... it is desirable to pursue economic policies that improve firm entry and exit since the variation of the latter will generate significant and generally positive changes on macroeconomic performance with the magnitude of these changes being relatively large" (pp. 5). In this chapter we leave an econometric inspection of the relationship between sectoral performance and product market reforms for future work. In fact this topic is at the heart of a parallel project carried out within DG ECFIN (see Monteagudo et al., forthcoming).

The chapter is organised as follows. Part I illustrates the process of business dynamics in the EU, and Part II investigates the empirical relationship between business dynamics and allocative efficiency.

Part I: In Section 1.2 we present descriptive statistics on the two dimensions of business dynamics central in this analysis, i.e. birth and death, and the average firm size at birth and death.

structural reforms in vulnerable and core EU countries. The selected reforms are related to the Country Specific Recommendations in the EU Semester. The authors adopt a closing the gap approach, i.e. a gradual closure of the gap with the best performers by half. The potential benefits from increases in market competition in services are calculated by imposing a reduction in mark-ups. The potential gains in GDP are fairly modest. Ignoring within-industry productivity differentials can however lead to an underestimation of the potential impact of product market reforms, as these reforms are likely to generate substantial gains in allocative efficiency.

⁽⁵⁾ The U.S. have a longer tradition of research in this field, and researchers such as John Haltiwanger and Ricardo Caballero have been studying business dynamics using plant-level data since the 1990s. Research in Europe has been given an impulse through the development of firm-level data sets such as ORBIS and Eurostat's ESSnet project (www.esslimit.eu).

⁽⁶⁾ Also see Restuccia and Rogerson (2013), and the other papers in the same issue.

Section 1.3 looks into the time-series dynamics of our explanatory variables, and inspects interdependencies between birth and death rates, and between employment at birth and death. In Section 1.4 we consider in more detail potential determinants of birth and death, and of employment at birth and death.

Part II: Section 1.5 describes the concept of allocative efficiency, and empirically implements an industry-level version of AE on Eurostat data covering most EU countries. In Section 1.6 we provide some first empirical analyses on the relationship between AE and business dynamics. Section 1.7 concludes and motivates the focus on access to finance in this Product Market Review.

PART I: BUSINESS DYNAMICS

1.2. BIRTH, DEATH, AND AVERAGE FIRM SIZE AT BIRTH AND DEATH IN THE EU

Business dynamics refers to changes in the number and size of firms in a particular market. This process may lead to a reallocation of workers from less productive to more productive jobs. We distinguish in this chapter between birth and death rates on the one hand, and average firm size at birth and death on the other.⁽⁷⁾ In this section we present descriptive statistics on these aspects of business dynamics, in order to better understand the data before turning to the econometric analysis in Part II of this chapter.

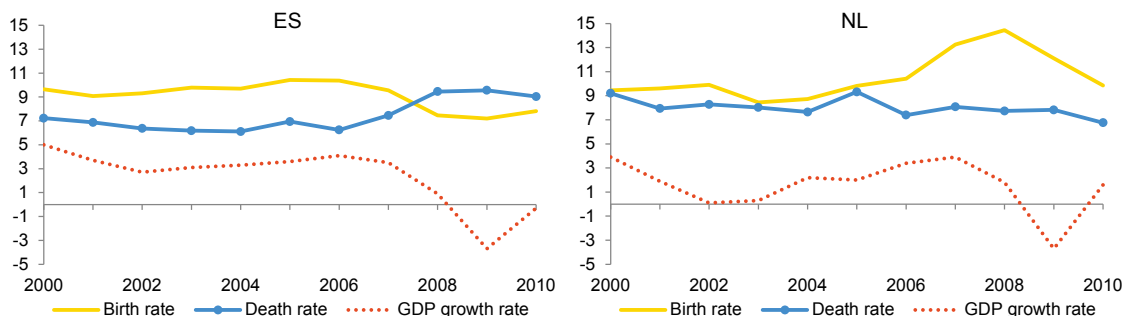
1.2.1. Birth and death

The birth rate (death rate) in year t is defined as the number of births (deaths) of enterprises in year t divided by the population of active enterprises in t .⁽⁸⁾ Graph I.1.2 shows patterns over time in birth

⁽⁷⁾ These two dimensions should be more or less independent from each other, an issue to which we will get back later in this chapter.

⁽⁸⁾ In principle we expect a strong association between birth and death, not necessarily in the short-run but certainly over longer time spans. Indeed in a stationary situation with a constant number of firms, birth and death rates should be equal. Likewise, in a situation of economic growth we would expect birth rates to exceed death rates, which would correspond to an increase in the number of active enterprises.

Graph I.1.2: Patterns over time in birth and death rates in ES and NL, %



(1) The data pertain to NACE Rev. 2 total industry (B-N_X_K642).
Source: Eurostat.

and death rates for Spain and the Netherlands.⁽⁹⁾ In Spain, the birth rate is above the death rate for most of the period, suggesting net business population growth, but not during the last two years of observation. Also, death rates have shown a steady increase since 2006, though there were some signs of recovery in 2010, possibly connected with the smaller contraction in the economy compared with the dramatic growth performance in 2009. In the Netherlands the birth rate is consistently higher than the death rate in the period under consideration, and birth rates peaked in 2007 and 2008. The death rate has gradually decreased during the decennium. The growth performance in both countries is remarkably similar, with an identical contraction of GDP growth in 2009.

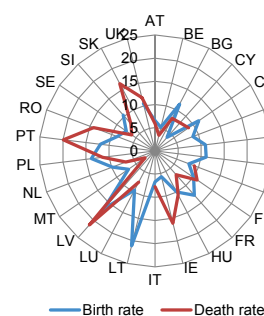
Graph I.1.3 shows birth and death rates across EU countries in 2010, the latest year for which data are available in Eurostat's business demography data set. The figure clearly shows strong variations in birth and death rates across EU Member States. The highest birth rates are observed in Lithuania, Latvia, Poland and France, and the highest death rates in Latvia, Portugal, Ireland and Romania. In Spain and Italy both birth and death rates are low, while in Portugal and Ireland death rates are substantially higher than birth rates.

In the remainder of this chapter we typically show the data for selected EU countries. We confine ourselves to illustrative examples of one or more countries from the group comprising Germany, Italy, Portugal, Spain, and the Netherlands.

⁽⁹⁾ When comparing ES and NL it should be kept in mind that in 2010 Spain was already undergoing a sizeable sectoral adjustment.

Germany is included as it is EU's biggest economy, and it has shown resilience during the economic crisis. Italy, Portugal and Spain are vulnerable Member States where the crisis has hit hard. The Netherlands is included as an example of a country with a relatively strong economic performance before the economic downturn, but which is currently also strongly affected by the adverse economic circumstances.

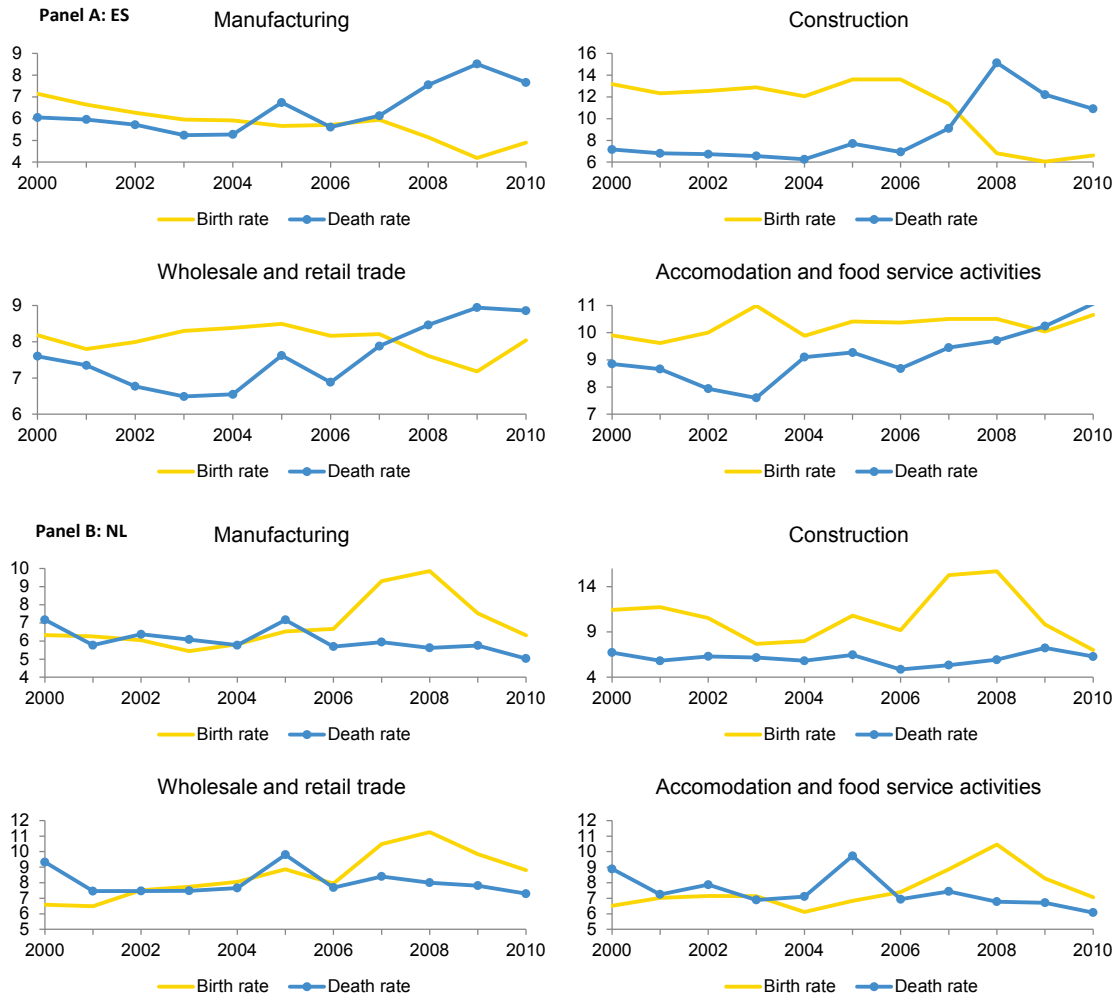
Graph I.1.3: Birth and death rates across EU countries, %, 2010



(1) The birth and death rates pertain to NACE Rev. 2 total industry (B-N_X_K642).
Source: Eurostat.

In Graph I.1.4 we present patterns over time in birth and death rates for selected sectors in ES and NL. In ES we observe for the most recent years we observe death rates in excess of birth rates. The boom in the construction sector becomes evident from the consistently positive net birth rate (birth rate minus death rate) during most of the decennium, and this pattern is only reversed in 2008. In NL birth rates exceed death rates also in the last years of observation, but birth rates are declining rapidly in all four sectors.

Graph I.1.4: Birth and death rates for selected sectors in ES and NL, %



(1) The data annex to this chapter describes the construction of time-series by combining NACE Rev. 1.1 and NACE Rev. 2 data.

Source: Eurostat.

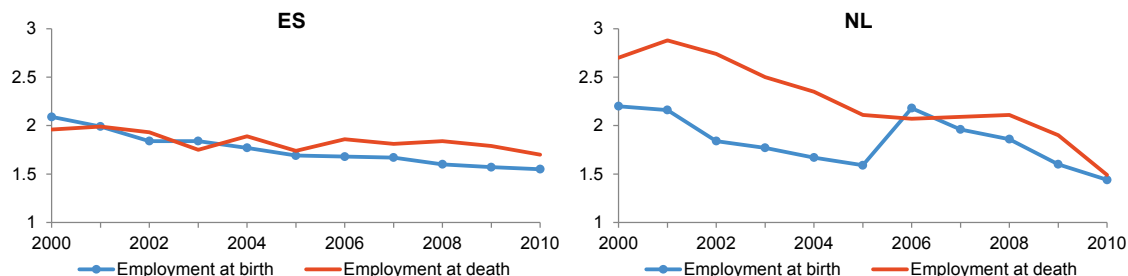
1.2.2. Average firm size at birth and death

Now we study the second dimension of business dynamics, i.e. the average firm size at birth and death. The average firm size at birth can be seen as a proxy for contestability of the market, in the sense that firms with larger initial size have a higher probability of survival (cf. Audretsch and Mahmood, 1995), and are at or closer to the minimum efficient scale (e.g. Görg et al., 2000). In other words, the threat of entry for the incumbent firms is stronger when the new-born firms are larger. Likewise, a larger average firm size at death indicates that market selection is not a phenomenon at the margin (i.e. a phenomenon

only pertaining to young and small companies with low survival rates and not seriously challenging the incumbent firms), but can affect all companies.

Graph I.1.5 shows the time pattern of the firm size at birth at death in the manufacturing sector in Spain and the Netherlands. While in both countries a declining trend in average size at birth and death is observed (implying a marginalisation of business churn), the pattern is more accentuated in the Netherlands. In combination with the fairly stable birth and death rates (as shown in Graph I.1.2), we conclude that job creation and job destruction associated with business churn has declined in the two examples under consideration.

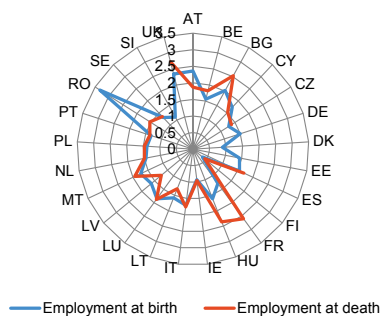
Graph I.1.5: Patterns over time in average firm size at birth and death for selected countries, number of employees



(1) The data pertain to NACE Rev. 2 total industry (B-N_X_K642).
Source: Eurostat.

In the other countries in the sample, a similar pattern is observed.

Graph I.1.6: Firm size at birth and death across EU countries, 2010



(1) The firm size at birth and death rates pertain to NACE Rev. 2 total industry (B-N_X_K642).
Source: Eurostat.

In Graph I.1.6 we illustrate the firm size at birth and death (measured in terms of employment) in the EU in 2010. In most countries employment at birth and death is in the same order of magnitude. For BG, FR and HU we observe that employment at death is clearly higher than employment at birth, while the opposite holds true for AT and RO.

Let us discuss some examples of the rather limited literature on firm size at birth, as this is the most prominent factor to understand variations in AE. Bartelsman et al. (2009) compare the firm size at birth with the average size of incumbents, and find that entrant firms are relatively smaller in the United States than in most of the other countries in their sample. They attribute this larger difference between firm size at birth and average firm size to the larger market of the United States that leads to larger average size of the incumbent firms, but also mention economic and institutional factors (such

as the relatively low entry and exit costs) as a potential explanation. Some studies analyse the impact of firm size at birth and subsequent performance. For example, Audretsch and Mahmood (1995) find a positive relationship between the probability of survival and initial firm size.

Several authors have studied the impact of industry characteristics on the size of start-ups. Görg et al. (2000) study the impact of industry characteristics on firm size for the Irish manufacturing sector, and find that the average firm size, industry growth and turbulence exert positive effects on start-up size.⁽¹⁰⁾ Almeida et al. (2003) find for a cross-section of start-ups in the semiconductor industry in the U.S. and other countries that external learning (measured by patent citations) increases with start-up size.

Finally, the recent literature also considers the impact of firm-specific characteristics. Colombo and Grilli (2005) investigate the influence of debt and equity financing on the firms' start-up size for a sample of Italian young firms in the high-tech sectors. They find that bank debt-financed firms are not larger than firms created only through personal capital. Access to external private equity financing appears to have a strong positive effect on start-up size, but this only holds true when the founders have a sufficiently high level of human capital. Gottschalk et al. (2009) study the determinants of initial firm size for a sample of German enterprises which were established

⁽¹⁰⁾ Turbulence is measured as the product of employment shares in firms that enter or exit in a particular industry, which is interpreted as an indirect measure of sunk costs. The authors take a high rate of simultaneous entry and exit as evidence of low sunk costs.

between 2005 and 2007, and concentrate on the role of firm-specific factors. They find that the founders' human capital has a large impact on initial size. The authors distinguish between generic and specific human capital, where the former is measured by formal education and professional experience and the latter by successful entrepreneurial experience and managerial experience. Their results suggest that both human capital components exert a positive impact on initial firm size, but specific human capital seems to be more important. As a final example, Capelleras et al. (2004) analyse determinants of start-up size and subsequent employment change of new enterprises in England and Spain based on similar surveys conducted in 2001 and 2003, respectively. They find that start-up size is strongly influenced by the starting resources of the entrepreneur (in particular the use of a bank loan or overdraft to establish the start-up) and industry effects (for example start-up size in manufacturing and hotels and restaurants tends to be larger, possibly reflecting the need to reach a minimum efficient scale in these industries at birth).

1.3. INTERDEPENDENCIES BETWEEN BIRTH, DEATH, AND AVERAGE FIRM SIZE AT BIRTH AND DEATH

In the previous section we presented descriptive statistics on business dynamics in the EU, without dwelling into possible interdependencies. Birth and death rates can be interrelated, for example when the death rate of young firms is relatively high. Low survival rates among young firms reduce the threat of entry for the existing firms, and thereby contestability and the intensity of competition.⁽¹¹⁾ It is important to consider such interdependencies for two reasons. First, the relationship between birth and death can give further insight into whether business churn poses a real threat to incumbent firms, or whether it is only a marginal phenomenon. Second, and related to the first point, a further inspection of the interdependencies can shed light on the issue of causality, e.g. whether new firms drive out inefficient old firms or whether liquidation of inefficient firms release resources for the establishment of new firms. A

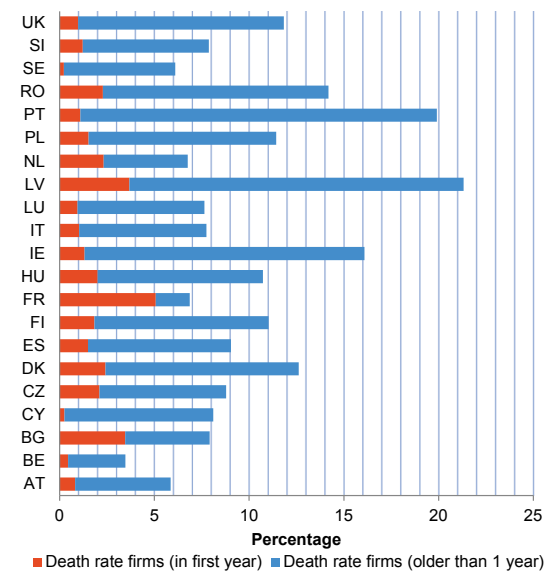
⁽¹¹⁾ This is known in the literature as the "revolving-door" phenomenon in the sense that the same firms entry and exit.

full-fledged treatment of both issues goes beyond the scope of this chapter, and we will confine ourselves in this section to a brief inspection of these issues.⁽¹²⁾

1.3.1. Survival

In Graph I.1.7 we present the death rate of firms decomposed into firms who did not survive the first year and exiting firms older than 1 year (data pertaining to 2010). The figure shows that in most countries the vast majority of exiting firms is older than one year, with the exception of France. These findings suggest that business dynamics is not only confined to very young firms that churn at the margin (confirming earlier results, see for example Baldwin and Gorecki, 1991).

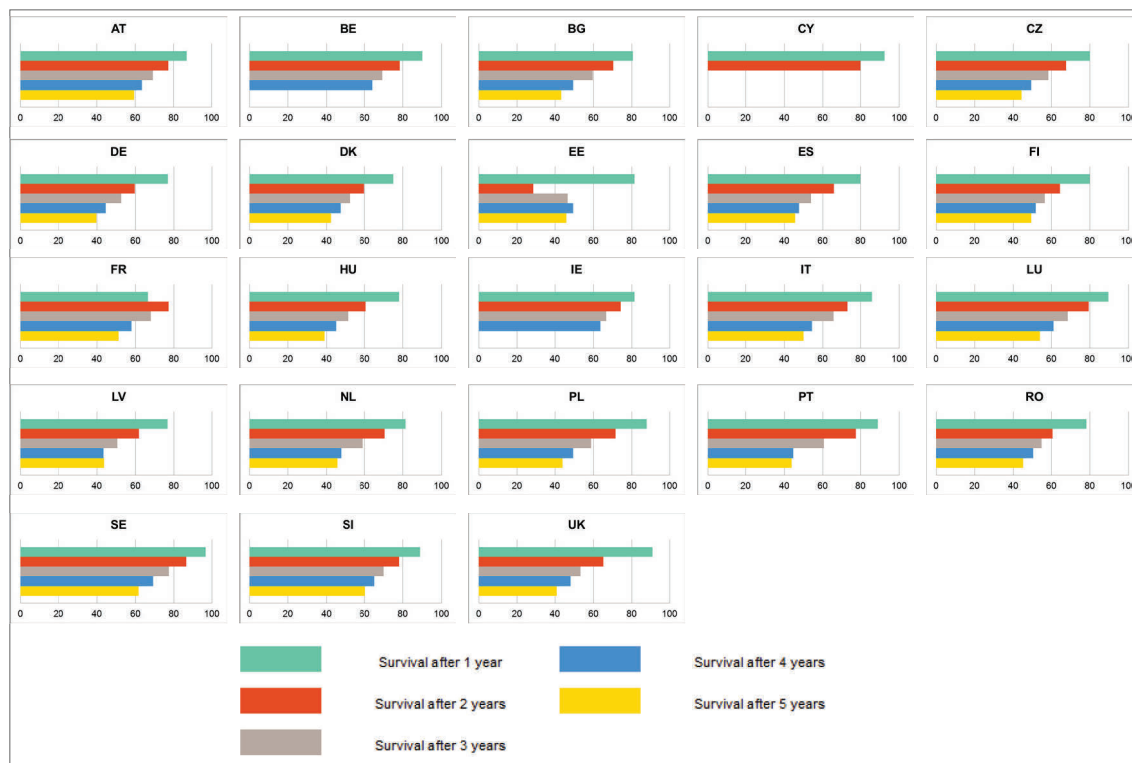
Graph I.1.7: Age composition of exiting firms in 2010, death rate in %



Source: Own calculations based on Eurostat.

⁽¹²⁾ The acknowledgement of interdependencies is not only relevant when developing appropriate policy measures, it is also necessary in order to build the econometric model in the second part of this chapter in which we establish the impact of business dynamics on allocative efficiency.

Graph I.1.8: Survival of newly born enterprises in the EU in 2010, %



(1) Survival is defined according to the Eurostat-OECD Manual on Business Demography Statistics. The survival of an enterprise is an event that should be observed between two consecutive years. An enterprise that was born in year t should be considered as having survived to $t+2$ only if it was active also in year $t+1$, so the survival rates are conditional upon survival until the previous year. The displayed data refer to the survival rates after 1, 2, 3, 4, and 5 years of the active firms in 2010, so the survival rates refer to different cohorts of newly born firms (the survival rate after 1 year pertains to the firms born in 2009, the survival rate after 2 years pertains to the firms born in 2008, etc.).

Source: Eurostat.

Graph I.1.8 shows the survival rates of newly born enterprises in the EU in 2010 after 1, 2, 3, 4, and 5 years. Survival rates gradually decline with the firm's age⁽¹³⁾, and for instance in the UK only 40% of the enterprises has survived after 5 years.

1.3.2. Correlation analysis

Now we turn to a correlation analysis in order to inspect the contemporaneous and sequential interdependencies between birth, death, employment at birth and employment at death.⁽¹⁴⁾ The correlation analysis in Table I.1.1 shows strong auto-correlation in the various time series.

The auto-correlations for the birth rate, the death rate, and the average firm size at birth are around 0.80. A weaker auto-correlation of 0.05 is found for the average firm size at death. Regarding the cross-correlations, we find strong associations between birth and death, between birth and the death rate in the previous period (consistent with a Schumpeterian replacement effect), and also between death and the birth rate in the previous period (consistent with a Schumpeterian displacement effect).⁽¹⁵⁾ The correlations between

⁽¹³⁾ The pattern in France and Estonia is somewhat atypical. In France the survival rate after two years is higher than after one year. In Estonia there is a sharp drop of the survival rate after two years, but a recovery thereafter.

⁽¹⁴⁾ In Annex II we present an error-correction analysis to further investigate such interdependencies, and to distinguish between short-run and long-run effects.

⁽¹⁵⁾ Manjón-Antolín (2010) reviews the main arguments put forward in the literature to understand the positive association between birth and death. According to the symmetry hypothesis the determinants of entry and exit are actually the same. For example, investments required for entry that become sunk act as a disincentive to exit for the incumbent firms and as a barrier to entry. Alternative explanations are related to Schumpeterian creative destruction, in which there is some causal link between birth and death. This is also referred to as the simultaneity hypothesis. For example, birth of innovative firms could

Box I.1.2: SAFE survey

The data from Eurostat and the SAFE survey have been matched for country-sector-year combinations, where we use the 2009H1 wave and the 2010H1 wave. The sectoral classification in SAFE covers industry, construction, trade, and services. These are matched with the Eurostat data as follows: C (for industry); F (for construction); G (for trade); L, M, and N (for services). The indicator "availability of bank loans has deteriorated" is the country-sector-year mean value of a dummy taking value 1 if availability of bank loans has deteriorated over the past six months and 0 if it has improved or remained unchanged. The indicator "availability of skilled staff is the most pressing problem" is based on the country-sector-year mean value of a dummy taking value 1 if availability of skilled staff was mentioned by the firm as the most pressing problem it is currently facing and 0 otherwise. The indicator "competition is the most pressing problem" is based on the country-sector-year mean value of a dummy taking value 1 if competition was mentioned by the firm as the most pressing problem it is currently facing and 0 otherwise.

Table I.1.1: **Auto- and cross-correlations**

	birth _t	birth _{t-1}	death _t	death _{t-1}	empl. at birth _t	empl. at birth _{t-1}	empl. at death _t	empl. at death _{t-1}
birth _t	1							
birth _{t-1}	0.8	1						
death _t	0.42	0.39	1					
death _{t-1}	0.4	0.4	0.78	1				
empl. at birth _t	0.02	0.05	-0.02	0.02	1			
empl. at birth _{t-1}	0.07	0.02	0	-0.01	0.79	1		
empl. at death _t	0.13	0.03	-0.05	-0.04	0.24	0.15	1	
empl. at death _{t-1}	0.25	0.17	-0.05	-0.04	0.11	0.17	0.05	1

Source: Own calculations based on Eurostat.

birth/death and employment at birth/death are in general weak⁽¹⁶⁾, with the exception of a strong association (0.25) between birth and the average firm size at death in the previous period. A possible explanation is that the employment resources released by exiting firms stimulate entry.

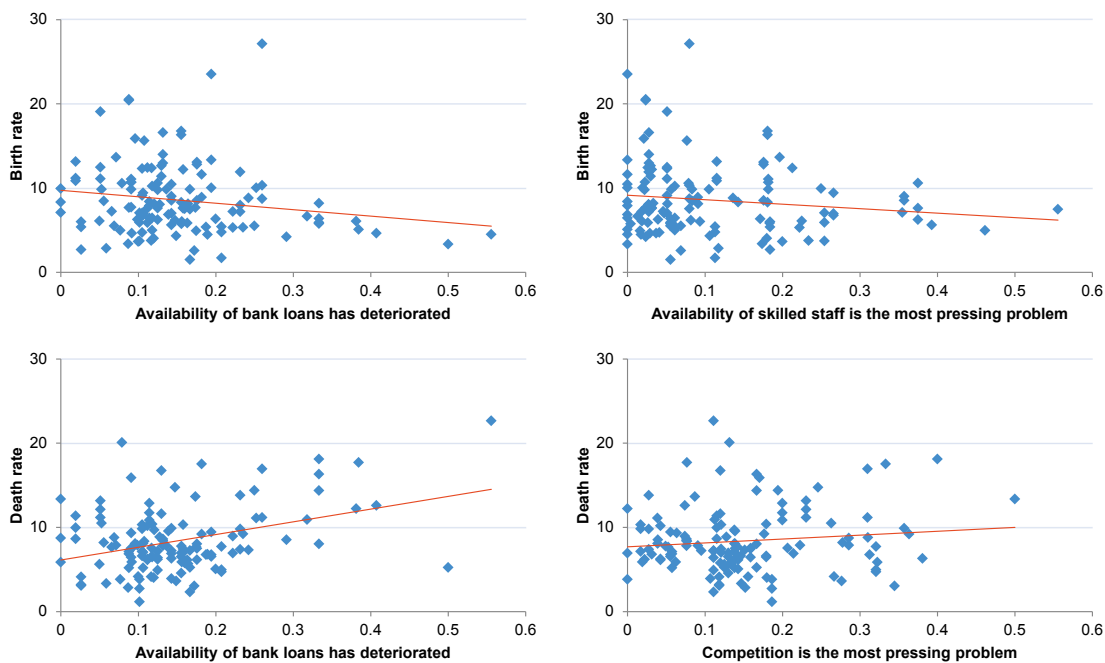
These findings are in line with other work. A well-known example is Dunne et al. (1988), who study patterns of firm entry, growth and exit in U.S. manufacturing sectors (over the period 1963-1982). They investigate the correlation of entry and exit variables over time and across industries. They find a positive time-series correlation for entry and exit, indicating that industries with

higher than average entry (exit) in one year will tend to have higher than average entry (exit) in another year. Relative differences in entry and exit across industries thus persist over time. This suggests that industry-specific factors are at play, affecting both entry and exit patterns. Dunne et al. also find positive and strong correlations between entry and exit rates across industries, indicating that sectors with higher than average entry rates also tend to have higher than average exit rates.

drive out inefficient old firms. Or death of old firms could release productive resources (workers and capital) for new firms. The empirical literature is not conclusive on which of these hypotheses receives the strongest support.

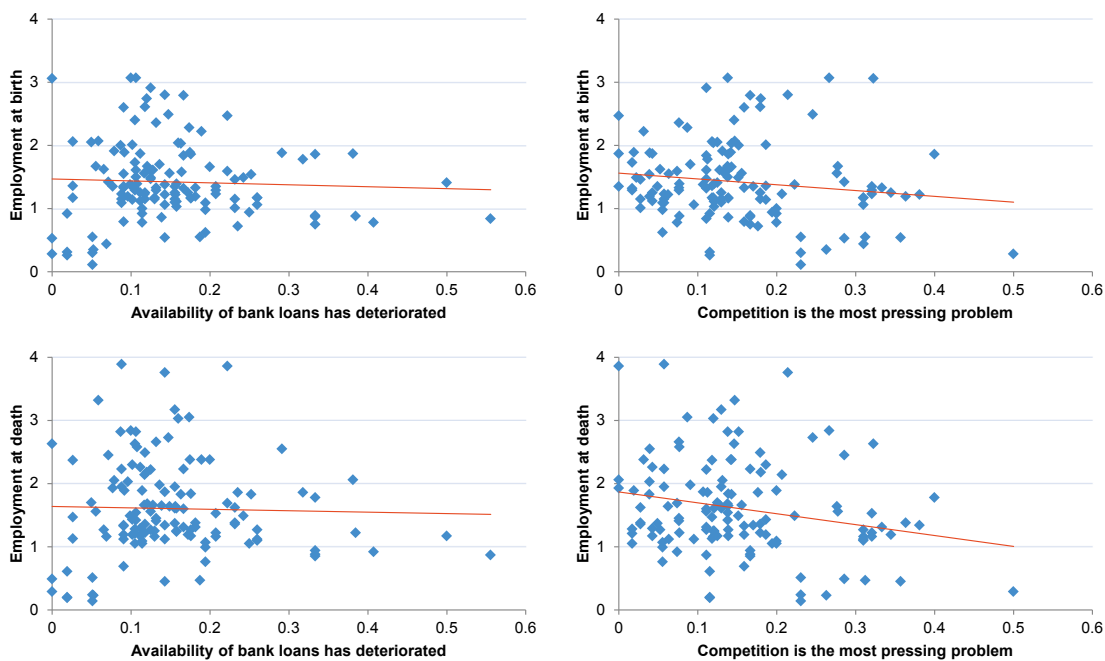
⁽¹⁶⁾ This supports our earlier assumption that birth/death rates and employment at birth/death are largely orthogonal phenomena.

Graph I.1.9: Exploration of factors behind birth and death



Source: Eurostat and SAFE data from European Commission/ECB.

Graph I.1.10: Exploration of factors behind employment at birth and employment at death



Source: Eurostat and SAFE data from European Commission/ECB.

1.4. TOWARDS A FURTHER UNDERSTANDING OF BUSINESS DYNAMICS

It can be expected that entry and exit decisions of firms are influenced by their access to productive resources (labour and capital) and the intensity of competition. As a first attempt to see if we find such a relationship in our data, we plot in Graph I.1.9 the birth rate against two indicators included in the survey on the access to finance of small and medium-sized enterprises in the euro area (SAFE), namely the percentage of firms indicating that access to bank loans has deteriorated over the past six months (left panel) and the percentage of firms indicating that availability of skilled staff is their most pressing problem (right panel). The plotted trend lines suggest e.g. that harder access to finance tends to decrease the birth rate, as we would have expected. In the lower part of the figure we plot the relationship between the death rate and availability of bank loans (left panel) and the fraction of firms indicating that competition is the most pressing problem (right panel). Also here the trend lines are intuitive. For example, more limited availability of bank loans is associated with higher death rates.

Graph I.1.10 presents some similar relationships for employment at birth and employment at death. These two figures illustrate the potential impact of bank lending on business dynamics. Chapter 4 in part II in this Product Market Review provides an analysis on the determinants of firms' perceptions regarding access to finance.

PART II: ALLOCATIVE EFFICIENCY

1.5. RESOURCE ALLOCATION

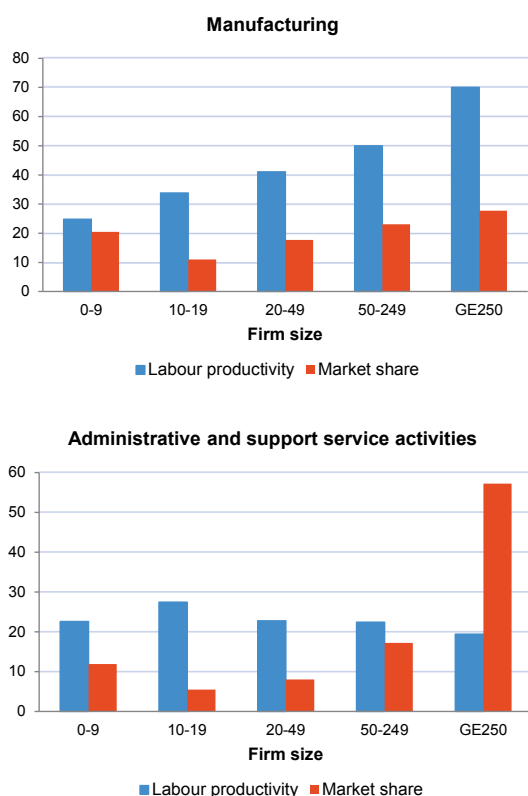
In the second part of the chapter we turn to an analysis of allocative efficiency. In this section we further explain the notion of allocative efficiency, and describe a procedure to compute it. We then implement this procedure using Eurostat's Structural Business Statistics. In the next section we present an econometric analysis to study the impact of business dynamics on allocative efficiency.

1.5.1. Labour productivity and firm size

As mentioned in the introduction an essential observation underpinning the analysis is that there exists substantial variation in productivity levels across firms, and that this variation is partly explained by the presence of economies of scale. From the theory of the firm and transaction cost economics we learn that a firm's optimal scale depends on the combination of scale economies (average production costs decline with firm size in the presence of fixed costs) and coordination costs (which tend to increase with firm size). The idea here is simply to investigate if the group of firms operating at optimal scale (identified as the scale at which firms within a certain size class exhibit the highest labour productivity) also have the largest market share (defined as employment by the firms in a specific size class divided by total employment in the sector). To this end we use Eurostat's Structural Business Statistics which present labour productivity data per size class, as well as data on the number of persons employed per size class.

Here we illustrate the connection between labour productivity and firm size (the linkage with the market share will be further discussed in the next sub-section). Graph I.1.11 shows that the optimal scale differs across sectors. In manufacturing (which is typically capital-intensive), the large firms show highest average labour productivity. The productivity differences across size classes are substantial: for example, whereas a worker in a large Spanish manufacturing firm has, on average, a labour productivity of 70,000 euros in 2010, his counterpart in a small firm has a productivity of 25,000 euros. For some service activities we find however that the optimal firm size is much smaller. For NACE sector N (administrative and support service activities), we find that firms in the size category 10-19 employees witness the highest labour productivity. The optimal firm size in administrative and support service activities (assessed in terms of average productivity performance of firms in a given size class) is thereby much lower than in manufacturing where the adage "big is beautiful" seems more appropriate.

Graph I.1.11: Labour productivity (1,000 euros) and market share (%) for ES (2010) in manufacturing (C) and administrative and support service activities (N)



(1) The market share is calculated as the employment of the group of firms in a certain size class as a share of total employment in the sector.

Source: Own calculations based on Eurostat.

1.5.2. Allocative efficiency

According to Boone (2008), productive resources are channelled towards their most efficient use in competitive markets. We therefore expect a positive association between labour productivity and market share. Graph I.1.11 illustrates this is indeed clearly the case in the Spanish manufacturing industry, but not in administrative and support service activities. In the manufacturing sector we observe that firms with 250 and more employees have the highest average labour productivity (blue bar) and also the largest market share (red bar). In support service activities we see that the size category with the highest labour productivity (i.e. firms with 10 to 19 employees) does not have the largest market share. Instead, the large companies (with at least 250 workers) have

by far the largest market share. These observations can be summarised in a single indicator for allocative efficiency. We compute allocative efficiency using a sector-level variant of the productivity decomposition developed by Olley and Pakes (1996):

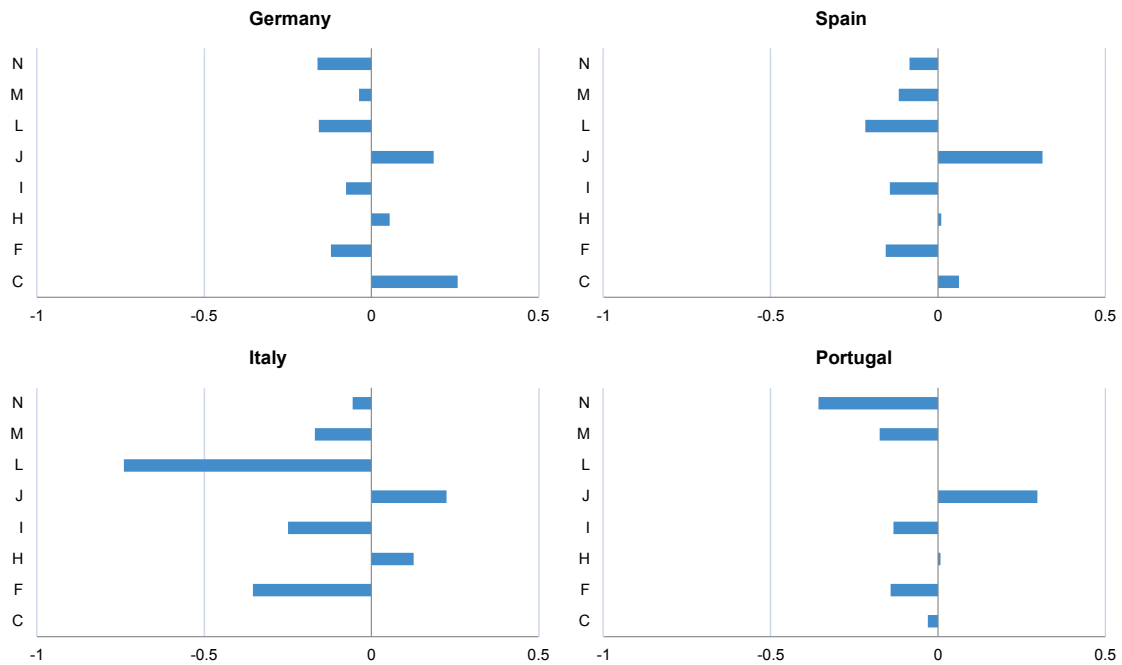
(1)

$$P_{jt} = \sum_{i \in J} \theta_{it} P_{it} = \frac{1}{N} \sum_{i \in J} P_{it} + \underbrace{\sum_{i \in J} (\theta_{it} - \bar{\theta}_{jt}) (P_{it} - \bar{P}_{jt})}_{AE}$$

where P_{jt} is labour productivity of industry j in year t , N is the number of firm size classes i in industry J , θ_{it} is the market share of firms within size class i , and bars indicate industry-level averages. Industry productivity is thus decomposed into the unweighted average of productivity per size class plus a cross-term measuring the extent to which firms in size classes with higher average productivity have a larger market share.⁽¹⁷⁾ This last term is referred to as allocative efficiency (AE). Following Bartelsman et al. (2008) and Andrews and Cingano (2012), we implement this equation by using log labour productivity as a measure of P_{it} and share of industry employment in firms in a particular size class as a measure of θ_{it} . Our estimate for AE is then interpreted as the %-increase in industry productivity connected with the actual allocation of employment across firm size classes, relative to a baseline scenario in which employment is allocated randomly (according to a uniform probability distribution) across the different firm size categories. Graph I.1.12 shows our measurement of AE at sectoral level for selected EU countries in 2010. Table I.1.2 presents the indicator for all sectors and countries included in the data set in 2010. A positive (negative) number for AE means that resources are allocated in a more (less) efficient way relative to the baseline. Negative numbers point at forces in the economy preventing competition to work properly, such as excessive regulation, rent-seeking, ineffective procurement, clientelism. In German manufacturing the AE index is 0.2, which

⁽¹⁷⁾ An obvious explanation why workers in larger firms are more productive than their counterparts in a small firm is that the former workers can produce in a more capital-intensive way. But the reasons why labour productivity differs across firms are irrelevant for the purpose of this study.

Graph I.1.12: AE-index in 2010 for selected countries



Source: Own calculations based on Eurostat.

says that the industry-level productivity gain from allocating resources towards their most productive use is 20%. In Spain, Italy and Portugal the AE index in manufacturing is much lower, close to zero.⁽¹⁸⁾

Graph I.1.12 also reveals large differences in allocative efficiency across sectors. In Table I.1.2 we list the sectoral AE-index for all countries in the sample⁽¹⁹⁾, and split the industries into tradeables and non-tradeables. We infer from this table that AE tends to be positive in sectors producing tradeables and negative in non-

tradeables. Countries can reap important benefits from improving the within-sector allocation of employees in non-tradeables. This chapter focuses on these within-sector effects, while Chapter 2 in part II addresses cross-sectoral allocation of resources.

It can be argued that part of the explanation of these observations is that the employed industry-level price deflators do not rightly capture within-sector quality differences across firms. For example, small firms in the business services industries could serve niche markets with highly-specialised services. Applying an industry-wide price deflator to this category of firms would then imply an underestimation of their actual productivity levels.⁽²⁰⁾ We do however also observe pronounced differences in the AE-index within one sector across countries. Keeping these limitations of the data in mind we therefore still believe the index can provide guidance to policymakers. An in-depth review of the sector should then provide insights if the low scoring on

⁽¹⁸⁾ As we have seen the AE-index shows strong variations across countries, sectors and over time. The maximum attainable level for the index actually also depends on the specific country-sector-year combination. To evaluate this we construct a hypothetical maximum value by assuming that the size class with the highest labour productivity has a 100% market share, while maintaining the observed labour productivity level per size class and unweighted average labour productivity level for the calculation of the index. The results of this exercise for 2010 (thereby complementing the results as shown in Table I.1.2) are given in Annex III.

⁽¹⁹⁾ Bartelsman et al. (2013) find an AE-index for the U.S. manufacturing industry of about 50 log points, while allocative efficiency only reaches 20-30 log points in Western Europe, and values around 10 log points in some Central and Eastern European countries.

⁽²⁰⁾ To overcome this issue some authors have only included narrowly defined sectors in the analysis (cf. Foster et al., 2008). See Triplett and Bosworth (2004) for a discussion on measurement issues in services.

Table I.1.2: **AE-index, 2010**

	Tradeables					Nontradeables			
	C	G	H	I	J	F	L	M	N
AT	0.229	-0.055	0.106	-0.118	0.101	-0.016	-0.142	-0.124	-0.142
BE	0.201	-0.082	-0.036	-0.187	0.162	-0.132		-0.053	-0.204
BG		-0.211	0.043	-0.191	0.247			-0.336	-0.089
CY	-0.042	-0.08	0.044	-0.034	0.217	-0.092		-0.11	
CZ	0.189	-0.053		-0.138	0.268	-0.182	-0.023	-0.13	-0.077
DE	0.258	-0.014	0.055	-0.076	0.186	-0.121	-0.158	-0.037	-0.161
DK	0.171	-0.029	0.168	-0.011	0.105	-0.045	0.025	0.024	-0.056
EE	0.099	-0.022	0.032		0.049	-0.152			-0.164
ES	0.062	-0.085	0.01	-0.144	0.312	-0.157	-0.218	-0.118	-0.085
FI	0.173	-0.047	-0.029		0.162	-0.033		-0.036	-0.03
FR	0.121		0.187	0.007	0.178	-0.014	0.039	0.003	-0.09
HU	0.328	-0.132	-0.209	-0.261	0.206	-0.243	0.007	-0.235	-0.169
IT	0.001	-0.217	0.126	-0.25	0.225	-0.354	-0.74	-0.169	-0.056
LT	0.301	-0.043	0.066	-0.12	0.029	0.011		-0.227	-0.089
LU		0.013	0.19			-0.024		-0.024	-0.515
LV	0.152	-0.052	0.007		0.107	-0.081	0.002		-0.003
NL	0.123	-0.062	0.06		0.213	-0.047	-0.015	0.002	-0.211
PL	0.199	-0.249	-0.062	-0.275	0.218	-0.324	-0.08	-0.208	-0.254
PT	-0.031	-0.091	0.007	-0.134	0.297	-0.142		-0.175	-0.358
RO	0.232		0.104	-0.14	0.276	0.035	0.016	-0.043	-0.167
SE	0.233	0.01	-0.002	-0.05	0.134	-0.036	-0.02	-0.012	-0.082
SI	0.087	-0.046	0.063	-0.121		-0.099			
SK	0.137	-0.046	-0.246		0.34	-0.243		-0.054	-0.144
UK	0.16	-0.077	0.016	0.091	0.155	0.037	0.051	0.032	-0.237

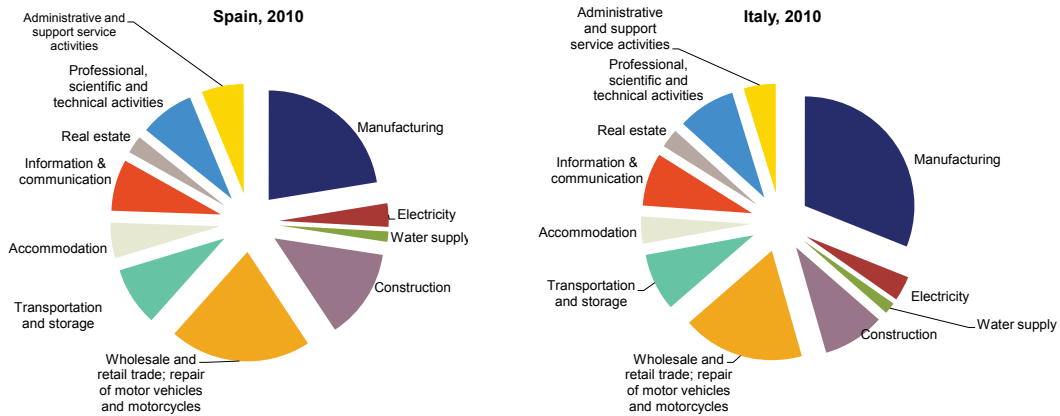
(1) The data for sector G pertain to 2009 (AE could not be calculated for 2010). Negative values for AE are shown in yellow, and non-negative values in green. Positive values not necessarily indicate strong performance, as the within-industry dispersion of the AE-index across countries shows.

Source: Own calculations based on Eurostat.

the AE-index reflects a genuine inefficiency or is the result of mismeasurement.

To evaluate the macroeconomic impacts of AE one obviously has to link the AE-index with the share of the sector in the economy. A relatively limited inefficiency in one sector can have substantial macro-effects if that sector is large (or if there are important interactions with other sectors). Likewise, a sector which has built up large inefficiencies may have a limited negative impact at the macro level if that sector is small and not strongly intertwined with other sectors. As an example we show in I.1.13 the pie charts for the share of the sector in total value added for Spain and Italy in 2010. The figure shows that manufacturing (NACE sector C) and wholesale and retail trade (NACE sector G) have the largest share in total value added, while for Spain also the construction sector is relatively important (from which one can understand the sensitivity of the Spanish economy to the burst of the housing bubble).

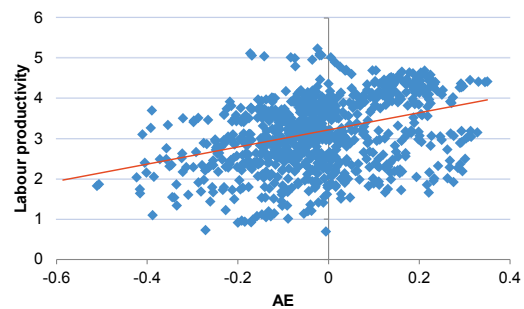
Graph I.1.13: Sector shares in selected countries



Source: Own calculations based on Eurostat.

As illustrated in Graph I.1.1, labour productivity is influenced by allocative efficiency, but also by productive and dynamic efficiency. In this chapter we only focus on allocative efficiency. In order to illustrate its importance for labour productivity, we plot in Graph I.1.14 labour productivity per sector against allocative efficiency in that sector. The figure clearly shows a strong and positive association: results from a fixed effects regression indicate that a 1%-point increase in AE tends to increase labour productivity by 0.73%. Given the large differences observed in AE (ranging from about -60% to +35%), substantial macroeconomic impacts can be expected from changes in AE. Notice that Equation (1) establishes the accounting identity between labour productivity, the unweighted average labour productivity and AE, so the connection illustrated in Figure 1 should not be seen as a causal impact.

Graph I.1.14: Relationship between labour productivity and AE



(1) Labour productivity (in logarithmic form) is corrected for country-fixed effects.

Source: Own calculations based on Eurostat.

1.6. CHURN AND ALLOCATIVE EFFICIENCY

In the previous section we have illustrated the concept of allocative efficiency by looking at the case of the Spanish manufacturing sector vis-à-vis administrative and support service activities. We also introduced an index to compute allocative efficiency, and implemented the productivity decomposition proposed by Olley and Pakes to the Structural Business Statistics data set from Eurostat.

An important next question for policymakers is how AE is determined (and thus how policy interventions may affect it). We conjecture that AE is affected by the process of business dynamics as described in Part I of this chapter. To achieve allocative efficiency, inefficient firms need to exit

Table I.1.3: **Impact of entry on AE**

VARIABLES	(1)		(2)		(3)		(4)		(5)		(6)	
	AE		AE		AE		AE		AE		AE	
	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects
birth _t	0.003***	0.003***	0.002*	0.002*	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
employment at birth _t	0.016***	0.016***	0.018***	0.017***	0.038***	0.034***	0.038***	0.038***	0.038***	0.038***	0.038***	0.034***
	(0.003)	(0.003)	(0.005)	(0.005)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
birth _{t-1}			0.001	0.001								
			(0.001)	(0.001)								
employment at birth _{t-1}			0.003	0.003								
			(0.004)	(0.004)								
employment at birth _t ²									-0.002***	-0.002***	-0.002***	-0.002***
									(0.001)	(0.001)	(0.001)	(0.001)
Observations	998	998	862	862	998	998	998	998	998	998	998	998
R-squared	0.619		0.655		0.623		0.623		0.623		0.623	

(1) Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sector- and year-dummies are included.

Source: Own calculations.

the market, and new firms (which tend to be more innovative) would need to be able to attract resources and gain market share.⁽²¹⁾ In this section we investigate the relationship between AE and business churn.

Results

The results for entry are shown in Table I.1.3. The column numbers correspond to the above-mentioned version of the regression model. The reported coefficients are quasi-elasticities. Both the birth rate and employment at birth appear with positive and statistically significant regression coefficients. For example, the results in Column (1) imply that an increase in the average employment at birth by 1 employee is associated with an increase in allocative efficiency by 1.6%. These results are fairly robust. The results in the last two columns suggest the presence of a non-linear impact of employment at birth and AE. The regression coefficient of the quadratic term is negative and statistically significant which in combination with the positive coefficient of the linear term generates an inverted-U relationship between employment at birth and AE, and a maximum when employment at birth is about 10 employees. This suggests that the impact of business dynamics on allocative efficiency is

largest when the average new-born firm employs 10 people. The average firm size at birth observed in the data is much lower than 10 workers, implying that gains in allocative efficiency can be reaped if economic policy manages to increase the average firm size at birth.

⁽²¹⁾ Entry and exit of firms are facets of market contestability (though the notion of contestability includes more aspects, such as equal access to technology).

Table I.1.4: **Impact of exit on AE**

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	AE	AE	AE	AE	AE	AE
	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects
death _t	-0.001*	-0.001	-0.000	-0.000	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
employment at death _t	0.010***	0.009**	0.009*	0.009*	0.040***	0.033***
	(0.004)	(0.004)	(0.005)	(0.005)	(0.009)	(0.009)
death _{t-1}			-0.001	-0.001		
			(0.001)	(0.001)		
employment at death _{t-1}			-0.001	-0.001		
			(0.005)	(0.005)		
employment at death _t ²					-0.003***	-0.003***
					(0.001)	(0.001)
Observations	936	936	779	779	936	936
R-squared	0.612		0.644		0.617	

(1) Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sector- and year-dummies are included.

Source: Own calculations.

Table I.1.4 reports the results for the exit variables, i.e. the death rate and the average firm size at death. Here we find that only employment at death appears with a statistically significant regression coefficient, and this result is again robust to variations in the model and estimation technique.⁽²²⁾ In a similar fashion as in Table I.1.3, we find evidence for the existence of an inverted-U shape between employment at death and AE, with a maximum when employment at death is approximately 5-6 persons. The average firm size at death is lower than this, suggesting that allocative efficiency can be improved if the average firm size at death would be larger.⁽²³⁾

⁽²²⁾ We have also carried out regressions including all four dimensions of business dynamics simultaneously (birth rate, employment at birth, death rate, employment at death). Results hardly changed.

⁽²³⁾ A possible explanation for this non-linear relationship between AE and firm size at death is that the impact on AE is small if mainly the small firms exit the market as this would represent the earlier mentioned revolving-door phenomenon, while the impact on AE may also be limited when mainly larger firms exit because of higher reallocation costs. A further investigation of these mechanisms is left for future research.

Box I.1.3: Regression model

We perform panel data regressions using fixed country effects

$$(FE) \quad AE_{cjt} = \alpha_c + \beta X_{cjt} + \delta_t T + \delta_j S + \varepsilon_{cjt},$$

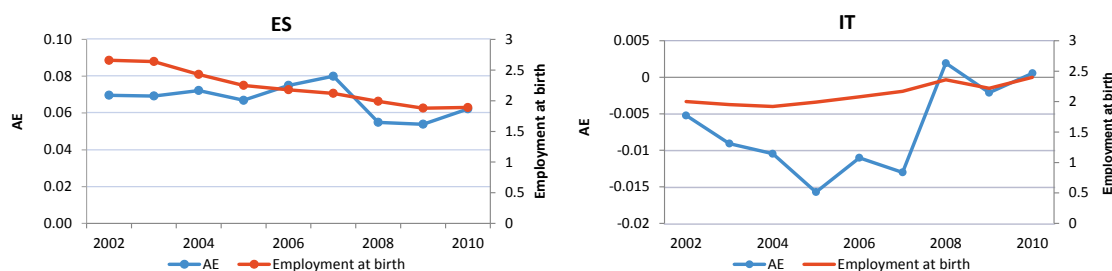
and a random effects version

$$(RE) \quad AE_{cjt} = \alpha + \beta X_{cjt} + \delta_t T + \delta_j S + u_{cjt} + \varepsilon_{cjt},$$

where X is a vector of explanatory variables, T is a vector of time dummies, S is a vector of sector dummies. The high correlation of the sectoral AE-index across countries supports the use of sector-dummies in the econometric approach. Vector X captures the business dynamics variables at the core of our analysis. We perform different regressions for entry and exit variables. The reason for this is that, as we have seen in Section 1.3, birth and death as well as employment at birth and employment at death are interrelated phenomena. To avoid collinearity issues we therefore decided to run separate regressions. In the basic regression model X includes (i) the birth rate and employment at birth, or (ii) the death rate and employment at death.

Various versions of the model are tested. In Regression (1) we run the fixed effects version for the basic regression model, and in Regression (2) the random effects version. In order to investigate the possible role of endogeneity we include in Regression (3) and (4) the lagged explanatory variables, for respectively the fixed effects model and random effects model. Finally, Regression (5) and (6) include a quadratic term for employment at birth or employment at death, in order to inspect non-linearities. We have also tested a version with a quadratic term for the birth rate or the death rate. The quadratic terms for birth or death were insignificant. Therefore, we decided to include the quadratic term only for employment at birth or employment at death.

Graph I.1.15: Patterns over time in AE-index and employment at birth in manufacturing in ES (upper panel) and IT (lower panel)



Source: Own calculations based on Eurostat.

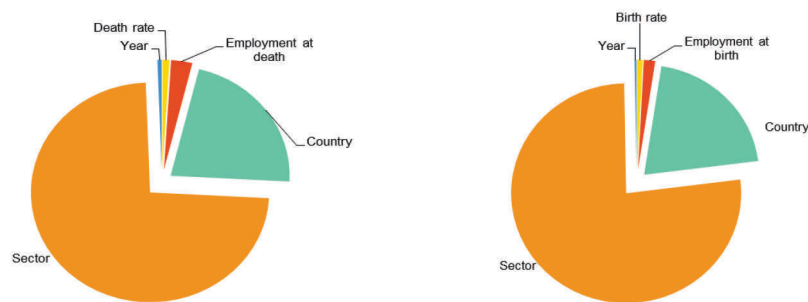
It should *not* be concluded from the decomposition presented in the box that business dynamics have a relatively modest role in explaining the variance in AE. In fact it is quite common that country- and sector dummies account for a big proportion of the variance, as they capture differences in institutions, technology, human capital endowments, etc. Indeed, as an illustration of the strong relationship between AE and employment at birth we show in I.1.15 the time series development of both variables for the manufacturing sector in ES and IT, which saw an opposite trend in the average firm size at birth in the period 2002-2010. In Spain

the average firm size at birth in the manufacturing sector has declined from about 2.6 to 1.9 persons over the 2002-2010 period, and we also observe a decline in allocative efficiency of about 1%-point. In the Italian manufacturing sector we see an increase both in the average firm size at birth and in allocative efficiency.

Box I.1.4: Shapley and Owen decomposition

The fixed effects regressions include country-, sector-, and year-dummies. In order to show the portion of variance explained by the set of independent variables, we present in the figure below a Shapley and Owen decomposition of the R-squared for model (1) in Table I.1.3 and Table I.1.4, respectively. The figure illustrates that the sector-dummies account for the largest part of the explained variance, followed by country-dummies. From this exercise we learn that unobserved heterogeneity at sector-level as captured by the sector-dummies is important. A further inspection of the sources of such heterogeneity (such as sector-specific regulation and technology) would be an interesting avenue for further research.

Graph: Shapley and Owen decomposition of R-squared of model



Source: Own calculations based on Eurostat.

1.7. CONCLUSION

In this chapter we have studied allocative efficiency at sectoral level in the EU, and we presented some first empirical analyses on the relationship between allocative efficiency and business churn.

The key findings in this chapter are the following. First, allocative efficiency tends to be higher in tradeables than in non-tradeables, which are typically sheltered from international competition. The focus of policymakers on malfunctioning non-tradeables thus seems a natural choice, and gains from reforms are potentially large. Secondly, we found some empirical evidence for the existence of a relationship between allocative efficiency and business dynamics. Both the average firm size at birth and death are positively associated with allocative efficiency.⁽²⁴⁾ These results suggest that

a deeper understanding on the determinants of the size of start-ups and exiting firms should deserve more attention from policymakers. In particular, access to finance seems to be an important condition to start-up a business of a certain size so that it can challenge the incumbent firms. As Bartelsman puts it, "frictions in the credit market could result in resources not going to firms with the most promising projects, but to firms with lower agency costs in borrowing" (page 2, 2013). The next chapters in this Product Market Review deal with various aspects on access to finance.

The analysis in this chapter can be extended in several directions. First, further work to strengthen the macroeconomic perspective would be to analyse in more detail the contribution of allocative, productive and dynamic efficiency to labour productivity growth, and to quantify the potential benefits from reforms in e.g. product or labour markets in order to improve AE. For example, Kox and Van Leeuwen (2012) calculate scale inefficiencies and X-inefficiencies for business services in selected EU countries, and find evidence for malfunctioning competitive selection in the sense that scale efficiency is falling

⁽²⁴⁾ The reported associations between allocative efficiency and business dynamics not necessarily also reflect causal relationships, and in further research the endogeneity of business dynamics could be explicitly taken into account in the econometric modelling.

rather than growing over time. Secondly, in this chapter we only briefly touched upon framework conditions impacting on firm dynamics, and the analysis can be elaborated by investigating in more detail the impact of product market reforms on firms' entry and exit decisions. Thirdly, the results delivered by the above-mentioned extensions can be combined in order to develop a system of regression equations that can be estimated simultaneously. In such a system of equations, the impact of product market reforms on labour productivity would be estimated, while taking account of the various transmission mechanisms. Fourth, the econometric work on explaining AE can be further developed, both in terms of model specification and in terms of set of explanatory variables. Finally, more detailed sectoral structures can be considered, so that the product categories become more homogeneous.

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ANNEX 1

Data and additional econometric analyses

A1.1. DATA ANNEX

The full data set is built from the following sources:

- Structural Business Statistics for NACE Rev. 2 and 1.1;
- Business demography data for NACE Rev. 2 and 1.1;
- Data on annual GDP growth at market prices;
- Producer price deflator at section level in the NACE classification (vCPI05_NAC).

All data are from Eurostat, and can be obtained online.

To link the NACE Rev. 2 and NACE Rev. 1.1 data, we use the rough one-to-one correspondence between the sections as presented in Eurostat (2007), and only use NACE Rev. 1.1 data if there is a unique correspondence. For example, we connect the Section D series under NACE Rev. 1.1 with the Section C series under NACE Rev. 2, but we do not connect the Section E series under NACE Rev. 1.1 as this section is split into Section D and Section E under NACE Rev. 2. By doing so we link C (Rev. 2) to D (Rev. 1.1); F (Rev. 2) to F (Rev. 1.1); G (Rev. 2) to G (Rev. 1.1); I (Rev. 2) to H (Rev. 1.1).

The classification of firm size shows some variation across the two NACE revisions and across sectors. For Sections C-F under NACE Rev. 2 we use the size categories sectors 0-9; 10-19; 20-49; 50-249; GE250. For Sections D and F under NACE Rev. 1.1 data are presented for the categories 1-9; 10-19; 20-49; 50-249; GE250, and the category 0-9 is not included. We ignore this issue in our approach to link the data, and treat the 1-9 category as if it represents the 0-9 category. This implies that some caution is warranted when studying the time variation in allocative efficiency for NACE Rev. 2 Sections D and F before and after the revision. We therefore also include time dummies in the regression models. Also, the firm size classes for Sections G and higher under NACE Rev. 2 do not contain the category 0-9, but instead the categories 0-1 and 2-9. G and H under

NACE Rev. 1.1 contain the categories 0-9 and 2-9. We decided to use the category 2-9 as the smallest firm size category, i.e. to exclude the self-employed and the firms with only 1 employee.

The producer price deflator, used to deflate the labour productivity series, is available for Sections C; B-E; F; G-I; J; K; L; M-N. We therefore have used similar deflators for e.g. Sections M and N.

Finally, we have performed a cleaning of the data:

- We drop observations if the birth rate or the death rate is larger than 50 and if employment at birth is larger than 200;
- We drop observations if the value added in the sector is negative;
- In the regressions for allocative efficiency we drop NACE Rev. 2 Sections D and E as these public utilities sectors may show different behaviour with regard to business dynamics.

A1.2. ERROR-CORRECTION REGRESSION ANALYSIS

In order to study the dynamic interplay between the various dimensions of business demography, we now present some first findings from a textbook-type error-correction model (ECM). In short, we estimate an ECM specified as

(EC)

$$\Delta Y_t = \phi \Delta X_t - (1 - \theta)[Y_{t-1} - \alpha - \beta X_{t-1}] + \varepsilon_t$$

The short-run multiplier is given by ϕ and the long-run multiplier by β , while the speed of adjustment is determined by $1-\theta$ (stability requires $1-\theta > 0$). Results for the relationship between birth and death are presented in Table I.A1.1 and Table I.A1.2 and for the relationship between employment at birth and death in Table I.A1.3 and Table I.A1.4.⁽²⁵⁾

⁽²⁵⁾ To run the ECM regressions we impose restrictions on the change in employment at birth and employment at death: we drop values where the absolute change is larger than 100%.

Table I.A1.1: **ECM to explain the relationship between birth and death**

VARIABLES	(1) $\Delta birth_t$	(2) $\Delta birth_t$	(3) $\Delta birth_t$
$\Delta death_t$	0.063** (0.026)	0.067*** (0.026)	0.068*** (0.026)
$birth_{t-1}$	-0.441*** (0.025)	-0.446*** (0.025)	-0.443*** (0.025)
$death_{t-1}$	0.103*** (0.020)	0.106*** (0.020)	0.103*** (0.020)
$crisis_{2008-2010}$		-0.657*** (0.241)	
GDP growth			0.095*** (0.023)
constant	7.774*** (1.295)	8.386*** (1.103)	7.326*** (1.293)
Observations	1,170	1,170	1,130
R-squared	0.272	0.264	0.270

(1) Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Country-, sector- and year-dummies are included.
Source: Own calculations.

Table I.A1.2: **ECM to explain the relationship between death and birth**

VARIABLES	(1) $\Delta death_t$	(2) $\Delta death_t$	(3) $\Delta death_t$
$\Delta birth_t$	0.084** (0.034)	0.090*** (0.034)	0.092*** (0.035)
$death_{t-1}$	-0.352*** (0.021)	-0.351*** (0.021)	-0.344*** (0.022)
$birth_{t-1}$	0.115*** (0.033)	0.117*** (0.033)	0.115*** (0.033)
$crisis_{2008-2010}$		1.434*** (0.276)	
GDP growth			-0.104*** (0.026)
constant	-2.358 (1.519)	-1.979 (1.304)	0.501 (1.529)
Observations	1,170	1,170	1,130
R-squared	0.259	0.252	0.245

(1) Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Country-, sector- and year-dummies are included.
Source: Own calculations.

Table I.A1.3: **ECM to explain the relationship between employment at birth and death**

VARIABLES	(1) $\Delta empbirth_t$	(2) $\Delta empbirth_t$	(3) $\Delta empbirth_t$
$\Delta empdeath_t$	0.004 (0.005)	0.006 (0.005)	0.005 (0.005)
$empbirth_{t-1}$	-0.097*** (0.017)	-0.094*** (0.017)	-0.098*** (0.018)
$empdeath_{t-1}$	0.026* (0.014)	0.022 (0.014)	0.027* (0.014)
$crisis_{2008-2010}$		-0.071*** (0.022)	
GDP growth			0.008*** (0.002)
constant	0.429*** (0.113)	0.431*** (0.098)	0.141 (0.112)
Observations	983	983	964
R-squared	0.132	0.112	0.101

(1) Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Country-, sector- and year-dummies are included.
Source: Own calculations.

Table I.A1.4: **ECM to explain the relationship between employment at death and birth**

VARIABLES	(1) $\Delta empdeath_t$	(2) $\Delta empdeath_t$	(3) $\Delta empdeath_t$
$\Delta empbirth_t$	0.036** (0.018)	0.041** (0.018)	0.039** (0.018)
$empdeath_{t-1}$	-0.144*** (0.017)	-0.146*** (0.017)	-0.142*** (0.017)
$empbirth_{t-1}$	0.058*** (0.017)	0.060*** (0.017)	0.058*** (0.018)
$crisis_{2008-2010}$		-0.070*** (0.025)	
GDP growth			0.005** (0.002)
constant	0.126 (0.178)	0.081 (0.132)	0.042 (0.132)
Observations	962	962	943
R-squared	0.164	0.135	0.127

(1) Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Country-, sector- and year-dummies are included.
Source: Own calculations.

The results reported in Table I.A1.1 suggest that an increase in the death rate of 1%-point yields a statistically significant short-run reaction of 0.06%-point, and leads in the long-run to an adjustment of the birth rate of 0.23%-point (0.103/0.441). In case of a change in the average firm size at death we find both a short- and a long-run relationship with the average firm size at birth. The results shown in Table I.A1.3 imply a short-run multiplier of 0.036 and a long-run multiplier of 0.40.

Table I.A1.5: **Artificially constructed maximum value for AE**

	Tradeables					Nontradeables			
	C	G	H	I	J	F	L	M	N
AT	0.512	0.274	0.497	0.188	0.509	0.243	0.316	0.297	0.208
BE	0.565	0.3	0.253	0.352	0.457	0.313		0.294	0.254
BG		0.359	0.326	0.622	1.011			0.506	0.209
CY	0.158	0.243	0.247	0.1	0.566	0.271		0.215	
CZ	0.558	0.369		0.429	0.953	0.646	0.327	0.303	0.147
DE	0.542	0.183	0.13	0.449	0.551	0.451	0.292	0.252	0.286
DK	0.473	0.127	0.4	0.212	0.242	0.198	0.115	0.14	0.16
EE	0.3	0.155	0.578		0.933	0.313			0.351
ES	0.528	0.184	0.281	0.202	0.796	0.384	0.316	0.241	0.186
FI	0.417	0.228	0.149		0.402	0.15		0.137	0.061
FR	0.374		0.364	0.067	0.365	0.152	0.39	0.052	0.1
HU	0.968	0.465	0.486	0.624	0.707	0.578	0.162	0.407	0.717
IE									
IT	0.486	0.267	0.437	0.286	0.947	0.676	0.358	0.327	0.145
LT	0.902	0.384	0.312	0.655	1.003	0.96		0.301	0.265
LU		0.249	0.518			0.371		0.102	0.603
LV	0.49	0.292	0.204		0.945	0.849	0.227		0.175
NL	0.471	0.264	0.151		0.676	0.26	0.562	0.281	0.196
PL	0.622	0.306	0.402	0.439	0.879	0.545	0.182	0.299	0.525
PT	0.27	0.275	0.214	0.303	1.071	0.503		0.551	0.285
RO	0.57		0.289	0.564	0.936	0.355	0.568	0.286	0.383
SE	0.604	0.172	0.127	0.229	0.412	0.24	0.209	0.204	0.123
SI	0.326	0.171	0.344	0.269		0.164			
SK	0.496	0.272	0.349		0.836	0.348		0.151	0.4
UK	0.508	0.265	0.173	0.292	0.397	0.129	0.248	0.174	0.355

(1) The data for sector G pertain to 2009 (AE could not be calculated for 2010).

Source: Own calculations.

Part II

Economic Activity and Finance: Main
Challenges at the Current Juncture

1. FIRM-LEVEL PRODUCTIVITY AND EXPORTING: DIAGNOSING THE ROLE OF FINANCIAL CONSTRAINTS

1.1. INTRODUCTION

In this chapter, we explore how and why financial indicators affect firm-level total factor productivity and the exporting status of a firm. We address three relevant policy questions: 1) Do financial indicators affect firms' productivity levels?; 2) Do financial indicators affect firms' ability to enter international markets and export?; 3) Have financial supply conditions and domestic aggregate demand during the crisis affected firms' ability to become exporters?

One transmission channel from financing to trade is that in order to export and/or produce abroad, firms often have to incur fixed and sunk costs (distribution networks, information costs, products customization, overseas production facilities etc.). This fixed cost investment accompanying internationalization has to occur even before export revenues can be reaped. But the financing of these costs may exceed a firm's internal financing ability and require external financing.

Academic research has shown that only the most productive firms with a low marginal cost of production can afford to invest in fixed costs of internationalization and become exporters (Melitz, 2003). Internationalization therefore requires high productivity levels at firm-level. This requires an increase in technical efficiency which will spur firm growth and result in larger firm size (Mayer and Ottaviano, 2007).

Firm growth typically requires financial means that exceed the firm's internal ability to generate funds. The literature has typically pointed out that only high productivity ensures the ability of a firm to recoup the fixed cost associated with exporting and to repay the loans undertaken to finance them. Conditioning on productivity levels, firm size may have an additional role to play since a larger firm may have more collateral which ultimately may affect its chances to obtain a loan and may facilitate a firm's access to finance.

However, the need for financing in trade is not just needed to cover fixed costs, but also to finance the ordinary trade transactions. As shown by Antras

and Foley (2011), the most commonly used financing for ordinary trade operations do not involve direct financial intermediation by banks but involve cash in advance. As such we would also expect the financial health of a firm and its cash position to be an important determinant of exporting.

More productive firms seem to rely less on outside bank financing. Earlier literature has shown that more productive firms appear to be in a better financial health and rely less on outside financing (Altomonte et al., 2012). The Altomonte et al. (2012) study also shows that when more productive firms apply for bank financing they are more likely to get it. As such we would expect more productive firms to be less financially constrained. This can be understood as follows. First, a highly productive firm is likely to have better investment projects that yield higher returns than the market interest rate, which is likely to make banks more interested. Second, banks may perceive highly productive firms as lower-risk investments since high productivity signals their past success. As such we expect more productive firms to be in a better position to obtain financing and to engage in exporting. The relationship between financing and productivity may thus run in two ways i.e. from finance conditions to productivity and from productivity to better financing conditions. This is likely to generate some endogeneity issues in the regression analysis which we need to address.

While financial indicators may have a role to play in allowing firms to reach higher productivity levels and to engage in exporting, they are unlikely to be the only factors that matter. In addition to financial conditions, the evolution of domestic aggregate demand is also likely to matter. Both domestic demand as well as shifts in demand in abroad will be controlled for.

To study firm-level productivity and exporting decisions by firms, we use the EFIGE firm-level dataset with survey questions on firms' internationalization activities that was collected by Bruegel and which we have merged with Amadeus balance sheet data, containing all the publicly available firm characteristics over time (2001-

2011). The seven countries included in the EFIGE survey are: Spain, Italy, France, Germany, UK, Austria and Hungary, with around 15,000 firms covered by the survey.

Our methodology consists of a three step approach.

First, we determine the role that financial indicators play in explaining total factor productivity differences of firms across countries.

Second we analyse the role that financial indicators and domestic demand evolutions play as a determinant in firm internationalization (exporting status) whilst controlling for firm productivity. Financial indicators may affect exporting directly, through their effect on firm productivity, or may have additional effects that go beyond their effect on exporting.

And **finally**, we investigate whether the financing conditions during the crisis had a dampening effect on firms' exports or whether domestic demand evolutions played a bigger role.

Our findings can be summarized as follows. Favourable aggregate demand conditions at home positively affect firms' productivity levels.⁽²⁶⁾ Controlling for domestic demand and consumer confidence, firms in our sample have higher productivity levels in countries with higher financial development. Thus, the total factor productivity of firms is positively correlated with credit supply conditions in the home country. Put differently, when a firm operates in a country that has more favourable bank loan supply conditions, the productivity level it can achieve is higher.

In terms of firm-heterogeneity within a country, we find that financial health of a firm is a determinant of high productivity. In other words, under equal macro-conditions of credit supply and demand, financially healthier firms, in terms of lower indebtedness and higher ability to repay interests on loans, have a higher level of productivity. The financial crisis since 2008 has however negatively impacted the within-firm productivity levels of incumbent firms in all

countries in our data. In line with earlier literature, we also find that size is a determinant of high productivity. Thus, larger firms are more productive where we measure size in terms of "number of employees".

In line with Manova (2012) our results show that productivity levels are lower in sectors that operate with a lot of fixed assets, but higher in sectors that rely more on external financing. However, during the crisis, fixed assets (collateral) appear to have been an advantage, since productivity levels of firms with fixed costs experienced a lower downturn than in other sectors. We find no evidence that firms in financially vulnerable sectors, i.e. those that rely more on external financing than other sectors, were particularly hit during the crisis.⁽²⁷⁾

In terms of exporting we base our analysis on a cross-section of firms for which we have information on export market participation. Our results confirm that firm-level productivity is an important direct determinant in explaining participation in export markets, which is in line with the heterogeneous firm literature. But the institutional environment in terms of a country's financial development and the credit supply, only indirectly affect firm-level exporting through the productivity channel. Bank credit supply conditions as a determinant of the export participation of firms, over and above their role through firm productivity, appears to matter little. In addition to firm productivity, we find that firm size is an important direct determinant of exporting. Controlling for firm-productivity, larger firms have a higher probability of exporting.⁽²⁸⁾ We also find that financially healthier firms are more likely to participate in export markets.⁽²⁹⁾

⁽²⁶⁾ We are aware of potential reverse causality issues between productivity and domestic demand, this is why we regress firm-level productivity on an aggregate country-level measure of domestic demand to avoid endogeneity.

⁽²⁷⁾ These results hold both under ordinary least squares (OLS) and instrumental variable regressions, while controlling for country and two-digit sector fixed effects. Inclusion of firm fixed effects and four-digit level sector fixed effects yields the same results but raises the explanatory power of the model.

⁽²⁸⁾ Potential endogeneity between the firm-level variables in the regressions is addressed by including productivity and size from a period prior to the cross-sectional data as well as with two-stage least squares instrumental variable regressions.

⁽²⁹⁾ The results on the firm-level exports equation that we report here are robust to quite a few estimation methods. Results are qualitatively the same when using a probit model (with marginal effects), a linear probability model or

More important to understand the different exporting patterns across countries are demand conditions. Aggregate domestic demand negatively correlates with the probability of firms exporting. Thus, in a country with favourable aggregate domestic demand conditions, firms of similar size and productivity tend to have a lower probability of export market participation than in a country where domestic demand turns weak or is shrinking.

Based on our exporters' analysis, we can obtain "out-of-sample" predictions for the years during the crisis. This allows us to make some tentative inferences about what happened to exporter status after the crisis, even though we do not actually observe it. The fall in firm-level productivity levels observed in all countries during the crisis, negatively impacts the probability of firms to become exporters. However, the probability of exporting appears to be heavily affected by aggregate domestic demand conditions in the country where firms are located. Since domestic demand turned sour after the crisis in most EU countries, the lower domestic demand at home appears to have led to an increase in the probability of exporting for EU firms in the post-crisis years despite their lower productivity levels.

Spain is probably a good example of this phenomenon. By now it is well-known that Spanish export market performance during the crisis went up. In the light of the micro-economic results on firms obtained here, at least a partial explanation can be provided: despite the less favourable credit conditions that applied in Spain after the crisis, the incentive of firms to start exporting more, may well be driven by the collapse of domestic demand in Spain.

While the inverse relationship between aggregate exports of a country and domestic consumption is well-understood in macro-economic terms, to our knowledge this relationship has never been

an instrumental variables regression using a two-stage least square estimation. The latter method better accounts for the potential endogeneity in the firm-level right-hand side variables such as firm-level productivity, size and financial health, all impacting the exporting decision. The endogeneity of the firm-level regressors is confirmed by a Hausman-test and the relevance of the instruments is confirmed by the F-tests.

documented with micro-level data. The advantage of firm-level data is the distinction between *how much* is exported at firm-level (the intensive margin) and *how many* firms are engaging in exporting (the extensive margin). What this study shows is that domestic demand evolutions at country-level significantly affect *how many* firms are exporting. Data limitations prevent us to also study the intensive margin of exporting and will be left for future research.

1.2. DESIGN AND METHODOLOGY

In this section we better explain the design and methodology used in this chapter. Our contribution will not lie in the novelty of the financial indicators that will be used, but instead we will turn to existing studies to guide us in our choice of financial indicators at country and sector-level (Cuerpo, Drumond, Lendvai, Pontuch, Raciborski, 2013). Additionally, due to the highly disaggregate nature of our data, we can also control for firm-level financial indicators, which has not been done before.⁽³⁰⁾

The main purpose of this paper is to see how financing conditions (country-, sector-, firm-level) affect firms' exporting status. Ideally, we would like to go beyond the extensive margin and analyse the effects of credit constraints on the intensive margin of exports i.e. the value of exports, but data limitations at this point do not permit us to do so since at present no EU-wide datasets are available that include firm-level *values* of exports.

In this section we will describe in detail the analysis that we aim to pursue which consists of three steps.

We first study the determinants of firm-level productivity based on time-varying data from 2001 to 2011 and to what extent productivity levels and growth correlate with financial indicators at country-, sector- and firm-level as well as other controls. In view of the large number of macro-indicators that we consider and their potentially overlapping information content, we apply a

⁽³⁰⁾ Our purpose is not to disentangle credit supply from credit demand conditions. Our purpose is to study how macro-economic credit conditions (see appendix for data) affect firm-productivity and firm-level exporting status.

"principal-component" analysis which allows us to substantially reduce the number of explanatory variables to include in the subsequent firm-level productivity and export regressions. Moreover, a principal components approach ensures orthogonality of the main factors when used as regressors.

Next, for a subsample of EU firms with information on their exporting status in a particular year, we study the direct role of financial indicators as a determinant of exporting, whilst controlling for firm-productivity, which in turn may be affected by financial indicators. As such we study the direct and indirect (through productivity) role that credit supply conditions and demand evolutions play in explaining exporting status.

Finally, we use the estimated coefficients arising from our cross-sectional subsample of firms to get "out-of-sample" predictions for the exporting status of firms during the crisis years as a function of the change in financial indicators and domestic demand evolutions in the country where the firm is located during these years. These predictions will allow us to give an indication of how the average "probability to export" at firm-level changed over time.⁽³¹⁾

The different analytics involved in this study are:

- Estimate productivity distributions of firms in different Member States
- Compare productivity distributions before and after the crisis
- Regress total factor productivity on financial indicators of credit supply (see below for a description) and other control variables such as domestic demand
- Estimate an empirical exporters model as a function of productivity, size, financial indicators and other controls
- Make inferences about the propensity to export of firms in the years after the start of the crisis

⁽³¹⁾ The probability of exporting is what the literature refers to as the extensive margin of exporting, since it tells us how many firms are likely to engage in exporting.

1.3. DATA

For this purpose we will use the EFIGE firm-level dataset with survey questions on firms' internationalization activities that was collected by Bruegel, merged with Amadeus data which has all the publicly available firm characteristics over time (2001-2011).

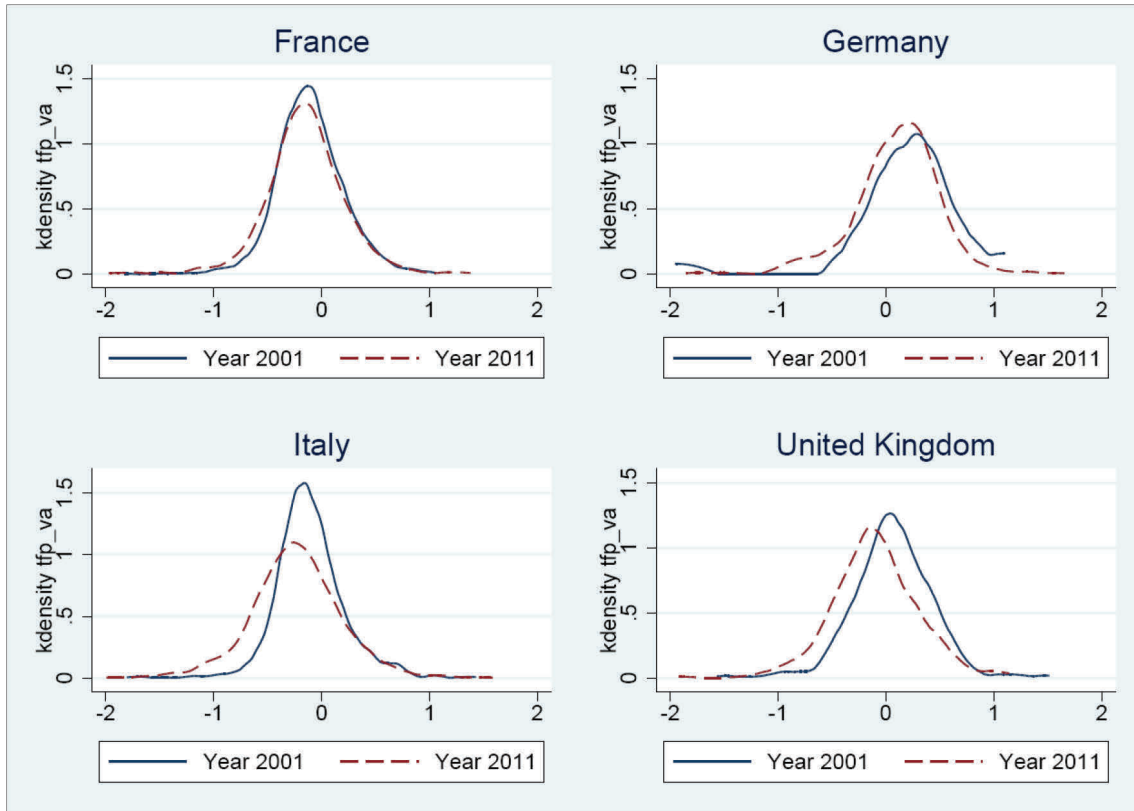
In addition we will use data on financial indicators. Our approach is a combination of the indicators used in earlier studies and additional ones at firm-level. As in previous studies, the challenge is to disentangle credit supply conditions from demand aspects. For this reason we will consider indicators from various sources and at various levels of aggregation.

In view of the large number of financial indicators that exist and the high level of correlation amongst several of them, we apply principal-component analysis. This amounts to generating a single scalar that contains the orthogonal and uncorrelated parts of the various indicators that we want to control for in the regression. This factoring of variables preserves degrees of freedom since it allows for a reduction of the number of independent variables. This will be explained more in detail in the regression section.

Unfortunately we do not have information on the firm-bank relationship as in Amiti and Weinstein (2012) on Japanese firms, nor do we have information on actual export values shipped by firms. Therefore we cannot comment or investigate the intensive margin of firm-level exports, since our data only bear on the export market status of a firm. Also, we do not know whether the firm is a new exporter or a long existing exporter. The cross-sectional information on exporting only gives us an indication of exporting status at a given moment in time, which is clearly a limitation of the analysis.

It is also important to point out that our data cannot account for new entrants in the market. Instead, our data consists of a "balanced" panel of incumbent firms that we follow over time from before the crisis (2001) till after the outbreak of the crisis (2011).

Graph II.1.1: Kernel density distributions of firm-level productivity (in logs)



Source: EFIGE data, BRUEGEL

1.4. DESCRIPTION OF RESULTS

1.4.1. Productivity distributions of firms in different Member States over time

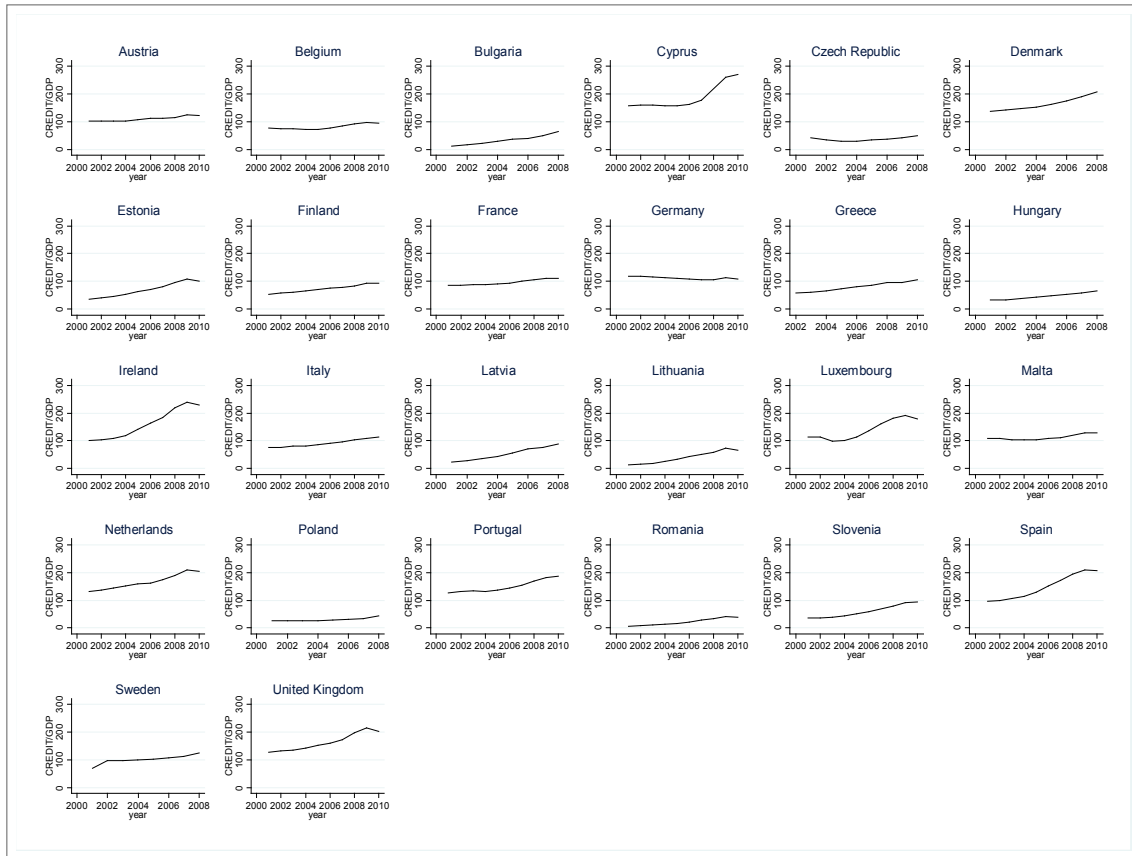
Before we engage in regression analysis, we study the evolution of both the dependent and independent variables that will be used in this process. Thus before we analyse the role of financial indicators on firm-level productivity levels and growth over time, we first document how our dependent variable of interest, i.e. firm productivity, has evolved over time. While there are many different methods around to estimate firm-level productivity, in this study we will be using the method proposed by Levinsohn and Petrin, which was also used in other studies using the EFIGE data (see Appendix B for more on this method).

Graph II.1.1 above shows productivity distributions for the four countries in our data for

which we had sufficient information to compute firm-level total factor productivity (TFP) distributions⁽³²⁾. For all countries we find that after the crisis, the productivity distributions shifted to the left and there are more firms in 2011 with lower levels of productivity than before the crisis in 2001. Also, there appear to be fewer firms with high productivity levels as shown by the shorter right-hand side tail of the dashed lines for most countries. The exception is Germany where the past decade seems to have generated some "winners" i.e. generating a few firms with very high productivity despite the crisis outbreak in 2008. But for the other three EU economies shown here (France, Italy, UK), there are fewer highly productive firms in 2011 than there were in 2001. Our data consists of a "balanced" panel of incumbent firms that we follow over time from before the crisis (2001) till after the outbreak of the crisis (2011). What our data show is that for

⁽³²⁾ Graph II.1.1 shows Kernel density functions of firm-level total factor productivity (in logs).

Graph II.1.2: The ratio of private credit as a share of GDP



Source: WORLD BANK, Beck (2012) data

incumbent firms, the "within"-firm productivity has decreased over time. Put differently, firms that were in the market in 2001 and were still there in 2011, lost productivity.

A simple test on the differences in means of the distributions indeed confirms that for France, Italy and UK, the mean level of productivity in 2011 was significantly lower than in 2001. For Germany we do not find a significant difference in the means of the distribution even though from Graph II.1.1 we can clearly see that even in Germany the distribution is more skewed to the left. The mean for Germany seems not affected because the larger number of low productivity firms in 2011 are offset by a small number of highly productive firms that pull up the mean value, leaving it largely unchanged. But the equal average hides the fact that many firms' productivity dropped, also in Germany.

The negative impact of the crisis on total factor productivity (TFP) levels is confirmed when regressing firm-level TFP on a crisis-dummy and country dummies, as we do in Table II.1.1 below. Results for the effect of the crisis on average productivity of incumbent firms are shown in the first column of Table II.1.1.

The negative and significant sign confirms the reduction in productivity. This is a remarkable fact, since typically the productivity of firms should be going up over time and its distribution if anything would be expected to shift to the right. The remainder of this paper will next ask itself, whether this reduction in productivity levels is the result of the financial crisis and of a change in the financial indicators that go along with it, or whether other evolutions coinciding with the financial crisis were more important.

1.4.2. Country-level financial indicators

In line with the study by Cuerpo et al. (2013), we consider the evolution of fifteen different country-level macro financial indicators (listed in Appendix A) before and after the crisis consisting of series from the European Commission, the Bank Lending Survey, the SAFE dataset and the INDICSER data. The country-level variables we consider as potential controls for our regressions later on are the following:

Financial indicators of domestic credit supply conditions:

- 1) Ratio of private bank credit over GDP (World Bank data, Beck (2012) from 2001-2010)⁽³³⁾
- 2) Return on equity of banks (INDICSER, 2001-2011)
- 3) Non-performing loans of banks (INDICSER, 2001-2011)
- 4) Exposure of banks to foreign high risk claims notably to Greece, Portugal and Ireland as a percentage of total bank assets (INDICSER 2001-2011)
- 5) Banking concentration defined as the assets of the three largest banks of a country as a share of the assets of all the commercial banks (World Bank, Beck (2012) from 2001-2010)
- 6) Banks tightening of standards for obtaining credit by firms (Bank Lending Survey, 2003-2013)⁽³⁴⁾

Financial indicators of domestic demand conditions:⁽³⁵⁾

7) Consumer sentiment indicator by country and year (European Commission)

8) Economic sentiment indicator by country and year (European Commission)

9) Unemployment rate by country by country and year (European Commission)

10) Demand for loans by Entreprises (Bank Lending Survey, 2003-2013)⁽³⁶⁾

The first variable (credit/GDP) is what Manova (2012) interprets as the "level of financial development" of a country, i.e. whether a country has a developed financial system, measured by the extent to which credit flows to the private sector. A look at Graph II.1.2 suggests that the evolution of this ratio is quite heterogeneous across EU countries. Although it seems to suggest that ever since the crisis, in most countries, this ratio has not gone down. This is already an important observation to note, i.e. that during the crisis years, especially the later ones, the stock of available credit continued to grow. However, the rate at which the credit stock increased was decreasing over time during the crisis.⁽³⁷⁾

1.4.2.1. Regressing financial indicators on crisis dummy

When regressing credit over GDP (credit/gdp) on a crisis dummy taking a value of "1" in post-crisis years and a value "0" in pre-crisis years and including country-dummies indeed suggests that the ratio of credit over GDP is significantly higher in post-crisis years. This can be seen from the sign and significance of the coefficient on the crisis dummy reported in column 2 of Table II.1.1. The same positive trend arises when we clean the ratio

⁽³³⁾ This ratio is defined as (credit given to the private sector deflated by the CPI / GDP deflated by CPI). In our analysis we do not want this number to be affected by the movement in the underlying GDP series of the denominator. For this reason, we multiply this ratio by the "GDP deflated by CPI", to just get the private credit evolution over time. In order to make this number comparable across countries we then consider the percentage variation in the private credit variable over time.

⁽³⁴⁾ The BLS survey is incomplete since responses to questions are available only for some countries and for some years and the coverage for EFIGE countries is not good which is why we had to drop this variable from the analysis later on.

⁽³⁵⁾ The inclusion of domestic GDP as an additional control for aggregate country-level demand evolutions does not affect our results.

⁽³⁶⁾ Again the coverage of this question for EFIGE countries is not good which is why we had to drop this variable from the analysis later on.

⁽³⁷⁾ We have no information on other sources of financing via the capital markets that may be available for some firms such as the issuing of shares or bonds, so our credit supply only captures bank financing. However, evidence in EFIGE shows that, with the exception of UK firms, a very small minority of firms in Europe uses capital market instruments, with the prevailing (>80%, and >90% in some countries) of firms turning to banks for financing.

Table II.1.1: Regressing financial indicators on crisis dummy

Dependent variable	Crisis-dummy is "1" after 2008 and "0" before	Country-dummies	Observations	R- squared
	(1)	(2)	(3)	(4)
1) Credit/gdp	36.677***	YES	242	0.91
Credit (in logs)	0.536***	YES	242	0.817
Δ ln Credit	-0.006***	YES	213	0.582
2) Exposure to Foreign risk (in logs)	0.393**	YES	54	0.868
3) Bank concentration	-2.354*	YES	257	0.881
4) Return on Equity for banks	-10.471***	YES	323	0.301
5) Banks Tightened (%) (standards for obtaining credit)	7.039	YES	24	0.322
6) Non-performing Loans of banks	1.916***	YES	72	0.565
7) Consumer sentiment	-10.579***	YES	88	0.709
8) Economic sentiment	-10.190***	YES	88	0.365
9) Unemployment rate	2.170***	YES	88	0.617

Source: See Appendix A for data sources

from the movement in GDP (as explained in footnote 33), which is reported in the second row of Table II.1.1 (ln Credit). As such we conclude that the average "stock" of credit in Europe has not gone down after the crisis, although country heterogeneity is substantial as shown in Graph II.1.2.

Next, in Table II.1.1 we also consider the "change in credit" ($\Delta \ln \text{Credit}$). A regression on a crisis dummy with value 1 for post-crisis years now shows that this has gone down. As such we can conclude that the average "flow" of credit in Europe has decreased during the crisis. However, from the observed reduction in loans, we cannot conclude whether this is a demand- or a supply-driven phenomenon. Whether this is a reflection of banks reducing the credit they allow to flow to firms, or whether it reflects the fact that firms apply less for credit due to weak demand and lower investment opportunities is not so clear. A recent study for Belgium (Van Hulle et al., 2012) has shown that banks' ratio of loans to total assets remains very stable over time even during the crisis, suggesting that banks did not reduce their credit supply. About 75% of credit demand is from

SME firms and another 25% from large firms. Especially SME firms seem to have reduced their demand for credit from banks during the crisis. This suggests that lower credit to firms was a demand side phenomenon. A recent study by the ECB however showed that for the Eurozone area as a whole, revealed a difference between the "north" and the "south" of Europe. While credit during the crisis continued to grow in the northern countries, it turned negative in the southern ones. The ECB singles out the "lack of demand" of SMEs as the main reason for lower credit to firms. But at the same time there seems to be stricter banking scrutiny of loan demands from SMEs.⁽³⁸⁾ Our findings reported in Table II.1.1 involve averages across EU countries and seem to confirm the ECB's findings.

Table II.1.1 summarizes the results of similar regressions for the macro-series above where we regress the relevant series both on a crisis-dummy and country-dummies. In these regressions we include all EU countries. A first and tentative conclusion can be drawn. According to Table

⁽³⁸⁾ This study was discussed in the financial press (De Tijd, 27/09/2013).

II.1.1, the crisis seems to have negatively affected banks' profitability in terms of their return-on-equity. This resulted in breakups of banks in the banking sector which decreased market concentration. The amount of credit that flowed to the private sector has remained on a growing path as a share of GDP. This is already a first indication that the reduction in average productivity levels of incumbent firms that we find is unlikely to be solely caused by a reduction in the supply conditions of credit. The average stock of credit available economy-wide seems to have gone up rather than down in crisis years. We assess more correctly the importance of financial indicators in explaining productivity levels of firms in subsequent sections.

The results for the other macro-indicators and their evolution during the crisis are also listed in Table II.1.1. It can be noted that non-performing loans in banks have gone up, as well as banks' exposure to foreign high risk claims in vulnerable EU countries. The survey results also indicate that banks have tightened their credit standards during the crisis years and that the demand for loans by firms has gone down.

Furthermore, we can see that consumer sentiment and economic sentiment in general have decreased significantly after 2008 and that the average unemployment rate has gone up.

There are however a number of important limitations to this data. First, the Bank Lending Survey (BLS) covers only four countries present in the EFIGE survey (Germany, Italy, Spain and Austria). The questions from the survey that we are interested in such as the "number of loans to enterprises" are only covered for the period 2007-2011. The SAFE data covers even a more limited number of years. The incorporation of these short time series from BLS and SAFE in our regressions reduces the number of observations substantially and renders the estimations unstable. Therefore we decided to reduce the number of country-level variables to the remaining eight series for which we have a longer time-span and a wider country-coverage available.

1.4.2.2. Principal component analysis on the macro-economic indicators

Instead of including all the macro-economic indicators as explanatory variables into our empirical regression model on productivity and exporting status, we prefer to first apply the technique of factoring, synonym for a principal component analysis. Factoring aims to reduce the number of variables in a regression analysis whenever these variables are highly correlated and involve overlapping information content. With factoring, we reduce the number of relevant variables to include in the regression while still keeping the non-overlapping content (the principal components) of the underlying variables. When we apply factoring on our macro-economic data series of indicators, two principal components emerge: one "supply" group of financial indicators and another consisting of a "demand" group of indicators.

These two principal components can then be used as explanatory variables in our regression framework to see to what extent financial indicators contribute to the explanation in the change of firm-level total factor productivity.

The first principal component captures the information content in the first six macro series listed above starting with the *credit/GDP ratio* and involving variables related to the *banking sector*. These variables all clearly belong more to the supply-side aspects of credit allocation. The interpretation of this composite variable is thus that the higher it is, the more favourable credit conditions are (credit-**supply** variable).

The second principal component points at overlapping information content in the consumer and economic sentiment as well as unemployment conditions at country-level. The first two variables (consumer and economic sentiment) vary positively with the principal component, while unemployment varies negatively with this composite variable. This second principal component can be thought of as capturing domestic demand-side aspects. In other words, the stronger the consumer confidence and the lower the unemployment rate, the stronger the domestic demand in a country (**demand**). In subsequent sections we additionally consider the firm-level financial indicators such as collateral, indebtedness and interest repayability indicators. Again we will factor these variables in order to obtain one principal component to insert as an additional

independent variable in the regression, to which we refer as financial health at firm-level (**financial health** variable).

1.4.3. Sector-level indicators

A recent paper by Manova (2012) has pointed out the importance of additional variables that may impact firms' access to finance. A first one is the "asset tangability" and a second one is the "financial vulnerability". The first variable captures the extent to which a firm operates with fixed tangible assets and the second one captures the extent to which a firm relies on outside capital for its investment. Both variables are defined at sector-level and averaged over time to avoid endogeneity issues in our firm-level regressions. We obtain the first variable from Amadeus and the second one from Manova (2012).

1.4.4. Firm-level financial indicators

Firm-level financial variables are likely to be correlated with a firm's productivity level and as such affect its exporting status. For this reason we consider firm-level indebtedness and interest repayability conditions as well as an often used index of financial health i.e. the Whited-Wu index (2006). The definitions of the variables can be found in Appendix A.

When factoring the firm-level financial variables we obtain one principal component to insert as an independent variable in the regression, which we refer to as **financial health**. To reduce the endogeneity, in the OLS regressions we lag the financial health factor by two years. For robustness we also engage in an instrumental variable, two stage least squares regression where we instrument all firm-level variables with lagged values.

1.4.5. Regressing financial indicators on firm-level productivity

In this section we describe the regression results of a panel regression where the dependent variable is the log of firm-level total factor productivity (obtained by using the methodology of Levinsohn and Petrin) between 2001-2011. We will also point out some limitations in the research design and data that should be taken into account when interpreting the results.

The results are reported in Table II.1.2. In that table we build the model step by step. The first column shows the sign and significance of a crisis dummy on TFP levels whilst at the same time controlling for country- and sector-level dummies in the regression. The crisis dummy confirms the results of Graph II.1.1, i.e. average productivity levels of firms dropped during the crisis. This is a robust result which is independent of the specification.

A first set of independent variables are credit supply conditions which vary across countries and over time (as illustrated by Graph II.1.2). They appear to be an important determinant to explain varying productivity levels per country. The results in Table II.1.2 suggest that when financial development of a country is stronger and credit supply conditions in an economy are more favourable, this results in higher average productivity levels of firms.

A second set of independent variables consist of aggregate domestic demand conditions which also vary by country and by year in our data. The stronger the domestic demand in a country, the higher the average productivity of firms in that country.

Both the credit supply variable and the domestic demand variable are aggregate variables defined at country-level, thus there is little potential for endogeneity to plague the results. Still, changes in the aggregate environment may affect firm productivity only with a lag. To allow for this delayed effect, in the regressions we include the demand and supply variables with a time lag, but even in the absence of such a lag, results are quite similar.

In order to verify whether demand abroad has an effect on domestic firm productivity we also include a time varying measure of EU GDP. This variable appears to have a positive and significant (or marginally significant effect) on firm-level productivity.

As third set of independent variables consist of firm-level controls such as firms' financial health. This time-varying variable appears to be positively correlated with firm productivity, i.e. financially healthier firms (lower indebtedness and higher cash flow) also appear to be more productive. An

additional firm-level control variable in the regression is the level of employment in the firm. This variable controls for firm size and is arguably a better one than sales, since sales may not just be driven by size but higher sales may stem from higher prices instead of larger volume. With the firm-level regressors we face a potentially serious endogeneity problem since financial health and employment are just like productivity observed at firm-level. We address this in several ways. In the OLS regressions, we start by lagging the two firm-level variables in order to avoid spurious correlation with productivity. But this may arguably not be sufficient to fully address the endogeneity issue since firm-level variables can be persistent over time. As a further test of our results, we run instrumental variable regressions where we instrument the endogenous firm-level variables with one and two period lags and the values in 2001 which is a year prior to the data analysis used in the regressions. The results of the IV-regression two-stage least squares are reported in column (7) of Table II.1.2. What is re-assuring is that the coefficients and significance of the firm-level variables and others do not change much, confirming that the environment in which the firm operates (i.e. country-level supply and demand conditions) matter for productivity of firms, as well as its size and financial health. While lagged values are not always the best instruments to use, in our case the first stage F-tests of the IV-regression confirm the relevance of our instruments and the Hansen J-test confirms the exogeneity of the instruments used.⁽³⁹⁾ This suggests that using the lagged values as instruments here is not too bad an approach.

In the regression we also follow Manova (2012) by including interaction terms between credit conditions and asset tangibility, where we define the latter at sector-level and averaged over time to avoid endogeneity. This interaction is telling us that average productivity levels are substantially lower in sectors that intensively use fixed tangible assets.

⁽³⁹⁾ A first stage F-test above 10 is considered to be an indication that instruments are relevant and as such correlate sufficiently with the endogenous variables. A p-value above 10 % is considered to indicate that instruments are sufficiently exogenous and do not correlate with the error terms.

When allowing for a double interaction with the crisis dummy, it becomes clear that while high collateral sectors have lower productivity levels, this effect was reduced during the crisis. This seems to suggest that when bank financing becomes more tight and selection criteria are stricter (Table II.1.2) that collateral may actually help firms to overcome stricter selection rules when applying for credit. A second interaction introduced by Manova (2012) is one between the financial credit supply conditions of a country and reliance on external capital to finance activities. This vulnerability to external capital is again defined at sector level to avoid endogeneity. The information on sector vulnerability is a cross-sectional variable without time variation. The interaction "credit supply x vulnerable sectors" shows a positive and significant result suggesting that especially for firms that rely more on outside financing, the availability of credit supply is important to allow them to reach higher productivity.⁽⁴⁰⁾ When taking a double interaction with the crisis dummy, we observe that vulnerable sectors were not more than other sectors negatively affected by the crisis, which is re-assuring. The results obtained here by and large confirm the results of Manova obtained on US firms. It can be noted that because the asset tangibility (collateral) and external financial dependence (vulnerability of a sector) are non-time varying variables, we can only include them in the interaction terms but not separately in the regressions, since they would drop out as we also include sector-level fixed effects.

Most regressions are run with country fixed effects and sector fixed effects which control for all omitted variables in the model that vary at country and sector level (but not over time).

The value of the coefficient on the crisis dummy is about the same in the first four columns but seems to increase in the last three columns of Table II.1.2. The simple explanation for this is that from column (5) in addition to including the crisis dummy separately we also include the crisis dummy in interaction terms. As such, the coefficients on the separate crisis dummy cannot simply be compared between the regressions without and with interaction terms. Without

⁽⁴⁰⁾ This result for firm-level data also applies when using industry-level data as in Chapter 3 in part II in this volume.

interaction terms, the crisis dummy coefficient reflects an average effect across all firms, sectors and countries. With the interaction terms, the crisis dummy coefficient represents an average effect for firms that belong to a certain group i.e. the firms that remain when the interaction terms are zero.⁽⁴¹⁾

When instead of sector fixed effects we include firm-level fixed effects as we do in column (6) of Table II.1.2, the overall variability explained by the model goes up but results on individual variables remain qualitatively the same. When we include the firm fixed effects we leave out the firm-level variables financial health and size which are likely to be correlated with the firm dummies and their time variation is likely to explain little additional variance. The goodness-of-fit of the model is not very high, which is typically the case when using firm-level variables. The best fit is obtained with firm fixed effects resulting in an R-squared of 68 %.

1.4.6. Regressing macro-level financial indicators on firm-level exporting status

The results of the cross-sectional exporters regression are reported in Table II.1.3. EFIGE data hold survey information about a firm's exporting status in the year 2008. Thus, we will first estimate the model as a cross-sectional regression based on one year, and then use the obtained regression coefficients to make out-of-sample predictions about the likelihood of exporting of firms in earlier and subsequent years. This is possible since the regressors that we are including in the cross-sectional exporters model are time varying (covering the 2001-2011 period).

In line with the literature we expect exporting to be driven by firm-level productivity and size. Indeed when including both productivity, employment, financial health and age as explanatory variables we see that their sign is positive and that they are very significant in any specification that we present in Table II.1.3. In the probit regressions we include these firm-level regressors of the year 2005 (i.e. preceding the year in which we have information on export status by three years) to

avoid endogeneity. Results show that the probability to export rises when firm productivity increases, when firms are older, larger and more financially healthy. These results are confirmed in an IV regression in which we instrument all the firm-level regressors with their lagged values in 2005 and 2001. First stage F-statistics suggest that instruments are relevant and the Hansen J-statistic confirms the exogeneity of the instruments.

The fact that financial health at firm-level is important to explain exporting status of a firm corresponds with the findings of Antras and Foley (2011), who show that especially in "civil law" countries, a cash advance is very common in trade contracts. Here we find that a good cash position is important to explain the exporting status and since we know from EFIGE that exporting firms are also often importing firms, the cash position of a firm appears to be an important element to facilitate trade both on the importing and exporting side.

A surprising but robust result that we find is that credit supply conditions have little direct impact on the exporting decision of firms. In other words, the financial environment at country-level in which the firm operates does not seem crucial for its exporting decision. The exporting decision seems to depend much more on the firm's own conditions such as how productive it is, its size and financial condition. Thus, while the credit supply environment appeared an important determinant for average firm-level productivity (as shown in Table II.1.2), and as such affects the export participation decision indirectly, this no longer is the case when directly including it in the export equation. This suggests that bank financing is critical for a firm to achieve a certain productivity level. The absence of sufficient financing can potentially act as an impediment to growth. But financing appears less of an obstacle whenever a firm wants to take its activities to a next level by engaging in exporting. Thus the firm appears less dependent on the country-level institutional environment in terms of financial development and credit supply once a firm has reached a sufficiently high productivity level.

These results need not be in contrast with earlier findings in the literature. Currently, there is a growing literature on the link between financing and trade and results highly depend on the specific research question. For example, Amiti and

⁽⁴¹⁾ The interpretation of the coefficient on the crisis dummy in the presence of interaction terms also using the crisis dummy is not straightforward and lies outside our interest here.

Weinstein (2012) find that a decline in the financial health of a firm's bank is associated with a decrease in its exports. But Levchenko et al. (2010) find that financial considerations play no role in understanding trade flows during the crisis. These studies differ in two important aspects from ours. Amiti and Weinstein (2012) use data on firm-bank specific relationships over time, which we do not have here. Our measure of credit supply is a much more aggregate one and refers more to the "country-level" financial conditions that a firm is operating in. Second, and more importantly, this earlier study investigated the intensive margin of exports over time, while in our study we consider the export market participation in a cross-section. The research question is therefore very different. In earlier studies the question was whether, *amongst exporting firms*, the ability to increase export market shipments depends on the health of the bank in the firm-bank relationship, thus comparing exporting firms with other exporting firms but with varying degrees of their individual banking health during the crisis. In this chapter, the research question is about *exporting firms to non-exporting firms*, and to see to what extent country-level credit conditions and institutions can explain the number of exporting firms in each country. There we come to the conclusion that, controlling for the productivity of firms (and for the effect credit supply has on productivity), the average health of the country-level banking sector does not directly impact the number of exporters much. Clearly, more research is needed to straighten out better and summarize the different results depending on the research question and data at hand. Future research on the intensive margin of exports during the crisis would therefore be complementary to this study.

While we would like to include a measure of demand abroad, by including the log of EU GDP, we cannot do this in our cross-section since this variable would not vary over EU firms and would drop out in the regression.

A very different (and robust) result is obtained when considering the importance of domestic demand. All the regressions appear to suggest that domestic demand is crucial in explaining the export participation decision. Surprisingly, the relationship is a negative one which can only be understood as the result of crowding-out. Put differently, in the event of a downturn in domestic

demand, firms are more likely to engage in exporting. But when domestic demand is strong at home, the export probability of firms appears to go down. In fact this result is quite intuitive in the light of the observation that countries with large domestic markets typically have less exporters. Indeed whether firms have an incentive to engage in exporting or not, appears to be largely driven by country-level domestic market conditions.⁽⁴²⁾

The coefficients of the IV-regression model in column (6) can now be used to generate out-of-sample predictions about the probability of exporting. We have information for all the regressors between 2001-2010. Thus by multiplying the regression coefficients from the model in (6) with these time-varying variables, we can obtain predicted probabilities of exporting. We limit this exercise that we perform here to verifying whether the average probability of exporting in years before 2008 is lower or higher than the average probability of exporting in years after 2008 (where we do not include 2008 itself). Subsequently we run a t-test on the difference of means to establish whether average exporting probabilities have gone significantly up or down.

There are several opposing forces at work in the model. First, we see that the evolution of firm productivity as displayed in Graph II.1.1 has gone down which results in a lower probability of exporting after 2008. However, this is offset by the fact that domestic demand and consumer sentiment in Europe on average decreased substantially after 2008, which induced firms to try and expand their sales by selling abroad. This downturn of domestic demand has had an upward effect on the probability to export that offsets the reduction in average firm productivity, ultimately rendering the probability to export for EU firms in our sample higher than before the crisis.

1.5. DISCUSSION OF RESULTS

In this section, we focus on the interpretation of results in light of other results obtained in the

⁽⁴²⁾ This complements the European Competitiveness Report, 2012, which states that the *amount of exports* (how much) depend on demand conditions abroad, whereas here we find that based on micro-level data, firms' incentive to *participate in export market* (exporting or not) relies on country-level domestic demand evolutions.

Table II.1.2: Productivity levels of EFIGE firms (TFP- Levinsohn-Petrin) and financial conditions

Dependent: ln TFP, ft	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ols	ols	ols	ols	ols	ols	ivregress
crisis_dummy,c	-0.085*** (23.77)	-0.06*** (13.85)	-0.07*** (16.82)	-0.06*** (8.32)	-.16*** (8.32)	-0.20*** (13.34)	-.18*** (9.25)
credit_supply,ct-1 (factor)		0.02*** (6.32)	0.009** (1.96)	0.05*** (14.02)	.07*** (4.59)	0.044*** (4.65)	.03*** (2.46)
domestic_demand,ct-1 (factor)		.018*** (7.01)	0.027*** (8.21)	0.03*** (10.13)	0.05*** (5.81)	0.03*** (6.28)	.04*** (6.18)
ln EU gdp,t-2			.068*** (8.09)	0.02 (1.51)	0.05* (1.83)	0.68*** (3.09)	0.16*** (6.12)
financial_health,ft-2 (factor)				0.09*** (43.20)	.10*** (21.3)		0.10*** (16.49)
lnEmploy,ft-1				0.11*** (38.20)	0.10*** (12.50)		.12*** (12.50)
credit_supply, ct x Collateral, s					-8.07*** (9.17)	-5.24*** (9.01)	-6.70*** (8.20)
credit_supply, ct x Collateral, s x crisis_dum					1.22*** (2.56)	1.40*** (3.09)	0.84* (1.74)
credit_supply, ct x Vulnerable, s					5.3*** (7.42)	5.74*** (10.05)	4.5*** (6.14)
credit_supply, ct x Vulnerable, s x crisis_dum					0.39 (1.38)	0.47* (1.86)	.55* (1.91)
Constant	0.09 (1.30)	0.09 (1.32)	-2.01*** (4.7)	-1.49* (1.97)	-1.81* (1.87)		-5.4*** (6.01)
cluster on firm identifier	YES	YES	YES	YES	YES	YES	YES
country dummies	YES	YES	YES	YES	YES	YES	YES
sector dummies (2 digit)	YES	YES	YES	YES	YES		YES
sector dummies (4 digit)						YES	
firm FE						YES	
observations	80 508	53 148	53 148	24 621	18 026	38 201	14 026
R-squared	0.08	0.08	0.08	0.26	0.28	0.68	0.26
Hansen J test of Identification							p=0.51
First stage F-test for instruments							
lnemp							835
financial_health							391

(1) t-values between brackets. *** significance at 1 percent; ** at 5 percent; * at 10 percent. Subscript f:firm; s:sector; c:country; t:time. In (7) lnemp and financial_health were instrumented with t-1 and t-2 values as well as with 2001 values

Source: See Appendix A for data sources

literature. We discuss those results that confirm earlier studies, but focus even more on the results that are new to the literature and that could be relevant for policy.

Our findings suggest that for firms to reach a high productivity level and to grow, the financial conditions that surround them are quite important. Thus, there is a role for the institutional framework here since we clearly see that in countries with highly developed financial systems and favourable credit supply conditions, firms do better in terms of average productivity levels, especially in sectors that heavily rely on outside capital.

This can be interpreted in the following way. When a country has a well-functioning banking sector with high returns-on-investments and with few non-performing loans, this is a necessary condition for firms to become more competitive and productive. A well-functioning banking sector

is more likely to recognize viable business projects and spot firms that are likely to pay back their loans. This is likely to result in more credit to "good" firms and less credit to "bad" firms, which will allow good firms to grow faster and average productivity to be higher than in countries where banks are less equipped to distinguish between firms. Our finding that domestic country-level credit conditions matter for productivity and growth also suggests that firms initially turn to local banks and seek financing nearby which makes them vulnerable to the local credit conditions.

However, when it comes to the exporting decision, our findings show that country-level credit supply conditions and the quality of the financial sector appears to play a much smaller direct role in affecting exporting decisions. A prerequisite for exporting thus appears to be a high productivity level, sufficient size and a good financial

Table II.1.3: Cross-section exporters probability of EFIGE firms (TFP- Levinsohn-Petrin) and financial conditions

Dependent: Prob (Exp=1) in year 2008	(1)	(2)	(3)	(4)	(5)	(6)
	probit	probit	probit	probit	probit	IV regres
lnTFP_2005, <i>f</i>	.173*** (21.30)	.073*** (8.30)	.066*** (7.35)	0.08*** (7.95)	.083*** (4.98)	.084*** (3.12)
lnEmployment_2005, <i>f</i>		.143*** (37.26)	.132*** (34.57)	.13*** (30.68)	.10*** (15.47)	.10*** (12.14)
lnage, <i>f</i>			.092*** (17.58)	.096*** (13.52)	.10*** (10.23)	.10*** (10.66)
credit_supply, <i>c</i> (factor)				.017 (0.79)	.011 (0.37)	.026 (0.83)
domestic_demand, <i>c</i> (factor)				-.107*** (9.97)	-.113*** (7.57)	-.111*** (15.91)
financial_health_2005, <i>f</i> (factor)					.022*** (4.39)	.024*** (4.17)
country dummies	YES	YES	YES	YES	YES	YES
sector dummies (2 digit)	YES	YES	YES	YES	YES	YES
sector dummies (4 digit)						
observations	26 464	26 464	26 464	22 000	12 030	7450
R-pseudo	0.1	0.14	0.15	0.18	0.15	
R-squared						0.2
Log LR chi 2 (29)	3832.56	5337.32	5626.84	4967	2454	
LL-Ratio	-16419	-15667.24	-15494	-12762	-7099	
Wald chi2 (30)						3572
Durbin_Wu Hausman test						p=0.0006
first stage F-tests lnTFP						350
first stage F-tests lnEmployment						1926
first stage F-tests financial health						261
Hansen J-test for underidentification						p=1.789

(1) t-values between brackets. *** significance at 1 percent; ** at 5 percent; * at 10 percent. In (6) we instrument lnTFP, lnEmployment, financial_health in 2008 with their values in 2005 and 2001

Source: See Appendix A for data sources

condition, but exporting relies much less on domestic country-level credit supply conditions. When firms reach high productivity and sufficiently large size, they appear to become much less reliant on local credit conditions which may point at the fact that this is no longer an impediment to their plans of selling abroad. The finding that older firms have a higher chance of export market participation also suggests that exporting is often a strategy that firms engage in later in their life.

Thus, we can tentatively conclude from this study that local financing conditions predominantly seem to matter in the early stages of a firm's life i.e. when the firm needs financing to grow and to become more productive. It is in this phase that firms are most vulnerable and most affected by the credit conditions set locally. Later in their life, when they have become sufficiently strong, local

credit conditions act much less as an impediment to further develop their activities.

Local demand conditions appear critical to explain export market participation. The relationship is a negative one. During a downturn of the domestic market, firms are more likely to be exporters than in booming domestic markets. Put differently, when there is a domestic market loss and firms can no longer sell as much locally, this raises their probability of engaging in exporting, while in demand booms they are more likely to sell at home.

This new result can also shed an interesting view on the current account. Typically a current account surplus is associated with competitive countries and productive firms, but what our firm-level results are showing is that it can also be a reflection of a shrinking domestic demand.

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ANNEX 1

Appendix A: Data & data sources

Table II.A1.1: **Country-level Macro Series**

Supply side	Source
<ul style="list-style-type: none"> • Non-performing loans 	INDICSER (2001-2011)
<ul style="list-style-type: none"> • Exposure of banks to foreign high risk claims to assets issued by Greece, Ireland and Portugal as a percentage of total bank assets 	INDICSER (2001-2011)
<ul style="list-style-type: none"> • Loans to enterprises 	Bank Lending Survey (2007-2011)
<ul style="list-style-type: none"> • Net percentage of banks that tightened their credit standards 	Bank Lending Survey (2007-2011)
<ul style="list-style-type: none"> • Loan applications success/failure 	SAFE dataset (2009-2012)
<ul style="list-style-type: none"> • Return on equity of banks 	Bankscope data (2001-2012)
<ul style="list-style-type: none"> • Credit/GDP ratio, i.e. "private credit by deposit money bank as a share of GDP"[1] 	World Bank data, Beck (2012) for 2001-2010
<ul style="list-style-type: none"> • Bank concentration in a country, i.e. "assets of the three largest banks of a country as a share of assets of all commercial banks of that country" 	Beck (2012) for 2001-2010
Demand side	
<ul style="list-style-type: none"> • Consumer confidence indicator 	European Commission (2003-2013)
<ul style="list-style-type: none"> • Economic sentiment indicator 	European Commission (2003-2013)
<ul style="list-style-type: none"> • Unemployment rate 	Eurostat (2001-2013)
<ul style="list-style-type: none"> • Changes in demand for loans to enterprises 	Bank Lending Survey (2003-2013)

Source: Indicated in the second column

Table II.A1.2: **Sector-level**

Data	Source
Asset tangibility of sector i.e. tangible fixed assets as a share of total firm assets	EFIGE data merged with AMADEUS
Financial vulnerability i.e. share of capital expenditure of firms not financed with cash flows from operations	Manova (2012)

Source: Indicated in the second column

Table II.A1.3: **Firm-level**

Data	Source
Indebtedness, i.e. non-current liabilities/total assets	EFIGE data merged with Amadeus
Cash flow	EFIGE data merged with Amadeus
Interest repayment ability, i.e. cash flow/interest paid	EFIGE data merged with Amadeus
Age	EFIGE data merged with Amadeus
Sales	EFIGE data merged with Amadeus
Crisis dummy	Assuming a value of "1" in years from 2008 onwards

Source: Indicated in the second column

Box II.A1.1: Appendix B: Total Factor Productivity method of Levinsohn and Petrin (2004)

Assume a Cobb-Douglas production function of the form:

$$y_t = \beta_0 + \beta_l l_t + \beta_k k_t + \beta_m m_t + \omega_t + \eta_t$$

and let y_t be the log of a specific firm's output. In our production function:

- l_t and m_t denote the labour and intermediate inputs in log terms (freely available), respectively

- k_t is the logarithm of the state variable capital

- η_t is the component of the error term uncorrelated with input choices

- ω_t is the component of the error term representing a productivity shock unobserved by the econometrician, but observed by the firm.

The reason why a simple OLS estimation cannot be used in order to estimate the production function is that the firm adapts its input choice as soon as it observes ω_t , therefore inputs turn out to be correlated with the error term of the regression, yielding to inconsistent OLS estimation as far as production functions are concerned.

Levinsohn and Petrin (2004) (LP) propose a correction for this issue. Assuming the demand for intermediate inputs m_t (e.g. material costs) to depend on the firm's capital k_t and productivity ω_t , the authors show that the same demand is monotonically increasing in ω_t . This allows to express the ω_t in terms of capital and intermediate inputs, in other words, we can write $\omega_t = \omega_t(k_t; m_t)$, where remind that ω_t is unobserved while k_t and m_t are observable.

In order to identify ω_t , LP follow Olley and Pakes and assume ω_t to follow a Markov process of the form $\omega_t = E[\omega_t | \omega_{t-1}] + \epsilon_t$, where ϵ_t represents the change in productivity uncorrelated with k_t . This assumption makes it possible to rewrite the production function as:

$$y_t = \beta_l l_t + \phi(k_t; m_t) + \eta_t$$

Where $\phi(k_t; m_t) = \beta_0 + \beta_k k_t + \beta_m m_t + \omega_t(k_t; m_t)$.

Substituting a third-order polynomial approximation in k_t and m_t in place of $\omega_t(k_t; m_t)$, LP show that it is possible to consistently estimate the parameter $\widehat{\phi}_t$ and $\widehat{\beta}_l$ in the equation above.

(Continued on the next page)

Box (continued)

For any candidate value β_k^* and β_m^* one can then compute a prediction for ω_t for all periods t , since $\widehat{\omega}_t = \widehat{\phi}_t - \beta_k^* k_t - \beta_m^* m_t$ and hence, using these predicted values, estimate $E[\omega_t | \omega_{t-1}]$. It then follows that the residual generated by β_k^* and β_m^* with respect to y_t can be written as:

$$\eta_t + \epsilon_t = y_t - \widehat{\beta}_l l_t - \beta_k^* k_t - \beta_m^* m_t - E[\omega_t | \omega_{t-1}]$$

The equation above can be used to identify β_k^* and β_m^* using two instruments:

- assuming that the capital stock k_t is determined by the previous period's investment decision, it then does not respond to shocks to productivity at time t and hence $E[\eta_t + \epsilon_t | k_t] = 0$;
- assuming the last period's level of intermediate input m_t to be uncorrelated with the error term at time t (which is plausible, e.g. proxying intermediate inputs with material costs), then $E[\eta_t + \epsilon_t | m_{t-1}] = 0$.

Through these two moment conditions, it is then possible to write a consistent and unbiased estimation for β_k^* and β_m^* by solving:

$$\min_{(\beta_k^*, \beta_m^*)} \sum_h \left[\sum_t (\eta_t + \epsilon_t) Z_{ht} \right]^2$$

with $Z_t = (k_t, m_{t-1})$ and h indexing the elements of Z_t .

This algorithm is implemented by Stata which automatically calculates this semi-parametric derivation of TFP.

Source: Altomonte, Aquilante and Ottaviano (2012).

2. CAPITAL REALLOCATION INTO TRADABLE SECTORS: INCENTIVES AND OBSTACLES

2.1. INTRODUCTION

The credit-fuelled boom of the early 2000s brought about in most vulnerable Member States⁽⁴³⁾ a progressive upward shift of non-tradable sectors' profitability relative to the tradable ones, as increasing internal demand was pushing the relative price of non-tradable goods upwards. This led to an excessive flow of productive resources towards the non-tradable sector, in some cases at the expense of the tradable industries such as manufacturing (see Alexandre and Bação, 2012, for the case of Portugal). In parallel, the increases of domestic prices and wages, driven by the boom in the non-tradable sector, led to an erosion of cost competitiveness, and demand for tradable goods was increasingly satisfied by imports.⁽⁴⁴⁾ The economic and financial crisis that started in 2008 revealed the unsustainability of this growth model, and triggered a difficult rebalancing process.

This necessary rebalancing involves a reallocation of resources from the downsizing non-tradable sectors into the rest of the economy. In particular, the development of tradable sectors, which could benefit from regained competitiveness, would be desirable as it would simultaneously allow addressing both internal and external imbalances built up during the expansion years. Moreover, a quick and smooth reallocation of labour and capital would minimize the social and economic costs of the adjustment. There are at least two necessary pre-requisites for this to happen.

On the one hand, the reallocation of capital requires the appropriate incentives in the form of a better expected return on investment in the tradable sector relative to the non-tradable sector (at least in the short-to-medium term). The restoration of the relative profitability of the tradable sector vis-à-vis the non-tradable one is

currently driven by several concurrent forces. Subdued demand for non-tradable goods (most prominently for real estate-related goods) is leading to a fall of their relative price, and hence to the fall of the profitability of firms operating in that sector. This process is at the same time favourable for tradables that use non-tradable inputs. In parallel, tradable sector performance will be facilitated by favourable wage and cost developments (see European Commission, 2013, discussing why a limited pass-through of wage costs into prices is a desirable feature of this process). Tradable sectors' profitability will ultimately also need to improve in absolute terms in order to retain new capital. This improvement in profitability levels of exporting sectors will to a large extent depend on developments in world markets and more specifically on economic conditions of main trading partners. Given that a substantial part of tradable sectors' output is not actually traded, a stabilisation of domestic demand will also play an important role.

On the other hand, the reallocation process in the non-financial corporate (NFC) sector will require corresponding financing flows for new viable investment projects in the tradable sector. Given limited possibilities of a direct reuse of physical capital of the downsizing sectors, the readjustment process will require significant new investment flows that will need to be financed either through financial intermediaries or directly through markets. The currently tight financing conditions and financing frictions seem to affect both the quantity of investment (see Farinha and Prego, 2013, and Bank of Spain, 2013), as well as its composition and quality (Garicano and Steinwender, 2013). Therefore, despite having been instrumental in triggering the adjustment of built-up imbalances, the restricted credit supply could be a significant drag for the adjustment of the NFC sector if it implies an across-the-board reduction in corporate lending.

The objective of this study is to assess the on-going capital reallocation in vulnerable Member States by looking at firm-level profitability and investment developments. The idea is to inspect whether, and to what extent, the above two pre-requisites for reallocation are fulfilled. A slow

⁽⁴³⁾ The vulnerable Member States are defined here as Greece, Spain, Cyprus, Ireland, Portugal, Slovenia, and Italy.

⁽⁴⁴⁾ Differing views exist on the causes of imbalances in the vulnerable Member States. Some commenters suggest that they were a result of cost competitiveness losses, while others argue that they were due to excessive imports driven by a credit expansion, while export sectors still performed relatively well (as examples of these two opposing views, see Dadush and Wyne, 2012, and Gaulier, Taglioni, and Vicard, 2012).

sector reallocation of resources could indeed be a result of either insufficient improvement of private incentives (i.e. the return on investment) or of financing difficulties, or a mix of both.⁽⁴⁵⁾ Any identified barriers to adjustment and their relative extent will allow formulating policy recommendations.

The main findings of this chapter are the following. First, the attractiveness of tradable sectors relative to the non-tradables has indeed been recently restored, as the profitability differential between the two sectors has tilted in favour of the former. Second, despite these favourable developments, investment in the tradable sector has not yet picked up. Firms in vulnerable Member States currently under-invest compared to their peers in non-vulnerable Member States, even after controlling for their current operating performance, still rather weak in absolute terms, and their financial strength. Third, the degree of underinvestment seems to be associated at least partially with financing difficulties. An estimate of the likelihood of a bank loan request rejection appears as a statistically and economically significant predictor of underinvestment among European firms in 2011.

The chapter is organised as follows. Section 2.2 presents the firm dataset. Section 2.3 provides a description of the developments in profitability, investment and resource allocation in the tradable and non-tradable sectors. Section 2.4 provides two complementary approaches to assessing firm level investment rates in tradable sectors, one based on an empirical investment equation and the other on a matching procedure between vulnerable Member States and non-vulnerable Member States firms. Section 2.5 presents a measure of firms' financing difficulties and uses it to explain the current investment patterns. Section 2.6 concludes with a some policy implications.

2.2. FIRM-LEVEL DATA OVERVIEW

The study is based on a large company dataset extracted from the Bureau Van Dijk Orbis database, which has a broad international

⁽⁴⁵⁾ Other possible barriers to reallocation could also be significant, such as those related to geographical and skill mismatches in the labour market.

coverage. This database is based on various public data sources (e.g., business registers) that provide financial and accounting information on companies. Both publicly traded and privately held companies are covered, except where the regulatory framework does not allow this, which for example is the case in the United States. Firm coverage in the database varies significantly across countries, reflecting both genuine differences in the number of existing firms (especially among the smaller ones, which tend to be the most numerous) but also due to different institutional frameworks on data reporting. See for example Andrews and Cingano (2012) for an example of use of this database studying intra-industry reallocation of resources, as opposed to the inter-industry focus in this chapter.⁽⁴⁶⁾

Our data cover the period 2003-2011 in Italy, Spain, Portugal, Greece, and Slovenia (representing the vulnerable Member States), Germany, France, Finland, Belgium (representing euro area non-vulnerable Member States), the Czech Republic and Poland (as non-vulnerable Member States outside of the euro area⁽⁴⁷⁾). Other Member States could not be included due to very low company coverage and/or limited availability of specific financial data required in our analysis. Most notably, Ireland and Cyprus could not be included owing to data availability reasons, despite being commonly included in the vulnerable Member States group.

We exclude from the analysis all sectors related to public administration, health and social services, and education, since a high share of these activities is performed by public entities. Similarly, finance and insurance are excluded due to a fundamentally different nature of their activity, as well as due to the fact that the concept of profitability and investment is differently defined for these companies.

⁽⁴⁶⁾ The authors compute a measure of allocative efficiency for each industry, capturing whether more productive firms within an industry are larger than less productive firms. The study shows that policies distorting the functioning of labour and product markets, as well as those restricting FDI, tend to reduce allocative efficiency.

⁽⁴⁷⁾ These non-euro area Member States represent an illustrative case of catching-up economies with floating exchange rates.

Table II.2.1: Descriptive statistics

	Obs.	N. of employees			Total assets (EUR mil.)			Profitability (%)			Sales growth (%)			Tradables' % of empl.	
		Mean	Median	SD	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD	Sample	All NFCs
ES	264907	65	17	1729	20.6	2.0	838.7	5.4	4.4	8.7	7.4	3.2	35.9	71.5	60.7
IT	522336	37	11	778	14.9	2.2	782.9	5.9	4.6	8.1	10.3	4.0	38.6	79.7	63.8
PT	93912	59	17	1807	9.0	1.2	359.8	4.5	3.9	9.0	8.8	2.9	37.3	87.7	69.9
EL	33705	78	19	575	21.1	3.4	212.7	6.3	4.9	9.7	6.1	2.5	34.7	87.4	73.0
SI	9887	93	18	727	12.3	2.0	84.7	6.1	4.7	8.3	11.7	6.7	36.0	89.1	71.1
DE	34847	1089	53	10974	342.2	5.9	5010.0	9.6	7.7	11.4	10.5	5.8	32.9	81.5	64.1
FR	159741	256	13	5351	71.9	1.2	1950.0	7.8	6.5	11.2	9.8	5.0	29.5	82.9	61.0
BE	10940	389	28	4080	119.3	6.1	1640.0	6.5	4.8	10.5	9.3	4.8	32.6	84.5	59.8
FI	13729	355	19	3288	86.4	1.6	1040.0	10.9	9.2	13.8	11.0	6.5	33.0	88.3	68.6
CZ	39895	45	23	147	2.2	0.8	14.0	10.2	7.9	13.6	8.6	3.6	34.9	77.0	72.3
PL	30048	145	36	1241	9.8	1.5	185.1	12.5	10.0	13.8	11.6	6.7	34.8	80.7	79.1

(1) Firm-year observations covering the period 2003-2011. Profitability is defined as the return on assets. Data on the number of employees, if unavailable, were estimated using the median assets/employees and sales/employees ratios for each country-industry-year. The last column (All NFCs) can be used for assessing the sample representativeness by showing the share of tradable sector firms' employment in the total non-financial corporate employment based on EUROSTAT sector data, compiled following the same sector classification as in our sample.

Source: Orbis data, EUROSTAT, own calculations.

Next, we only select independent and quasi-independent companies, i.e. no majority-controlled subsidiaries, as given by the database's independence indicator (minimum note of B- is required). Independent companies are the most likely to enjoy full autonomy in their financing, investment and employment decisions. This criterion keeps in our sample both large firms (e.g., multinationals) as well as medium and small firms, provided that they are not majority-owned by a larger corporate entity. A similar filter based on the same rationale was applied for instance by Kremp and Sevestre (2013). Indeed, subsidiaries of large corporate groups can benefit from intragroup financing and may therefore be less subject to financing constraints than independent firms of otherwise similar characteristics. This sample restriction also prevents a double-counting bias, as subsidiaries' assets, liabilities and income are included in the consolidated financial data of parent companies. Firm-years that have incomplete data on total and fixed assets, sales, and earnings, were also excluded, just as firm-years where risks of data errors were high (annual growth rates of assets, sales, or employees higher than +500% or lower than -95%). The final sample contains just over a million firm-years.

We construct ratio variables (e.g., return on assets, investment rates, or employment growth) from financial and accounting data. Flow variables related to investment, borrowing and employment were obtained as the annual changes of corresponding stock variables, since the actual flow data are not available in the database. To

mitigate the effect of corporate events such as mergers or spinoffs on this calculation, we only construct such flow variables for firm-years where the growth rate of total assets was between the 1st and the 99th percentile. All constructed ratio variables were winsorised at the 1% level, in order to mitigate the influence of outliers.

Table II.2.1 presents descriptive statistics of the dataset over a few key characteristics. The first column of the table confirms the country heterogeneity in firm coverage mentioned above. Italy and Spain are the two countries with the highest number of firm-year observations, followed by France and Portugal. At the other extreme, Finland, Belgium and Germany are among those with a less rich coverage. These differences in coverage have a direct impact on the typical size of the firms in our sample. Spanish, Italian, Portuguese and French firms in our dataset have a median size below 20 employees, and median assets of about EUR 2 million. In contrast, German firms in our dataset are about three times as large in the median, and the very high mean values of employees and assets suggest that the distribution is right-skewed (relatively more very large companies), which is only to some extent attributable to Germany being a larger economy. The median firm profitability also varies significantly, ranging between 4% and 6.5% in most cases, with German profitability again higher, part of which is probably due to a higher share of large firms. Firms' sales growth in most vulnerable Member States, compared to non-vulnerable ones, seems to be lower for the typical firm with more

within-country dispersion (the relatively high average growth rate is due to a smaller number of fast-growing firms).

A usual definition of tradable sectors was used throughout the study covering agriculture, mining, manufacturing, energy and utilities, trade, transport, accommodation and food services.⁽⁴⁸⁾ Non-tradable sectors were in turn defined as information and communication, professional and administrative services, construction, and real estate. The last two columns of Table II.2.1 assess our sample's representativeness as regards the split between tradable and non-tradable corporate sector employment in the overall economy. Both columns use the same definition of tradable and non-tradable sectors, excluding the same specific sectors as mentioned above. In particular, both exclude the non-tradable employment of the non-corporate sector, such as in the public sector. The last two columns reveal that, owing to this exclusion of several non-tradable sectors from the analysis, a large majority of firms are classified in the tradable sector, both in our sample and in the overall firm population. However, there appears to be an overrepresentation of the tradable sector in our sample by about 10 to 20 percentage points in several countries, likely related to the fact that typical non-tradable firms (e.g. in construction, professional services) are likely smaller, and therefore have a lower coverage in the database. This selection bias should not be problematic given that our analysis is performed separately for the two sectors. The only necessary working assumption is that the sample firms in both sectors are representative of the overall population of firms in each sector.

⁽⁴⁸⁾ See for example the tradables definition used in the AMECO database covering the same industries (in ISIC nomenclature A-E, G-I). This definition is arguably too simplistic as many industries' tradability is not clear-cut. A refinement using a ranking of industries based on actual exports to total output, or even more precisely by looking at the traded share of value-added (Gächter et al., 2013, and Zeugner, 2013), could improve the definition of industries. It would also lead to different classifications of tradable sectors between different countries and possibly raise the questions about how to adjust for this country heterogeneity.

2.3. PROFITABILITY AND CAPITAL REALLOCATION

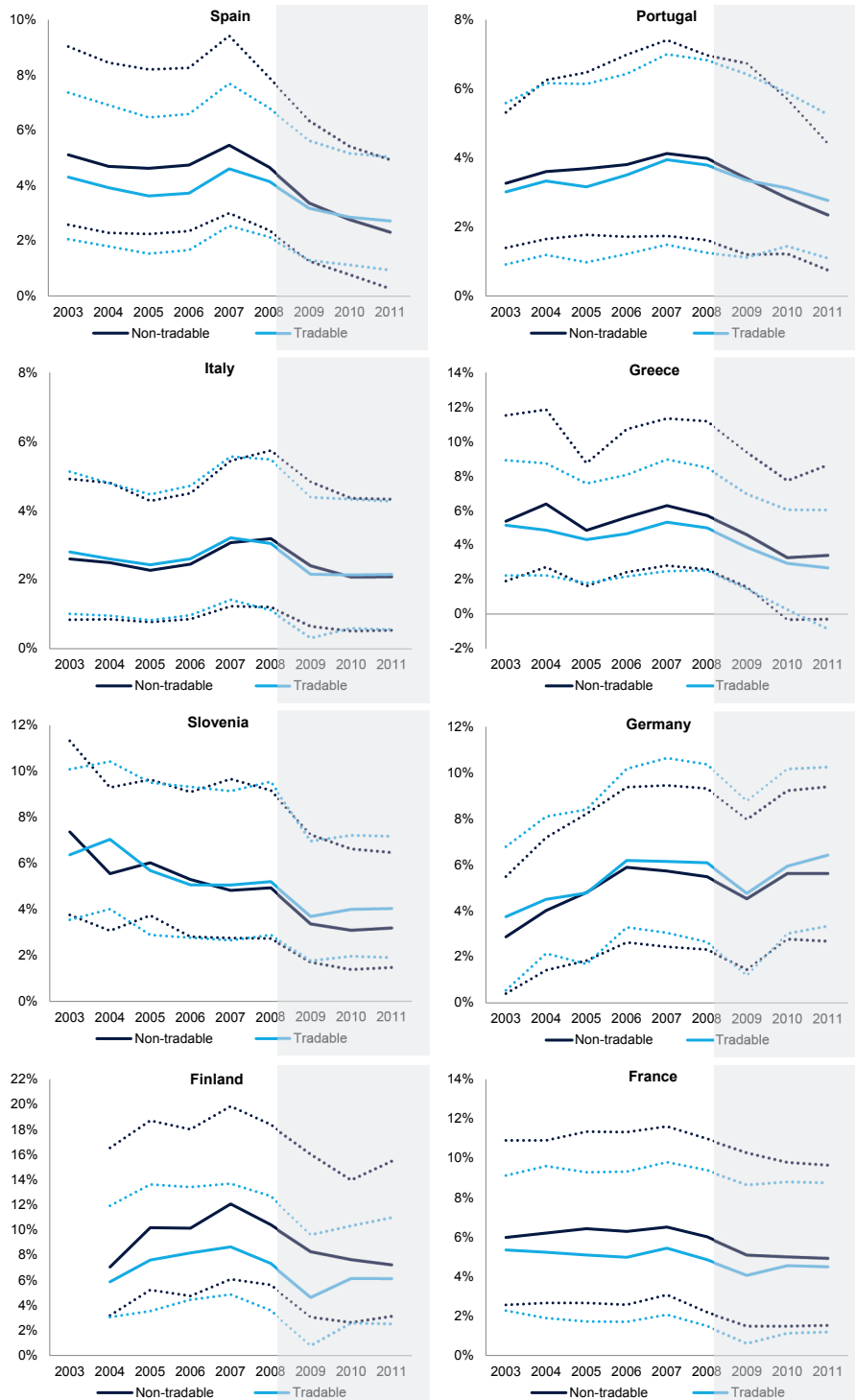
2.3.1. Evolution of relative profitability across sectors

As a first step this section provides a look at the developments of firm profitability between tradable and non-tradable sectors. It is not straightforward to define a good proxy for typical profitability within a sector (this obviously applies to any other variable, such as an investment rate), one that would be representative of the actual returns on new investments. On the one hand, simple average profitability of a sector is likely to be very sensitive to extreme observations (positive or negative) and therefore noisy. On the other hand, weighted average profitability would be driven by large companies, in particular because our dataset does not cover the smallest firms. Moreover, large firms' profitability, due to greater geographic and sector diversification, may be less representative of returns on new investments in a given industry and country. We focus instead on the movements of the distribution of firm profitability, by following the median and the two quartiles of the distribution (firm-level analysis in ECB (2013) also largely relies on median values). By doing so, we deliberately give more informative relevance to the more numerous small and medium-sized firms⁽⁴⁹⁾ while mitigating the effect of extreme data (in some cases possibly erroneous).

Graph II.2.1 presents for a selection of vulnerable Member States and non-vulnerable Member States the evolution of the distribution of firm profitability over the sample period, yielding several observations. First, during pre-crisis years profitability in the non-tradable sector was shifted above that of tradables in Spain, Greece, and Portugal (the shift is particularly obvious when looking at the upper quartiles). This was not the case in Italy and Slovenia, where the distributions of profitability in the two sectors were very similar. We observe that Italian firms' level of profitability was clearly lower compared to

⁽⁴⁹⁾ SMEs can be credited for a majority of EU growth in value added and employment, see Eurostat (2009) http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-09-071/EN/KS-SF-09-071-EN.PDF (accessed Oct 2013).

Graph II.2.1: Firm profitability in tradable and non-tradable sectors of selected euro area MS. Medians (solid line), 1st and 3rd quartiles (dotted) of the distribution of firm profitability



(1) Profitability is measured after-tax as Return on Assets (ROA=Earnings before interest/Total assets). The crisis period is highlighted for illustrative purposes. The median and the quartiles are calculated each year in each country and sector from the distribution of firm ROAs. The median therefore represents the typical value of profitability in a given sector-year, rather than the profitability of the typical firm based on other characteristics.

Source: Orbis data, own calculations.

European peers.⁽⁵⁰⁾ It is also noteworthy, that a similar shift of non-tradable firms' profitability above that of tradables was present in France and Finland. In contrast, the German tradable sector saw the opposite situation where the distribution of tradable sector profitability was shifted above that of non-tradables.

Second, since the onset of the crisis, profitability fell in all vulnerable Member States and in both the tradable and the non-tradable sectors (in Italy, this fall was actually a reversal to early 2000s levels). While a fall was also observed in Finland and France, the most recent profitability levels still remain relatively good compared to the pre-crisis period. German developments are somewhat specific: profitability contracted in the period around 2009, but has recently rebounded to, or even slightly above the pre-crisis levels.

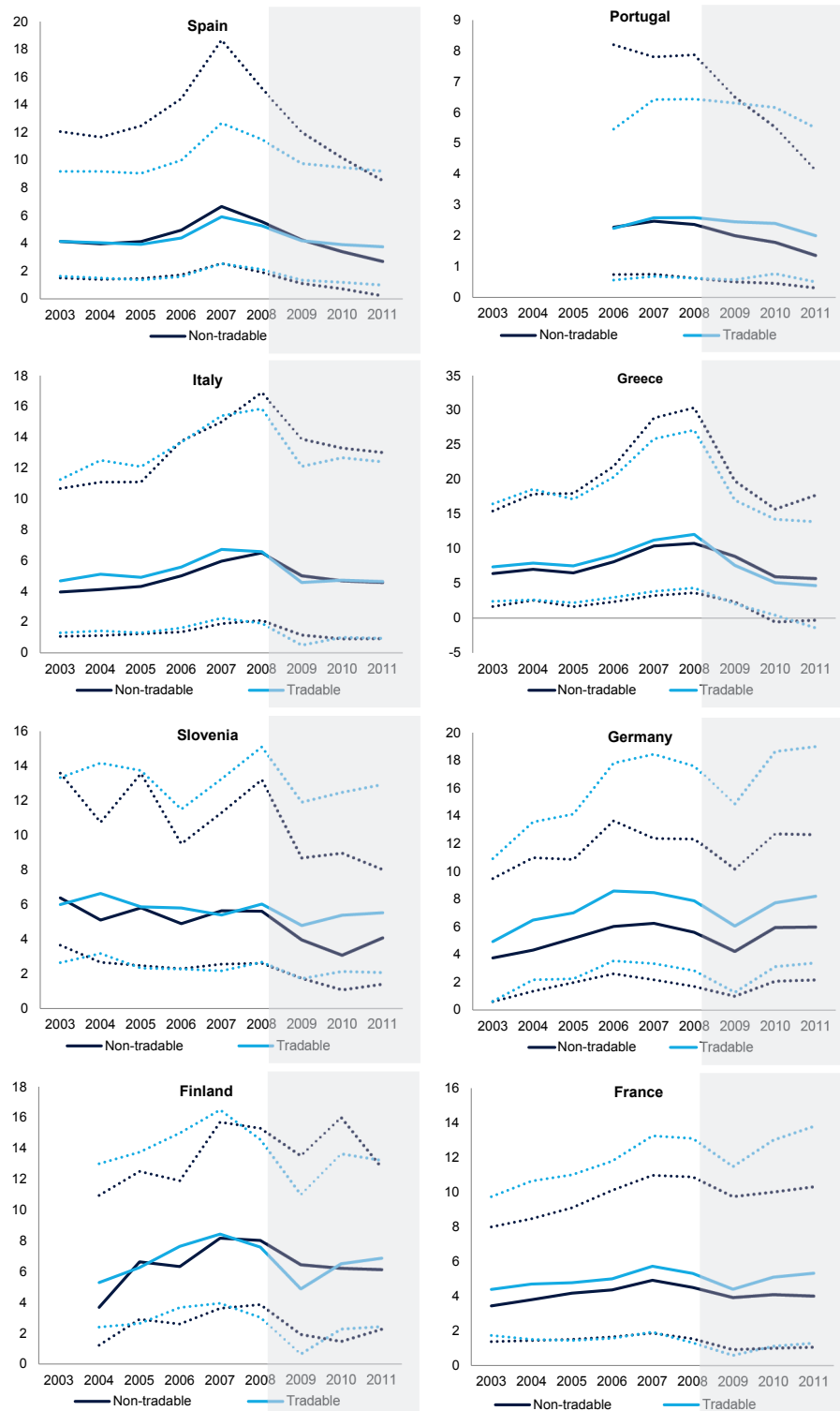
Third, the contraction of profitability was in general stronger in the non-tradable sector, while tradables tended to resist relatively better to the adverse economic shock. As mentioned above, this development is driven both by a contraction of non-tradable goods' relative prices (in particular those related to the housing markets), but also to an incomplete cost-price pass-through supporting profit margins in tradables following wage moderation efforts (see European Commission, 2013). An inversion of relative profitability in favour of tradables has occurred in Spain and Portugal. In Slovenia, tradables also became relatively more profitable in recent years, despite the fact that there was bias towards non-tradables in the pre-crisis years. The absence of such development in Greece is potentially worrying. On the one hand, the relative resilience of the non-tradable sector profitability could be a symptom of product market imperfections that could hamper the readjustment process. On the other hand, one should also take into account the fact that actual exporting of the Greek tradable sector is limited compared to, say, Spain. In a context of a depressed domestic economy, Greek tradable firms suffer a loss in demand which is not very different from non-tradable firms. As regards non-vulnerable Member States, Finland and France

recently saw the relative advantage of non-tradables reduce, though only partially. In Germany, tradables have further increased their lead relative to non-tradables.

We next complement this analysis using a less common measure of profitability, namely profits per employee (earnings before interest divided by total employees). This ratio does not actually reflect profitability per se, but rather gives an idea of the return to firm claimholders given a certain level of use of labour resources (arguably, the required efforts for managing a firm are increasing with the number of employees). Moreover, the profit per employee ratio is also interesting from the point of view of a sector's attractiveness to labour. The more earnings can be generated per employee, the better the employees' bargaining position with respect to wages or working conditions. It is therefore possible that a high profit per employee induces the firm to seek additional workers, and at the same time actually attracts these workers by offering better wage prospects. One needs to be careful, however, with interpreting this ratio and with any generalised normative conclusions. Both the evolution and the level of the ratio depend to a large extent on the capital intensity of a sector, as well as on such characteristics as the type and skill of workers employed. If we assume that these structural characteristics of the two sectors did not fundamentally change over the sample period, the relative evolution of this variable between the two sectors provides relevant information about the private incentives for resource allocation between these sectors.

⁽⁵⁰⁾ Cross-country comparisons of profitability should be done cautiously, owing to aforementioned differences in country coverage. Therefore, the evolution of profitability within one country over time appears to be more relevant.

Graph II.2.2: Profit per employee (thousand EUR) in tradable and non-tradable sectors of selected euro area MS. Medians (solid line), 1st and 3rd quartiles (dotted) of the distribution of firm profit per employee



(1) Orbis data, own calculations.

Source: Data on the number of employees is only available from 2006 for Portuguese firms, and for Finnish firms it is limited before 2004. The crisis period is highlighted for illustrative purposes.

As can be seen in Graph II.2.2, non-tradables' profit per employee in France and Finland increased during the pre-crisis years broadly in line with that of tradables. A similar pattern is present in the Slovenian data (possibly even a relative decline of non-tradables' profit per employee). For Germany, there was a clear relative increase of the tradables' profit per employee over 2003-07, suggesting that German labour market reforms of the early 2000s benefitted relatively more the tradable sector. The pre-crisis developments of profit per employee in Spain, Greece, and to some extent Italy are strikingly different, as they clearly show a relative increase in the non-tradable sector. One can see, however, that this did not affect the whole distribution of firms, as the lower quartiles evolved broadly in line in both sectors. Instead, only the upper part of the distribution was strongly skewed, suggesting that a part of the non-tradable sector enjoyed a significant boost to their profits per labour inputs used.⁽⁵¹⁾

As one moves to the post-crisis period, an inversion of the skewed incentives occurred in Spain and Portugal. The relative development in Slovenia was also more favourable to tradables. On the other hand, a less desirable change occurred in Greece, where during the post-crisis years the upper and middle part of the distribution of tradable firms' profitability per head seemed to fall more than for non-tradables. This is in line with our above findings on firm return on assets. The post-crisis development in non-vulnerable Member States such as Germany and France, however, does not present a mirror image of these developments, as they also suggest a relative improvement in the tradable sector. The joint relative improvement in profit per employee in the tradable sectors of virtually all Member States could therefore be interpreted in the context of the recent aggregate movement to an external surplus in the euro area.

This section suggests that the relative incentives for resource allocation, as signalled by the return on assets and the return per labour input used, have

recently reversed (or even further improved) in favour of the tradable sector in Spain, Portugal, and Slovenia. In Italy, the absence of these post-crisis developments mirrors the absence of a pre-crisis bias. The case of Greece is less reassuring: the incentive bias represented by higher returns in the non-tradable sector was not reversed and in some respects even worsened. It would be worth exploring the relative importance to this development of (i) the low openness of the Greek tradable sector which implies that demand for tradable goods is depressed almost in the same manner as that for non-tradable goods given the very weak economic conditions, and (ii) possible product market rigidities in the non-tradable sector.⁽⁵²⁾

It is worth noting, however, that the absolute level of tradables' profitability is still below its pre-crisis level in most vulnerable Member States. An improvement in profitability levels will depend both on improved economic conditions of main trading partners, as well as on a stabilisation of domestic economic activity. Once domestic demand improves, even non-exporting tradable firms will be able to benefit from restored competitiveness vis-à-vis foreign imports.

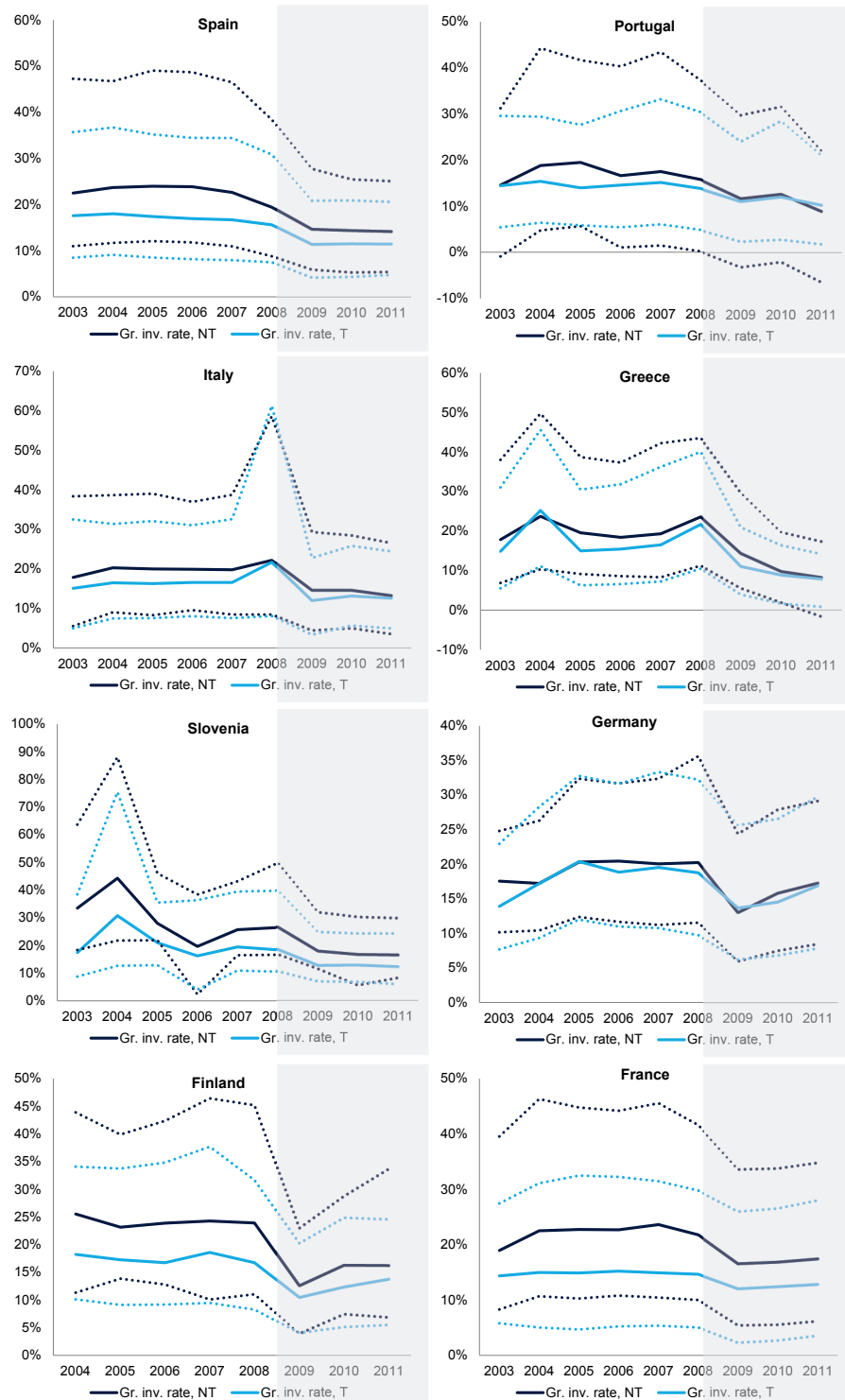
The inversion of incentives for capital allocation in most vulnerable Member States is a desirable feature of the on-going rebalancing in these Member States. If current higher relative returns in the tradable sector are assumed to signal also better expected future relative returns in tradables⁽⁵³⁾, this development is a necessary condition for stimulating investment and actual reallocation of resources into the tradable sector. The next section inspects these outcomes in more detail.

⁽⁵¹⁾ The different scale in Greece as well as the gap between the median and the upper quartile are noteworthy, but they could possibly be related to stronger sector differences in labour intensity (one could think of the labour intensity difference between transport and tourism, both tradable), as well as to different reporting practices in the number of employees

⁽⁵²⁾ Given that our data cover only the period until 2011, recent reform efforts in Greece are not yet reflected in our results.

⁽⁵³⁾ This relies heavily on the assumption that the recent patterns are not only a result of the current cyclically weak demand, but are related to a structural change in the non-tradable sectors of these economies, most notably in the real estate and financial sectors.

Graph II.2.3: Investment rates in tradable and non-tradable sectors of selected euro area MS. Medians (solid line), 1st and 3rd quartiles (dotted) of the distribution of gross investment rates



(1) Investment rates are measured in gross terms (before depreciation) by taking the yearly change in fixed capital stock and adding back estimated depreciation (using the median depreciation rate of the industry-year). The crisis period is highlighted for illustrative purposes.

Source: Orbis data, own calculations.

2.3.2. Do productive resources follow profitability?

The second step of the analysis consists in assessing whether the recent patterns in investment and resource reallocation in general have been responsive to recent developments of relative profitability of the tradable sector. We subsequently inspect firm investment, borrowing and employment growth.

We start by looking at investments in fixed assets, as a direct measure of capital creation. Graph II.2.3 presents the distribution of gross investment rates, defined here as net investment (change of fixed capital between year t and $t-1$) plus accounting depreciation divided by the previous year's fixed capital. Depreciation data are not very reliable and usually an arbitrary depreciation rate is assumed (e.g. a 10% annual depreciation rate is assumed in Farinha and Prego, 2013). We use a somewhat more firm-differentiated method by estimating the median depreciation rate for each industry (defined at the 2-digit classification level) in each year and apply this rate to all firms within this industry-year.

The figures clearly confirm that the non-tradable sector was investing at a much higher pace in the pre-crisis years in all vulnerable Member States, suggesting that the incentives represented by higher investment returns were playing a role. The investment rates in Germany, on the other hand, were surprisingly similar in both sectors despite the higher profitability in the tradable sector. Moreover, the level of German investment in both sectors appears lower compared to other Member States. The last two panels of Graph II.2.3 show that both Finland and France also had a stronger investment activity in their non-tradable sectors, again in line with relative profitability developments in the two sectors.

One can see that the crisis has led to a reduction of the investment gap between non-tradables and tradables in virtually all vulnerable Member States. This reduction was achieved by a strong contraction of the non-tradable sector investment. The implication of this for aggregate investment would likely be even stronger if one included also the public sector. As for tradable industries, investment rates have also contracted considerably and no picking up is apparent in the recent years.

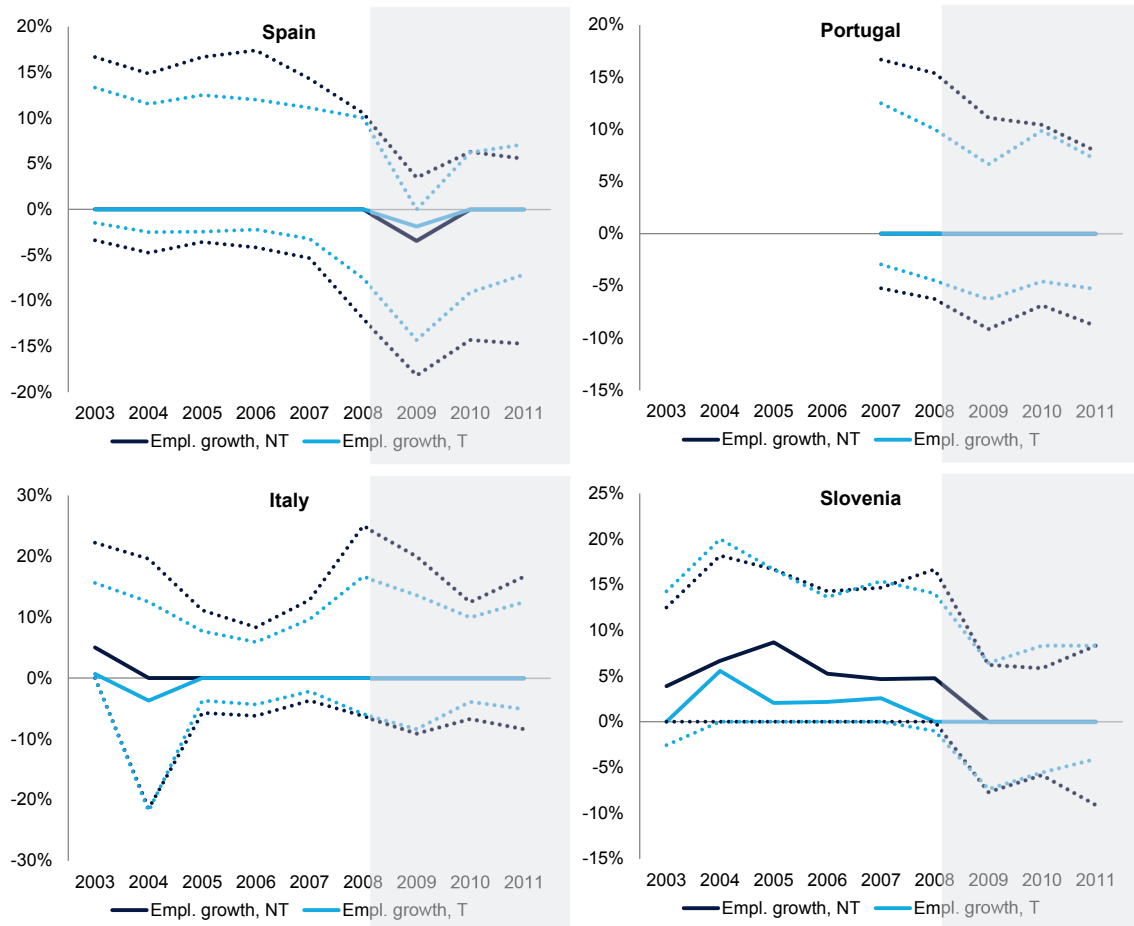
This is in contrast with post-crisis developments in the non-vulnerable Member States, where investment rates contracted strongly in 2008, but started to recover afterwards. The recovery was strongest in Germany, but signs of a recovery in the tradables are also present in Finland and France.

As a second step we inspect the developments in employment growth, defined as the annual growth rate of the number of employees. Graph II.2.4 plots the results for four vulnerable Member States. We note first that employment figures show a high persistence from one year to the other, and in a majority of years the median firm's employment growth is zero. This finding seems to confirm the stickiness of employment levels, possibly due to adjustment costs (see for instance Merz and Yashiv, 2007) or regulatory constraints, which make firms' labour adjustments occur in a lumpy manner. On the other hand, the quartiles of the distribution still capture informative changes in employment rates across sectors, and suggest that the aggregate developments in employment are mostly driven by the distribution tails. In Spain, Portugal and to some extent Italy, the distribution of employment growth rates of non-tradables was more dispersed than for tradables, implying that the former tend to have higher labour turnover. However, one can still observe that pre-2008 non-tradables' employment growth rates tended to be skewed upwards, meaning that the sector was hiring more than the tradables. The recent years saw a reversal of this pattern, as non-tradables started to downsize. Post-2008 Spanish data seem to show some positive signs of rebalancing, as the tradables' employment growth rates seem to be recovering slightly from low levels.

2.3.3. Additional information from net borrowing patterns

To shed additional light on the developments in resource reallocation we look at net borrowing as a broader proxy of external capital flows. The variable is calculated as the growth rate of outstanding debt, and it therefore takes into account new lending flows, as well as debt repayments and other changes of levels, such as debt renegotiations. Net borrowing data cover jointly bank loans as well as market-based debt financing. Therefore, this variable captures the tendency to switch to market-based borrowing by

Graph II.2.4: Employment growth in tradable and non-tradable sectors of selected euro area MS. Medians (solid line), 1st and 3rd quartiles (dotted) of the distribution of the growth rate of the number of employees



(1) Orbis data, own calculations.

Source: The crisis period is highlighted for illustrative purposes. Non-vulnerable Member States available upon request.

larger companies, observed since the onset of the crisis (see for example European Commission, 2010). Arguably, firms can also tap other sources of financing, most notably equity through new issuances. However, this form of funding, less risky from the point of view of the firm but riskier for the claim-holder, became even more scarce and costly in the current crisis and could not become a full substitute for borrowing.

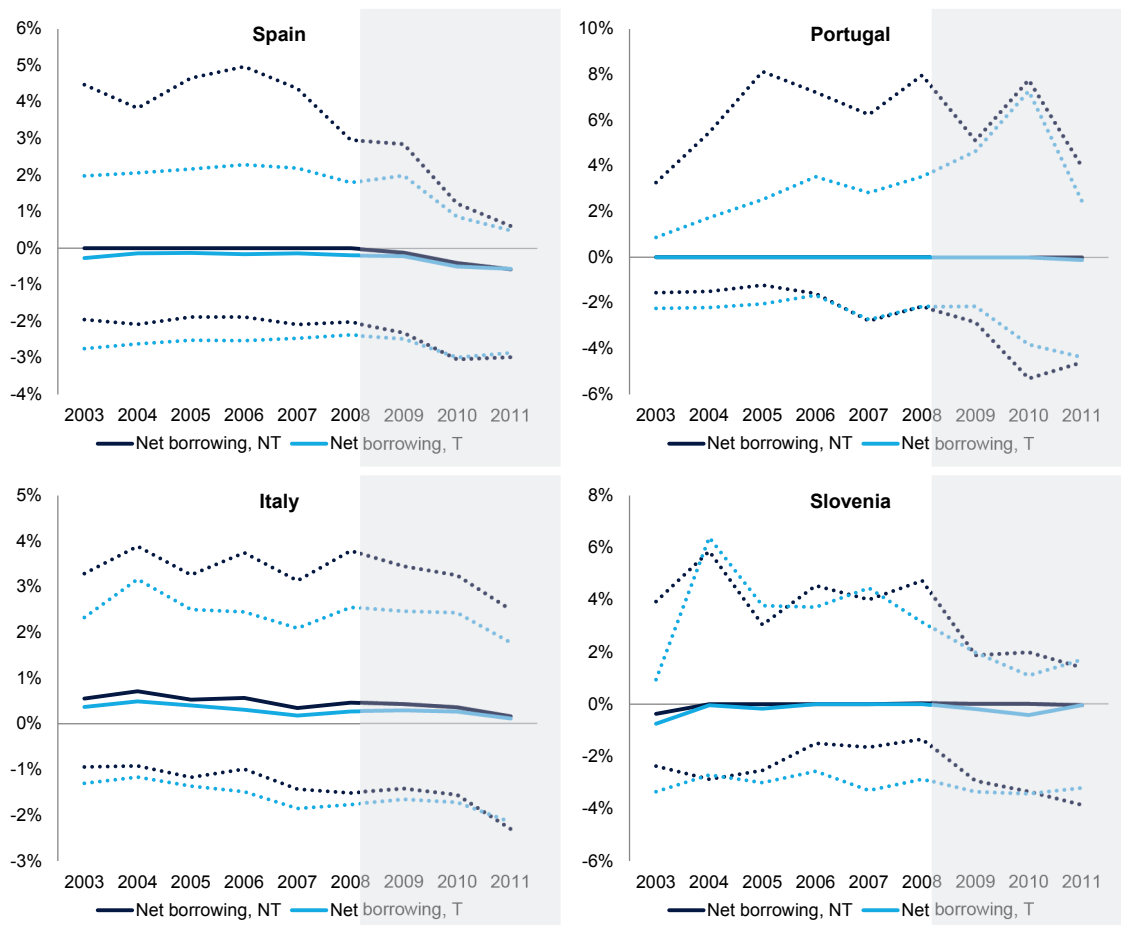
Graph II.2.5 shows a very similar pattern to the one seen on investment rates.⁽⁵⁴⁾ Non-tradable

⁽⁵⁴⁾ The figure for Greece is not presented as it shows little variation in the firm distribution. In effect, about 45% of Greek firms in our sample show no debt, compared to about 22% in Spain, and less than 6% in Italy, suggesting that the smallest Greek firms apparently finance their operations mostly through equity and current liabilities. The quartiles of the distribution of the borrowing rate are

sector's pre-crisis net borrowing was clearly strong in Spain, Portugal and Italy. In Spain both sectors' borrowing contracted strongly post-2008, and borrowing rates had a very similar distribution for the two sectors in the recent period. The data indicate that there was still a significant part of firms that continued to enjoy a positive net credit inflow as of 2011, but at a much slower pace (the upper quartile of net borrowing has strongly contracted). This is consistent with and further complements findings reported by the Bank of Spain (2013) showing that less indebted firms, both large and SMEs, were able to borrow during the crisis period. In Portugal, a brief spike in the

often at zero and the figure only shows some variation towards the end of the sample period.

Graph II.2.5: Net borrowing in tradable and non-tradable sectors of selected euro area MS. Medians (solid line), 1st and 3rd quartiles (dotted) of the distribution of the net borrowing rate



(1) Orbis data, own calculations.

Source: The crisis period is highlighted for illustrative purposes. The net borrowing rate is defined as the increase in non-current liabilities divided by previous year's total assets. Non-vulnerable Member States available upon request.

borrowing of the tradable sector in 2010, mirroring also the increase in investment in that year, was quickly reversed and both sectors' borrowing rates contracted in 2011. The contraction of borrowing in Italian firms was less abrupt, but still affecting the whole distribution of firms, and tradable sectors were not preserved from this development. Slovenia shows a slight relative increase in the borrowing rate of the tradable sector in 2011, but data for 2012 would likely reveal a different picture as the banking sector woes in Slovenia materialized later than in other vulnerable Member States.

The fact that the developments in investment rates and in borrowing seem to show similar patterns before and during the crisis is not surprising. It is

impossible to distinguish from the above graphs the direction of causality: did borrowing go down because of a reduced demand for investments or, on the contrary, did investment fall because of a lack of credit? The subsequent analysis will aim to provide at least partial answers to these questions.

2.3.4. Summary of recent trends

All in all, this section has shown that the recent changes in relative profitability between tradables and non-tradables were in line with the needed rebalancing. Following several years of skewed private incentives (represented by high investment returns) fostering capital to flow into non-tradable sectors, the incentive setup has recently been inverted, as tradables' profitability has resisted

better to the adverse economic shocks following the financial crisis.

However, the correction of the incentives for investment has not yet stimulated a clear reallocation of resources. Investment rates and employment growth in both sectors seem to be low, and a significant reallocation towards tradables was not yet discernible as of 2011. Given that firms' net borrowing closely reflects these patterns, one of the possible explanations of these trends could be the fact that despite a relative improvement of tradable sector's profitability vis-à-vis the non-tradable sector, the lack of financing due to the financial sector woes prevents an actual reallocation to take place. An alternative, more demand-driven explanation would be that profitability is currently depressed in absolute terms, while firms are still facing pressures to reduce their indebtedness. Therefore, the low investment would merely reflect the deteriorated tradable firms' fundamentals. The next sections aim to disentangle these two possible explanations.

2.4. DOES FIRM INVESTMENT REFLECT DIFFERENT FUNDAMENTALS?

As summarized in the previous section, tradables' investments have failed so far to respond to the inversion in the relative profitability between the two sectors. This development could either reflect the fact that current levels of investment returns do not justify an increase in investment, as capacity utilisation is low. Observed low investment rates would not in this case be an anomaly. An alternative reading of this would be that firm investment is low even in tradable sector firms with viable investment projects due to financing constraints. The aim of this section is to shed light on these post-crisis developments of investment in the tradable sector. We propose two complementary methods to assess investment controlling for firm fundamentals. The first approach uses an empirical investment equation to predict an expected level of investment, while the second one is based on a comparison of firms operating in a given vulnerable Member State with firms having similar fundamentals but operating in non-vulnerable Member States.

2.4.1. Investment equation approach

In this section we formulate an empirical investment equation for firms operating in the tradable sector.⁽⁵⁵⁾ The idea is to construct a model-predicted investment rate that would take into account fundamental characteristics of a given firm, as well as aggregate conditions affecting all firms. The comparison between actual and predicted investment yields for each firm and year an investment equation residual. A positive residual implies that actual investment of a given firm is higher than what the model would predict. Conversely, a negative residual implies that the company underinvests compared to what the fundamentals-based model forecasts.

We construct two reduced form models explaining net investment rates (see discussion of reduced models and the use of net investment rates in Bond and Van Reenen, 2007). One additional argument for using net investment rates is that we do not have depreciation data for all firms in our sample. We would need to estimate these using the sector peers (as it was done in Section 2.3.2), which could lead to an errors-in-variables problem. Both models explain investment using the following lagged company variables: profitability (measured by the return on assets, i.e. before financing costs⁽⁵⁶⁾), sales growth, size (log of total assets), capital intensity (fixed capital to total assets), and leverage (debt to operating assets). Sales growth and measures of profitability or cash flows are common explanatory variables of investment capturing demand prospects (see Bloom et al., 2007) and possibly also the availability of internal funds. We control for size to take into account possible changes in returns to scale, while capital intensity captures the importance of physical capital in the company's total assets. Leverage is used as a proxy of financial flexibility of a firm, the underlying idea being that indebtedness can be increased only up to a certain level. By using lagged values of these variables we only partially address the risks of endogeneity, especially as regards the profitability and capital intensity

⁽⁵⁵⁾ We exclude agriculture and mining, due to a specific nature of their operations and investments.

⁽⁵⁶⁾ This is the economically relevant variable measuring the return on capital that should drive investment. The choice of the financing mix (equity versus debt) should not affect the assessment of economic viability of an investment project.

variables. Some reverse causality running from investment to profitability could still bias our coefficients. We include a firm fixed effect to control for unexplained heterogeneity among firms, related to time invariant characteristics and different starting points. We estimate the model over the sample period 2003-2011.

The two investment equations differ only by how we control for aggregate conditions affecting all firms. In model 1, we introduce year×industry dummies (industries defined at the 2-digit level of the NACE rev. 2 classification). This specification controls for aggregate conditions within a given sector, but without capturing country differences. The idea behind this is that we want to take into account the state of a given industry (e.g., the state of demand, technological changes, price of intermediate inputs, etc.) at the EU level, as this would be the appropriate definition of the "market" in the tradable sector. The distribution of residuals from model 1 can therefore be used for cross-country comparisons. On the other hand, model 2 uses year×country dummies, explicitly controlling for the aggregate conditions in a given country, but not for industry specificities. The estimates of these country×year dummies can therefore be used to assess the year-by-year evolution of average errors of the model in predicting investment rates in different Member States.

Table II.2.2 presents the estimated coefficients of the two models. Most firm-level variables have the expected sign and most are significant. Highly profitable firms and firms that have a high sales growth tend to invest more (see for example Bloom et al. 2007). The profitability variable is likely to capture both the quality of investment projects, as well as the availability of internal funds. Furthermore, larger firms tend to have lower net investment rates suggesting that growth of capital becomes increasingly difficult as the size of the company becomes larger. This interpretation would be consistent with non-increasing returns to scale beyond a certain firm size.

Table II.2.2: Empirical investment equation of firms in tradable industries

Dep. var:	Model 1	Model 2
	Inv. rate (t)	Inv. rate (t)
ROA (t-1)	0.083*** (8.80)	0.086*** (9.17)
Sales growth (t-1)	0.005* (2.35)	0.004 (1.68)
Size (t-1)	-0.068*** (-13.25)	-0.067*** (-14.00)
Capital int. (t-1)	-0.282*** (-11.46)	-0.283*** (-11.61)
Debt/op. assets (t-1)	-0.028*** (-4.62)	-0.027** (-4.20)
Constant	0.626*** (15.15)	0.616*** (17.22)
Firm fixed effect	yes	yes
Year * industry dummy	yes	no
Year * country dummy	no	yes
N	112 889	112 889
R-sq. adj.	0.122	0.125

(1) Investment rates are defined in net terms as fixed assets' increase divided by the previous year stock of total assets. Size is measured by the log of total assets. Capital intensity is the ratio of fixed assets to total assets. The sample includes firms in tradable industries (excl. agriculture and mining) from ES, IT, PT, EL, SI, CZ, PL, DE, FI, FR and BE. A random sample of 3000 firms is selected for MS where a larger number of data is available. Firm fixed effect estimator with standard errors clustered at the country level. The sample period is 2003-2011.

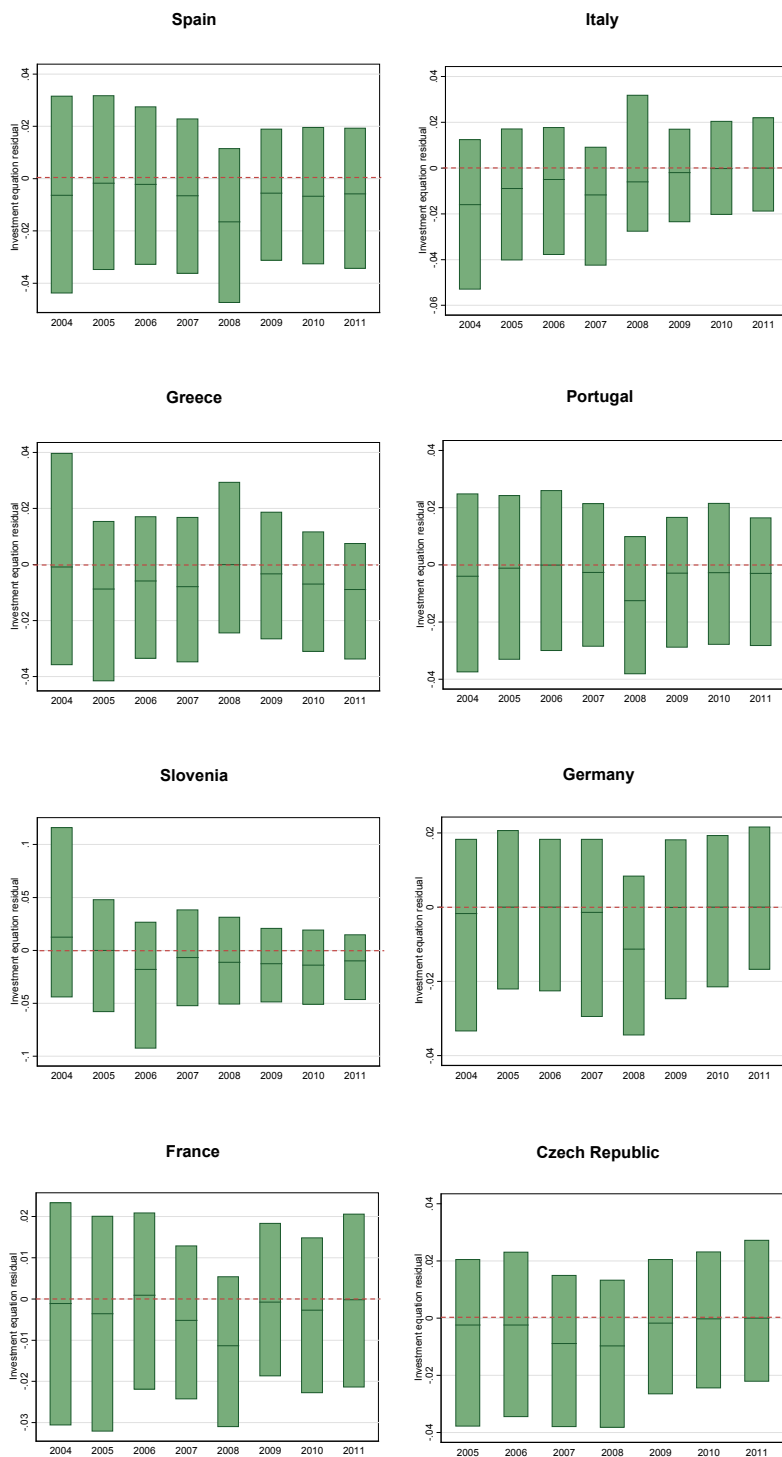
Source: Orbis data, own calculations.

The interpretation of the negative coefficient on capital intensity requires some additional discussion. The firm fixed effect in the specification captures large differences in capital intensity across sectors (heavy vs. lighter industries) and firms (the specific capital and labour choice for each firm), which are arguably both quite persistent over time. Therefore, the negative coefficient reflects changes of net investment as the firm moves around its "usual" level of capital intensity: investment is higher if capital intensity is low and decreases as capital intensity rises. Finally, more indebted firms tend to have lower investment possibly owing to the fact that access to external funds becomes scarce at higher levels of financial risk (the effects of debt pressures on investment, as well as possible non-linearities of this relationship that are not modelled here, were signalled by ECB, 2013).

Our subsequent analysis is not focused on individual coefficient values, but rather on the residuals from these investment models, as we are interested in the deviations of actual firm investment from the "expected" investment. In

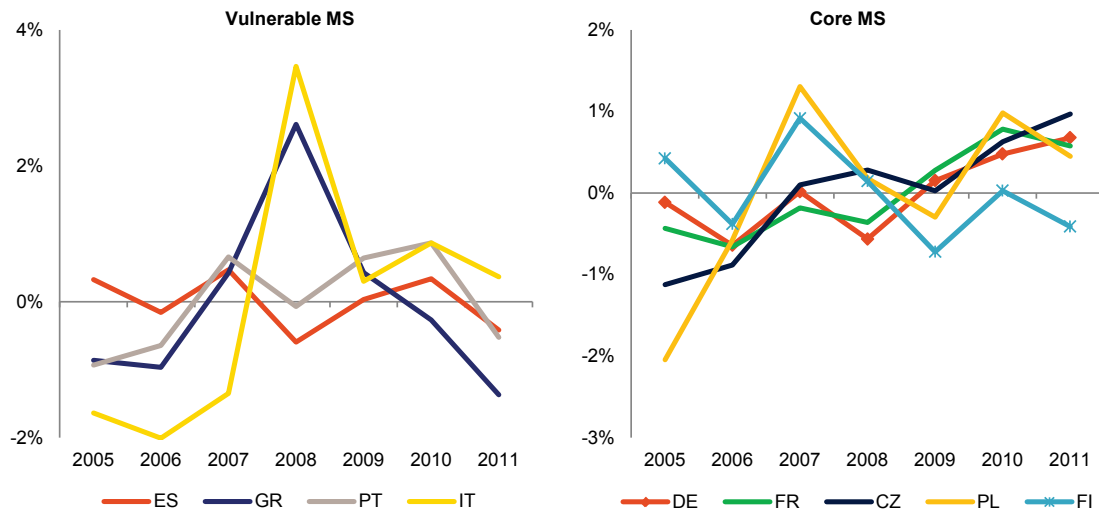
Graph II.2.6 we plot the annual median, and the lower and upper quartiles of the distribution of residuals from the investment equation (negative values imply firm underinvestment compared to model, and vice versa) for a set of Member States. Non-vulnerable Member States (France, Germany as members of the so-called core, the Czech Republic as an example of a new MS) show a quite consistent pattern: the residuals were roughly distributed around zero in most pre-crisis years, followed by a drop of the distribution of residuals below zero around the start of the global financial crisis in 2008 and a subsequent recovery back to a distribution around zero (with even some positive skew in Germany).

Graph II.2.6: Distribution of residuals from the investment equation of firms in tradable industries based on Model 1 (negative residual signals underinvestment). Median (middle bar) and 1st and 3rd quartiles (box bottom and top)



(1) The sample includes firms in tradable industries (excl. agriculture and mining) from ES, IT, PT, GR, SI, CZ, PL, DE, FI, FR and BE. A random sample of 3000 firms is selected for MS where a larger number of data is available. See Table II.2.1 for model details.
Source: Orbis data, own calculations.

Graph II.2.7: Average country-year residual from investment equation of firms in tradable industries (Model 2)



(1) The sample includes firms in tradable industries (excl. agriculture and mining) from ES, IT, PT, GR, SI, CZ, PL, DE, FI, FR and BE. A random sample of 3000 firms is selected for MS where a larger number of data is available. See Table 1 for model details.
Source: Orbis data, own calculations.

In Spain, Portugal, and Slovenia, the post-crisis investment residuals have not fully recovered from their 2008 fall and remained shifted in the negative territory. Firms in these countries appear to underinvest as of 2011 based on Model 1 predictions. In Greece, the picture is even worse, as the underinvestment has lasted for even a longer period. Italy again confirms its very specific status among the vulnerable Member States. Its firms have been underinvesting for most of the early 2000s compared to what their fundamentals would justify. As the crisis hit, the distribution of residuals actually moved upwards and was around zero as of 2011. However, this development is not a desirable one. Before the crisis, Italian firms appear to underinvest relative to their fundamentals. As the crisis stroke, the firms' fundamentals deteriorated, which moved the predicted investment downwards. The closing of the underinvestment gap in Italy after 2009 was therefore rather related to a reduction in the "target" investment, rather than by an actual increase in investment.

Estimates of the annual country fixed effect provided by the country×year dummies from Model 2 (see Graph II.2.7) yield a similar picture. In 2011 Spain, Portugal, and Greece were all underinvesting compared to the predicted level. On the other hand, most non-vulnerable Member

States (except Finland) had a positive average investment gap, indicating an average investment above that predicted by the model. The clear difference between the left and the right panel of Graph II.2.7, especially if one focuses on the 2010/11 period, confirms very different recent investment patterns in these two groups.

In summary, both specifications seem to signal that recent tradable sectors' investment in vulnerable Member States was lower not only in absolute terms, as signalled in Section 2.2, but also after controlling for firm fundamentals.

2.4.2. Comparable firms approach

In the second assessment of firm investment, we use a more flexible way to assess "normal" investment levels compared to a linear investment equation. Instead of using an econometric model to provide expected investment, we compare vulnerable Member States' firms (or, using statistical terminology, the "treated" firms, where the treatment is simply the fact that a firm is located in a vulnerable Member State) against their closest possible matches among firms operating in non-vulnerable Member States (in statistical terms the "control" firms). For a given treated firm, say, a Portuguese one, the matching procedure looks for three most similar firms operating in Germany,

Table II.2.3: Average difference in investment rates between firms in vulnerable MS and comparable firms in core MS, 2005 and 2011 (measured as share of total assets)

2005										
Manufacturing	of which:						Transport and storage	Information and communic.	Construction	
	Textile, wood, paper	Chemical, pharma, plastics	Materials	Metal products	Electronic & electrical equipment, machinery	Other manufacturing				
ES	0.011** (2.67)	0.009** (2.98)	0.010* (2.05)	0.019*** (3.93)	0.015*** (3.92)	0.005 (1.21)	0.007 (1.45)	0.014** (2.97)	0.005 (0.64)	0.020*** (5.98)
EL	0.008 (1.85)	0.008 (1.22)	-0.002 (-0.21)	-0.008 (-1.08)	0.012 (1.17)	-0.015 (-1.89)	0.006 (0.46)	-0.005 (-0.29)	-0.015 (-0.78)	0.013* (2.10)
PT	-0.007 (-1.80)	-0.017*** (-4.06)	0.004 (0.32)	-0.022* (-2.30)	-0.008 (-1.03)	-0.011 (-1.16)	0.002 (0.35)	-0.006 (-0.57)	0.026 (1.09)	-0.004 (-1.38)
IT	0.004 (1.21)	-0.008* (-2.30)	-0.024*** (-4.39)	-0.011* (-2.36)	-0.012** (-2.97)	-0.004 (-1.08)	-0.017** (-2.85)	-0.014** (-3.04)	0.007 (1.16)	-0.012*** (-3.93)
SI	0.042*** (5.29)	0.020 (1.25)	0.023 (1.07)	0.034 (0.71)	0.044* (2.02)	-0.024 (-1.80)	-0.003 (-0.16)	0.010 (0.42)	-0.020 (-1.18)	0.028* (2.00)
2011										
Manufacturing	of which:						Transport and storage	Information and communic.	Construction	
	Textile, wood, paper	Chemical, pharma, plastics	Materials	Metal products	Electronic & electrical equipment, machinery	Other manufacturing				
ES	-0.015*** (-4.45)	-0.004 (-1.39)	-0.011** (-3.21)	-0.006 (-1.44)	-0.008** (-2.71)	-0.004 (-1.41)	-0.005 (-1.43)	-0.013*** (-3.75)	-0.000 (-0.07)	-0.002 (-0.84)
EL	-0.022*** (-6.83)	-0.017*** (-3.77)	-0.014** (-2.73)	-0.019*** (-3.42)	-0.020*** (-3.61)	-0.019*** (-3.36)	-0.007 (-0.76)	-0.002 (-0.20)	0.003 (0.26)	-0.010* (-2.57)
PT	-0.004 (-1.03)	-0.010** (-3.17)	0.012 (1.60)	-0.007 (-1.11)	0.001 (0.12)	0.005 (0.60)	0.002 (0.55)	-0.027*** (-5.53)	-0.003 (-0.34)	-0.002 (-0.91)
IT	-0.003 (-1.00)	0.005 (1.66)	-0.002 (-0.56)	0.003 (0.88)	0.005 (1.57)	-0.008* (-2.43)	0.001 (0.25)	0.006 (1.69)	-0.011* (-1.96)	-0.001 (-0.41)
SI	-0.002 (-0.27)	-0.013 (-0.80)	-0.024 (-1.63)	0.009 (0.45)	-0.012 (-1.07)	-0.008 (-0.86)	0.014 (0.78)	-0.014 (-1.11)	-0.013 (-0.93)	0.009 (0.80)

(1) Estimated using the nearest neighbour matching procedure. For a given firm in a vulnerable Member State ("treated" firm), three closest matching firms ("control" firms) from non-vulnerable Member States (DE, FR, BE, FI) are found. The matching criteria are: industry at the 2-digit NACE rev.2 level (required criterion), ROA, sales growth, size, capital intensity, debt/op. assets. Matching firms are those with the minimum Mahalanobis distance from the treated firm (see footnote below for more details on this distance measure). The average treatment effect is reported with a t-statistic.

Source: Orbis data, own calculations.

France, Finland, or Belgium, within the same 2-digit industry (a perfect match is required for this criterion), and with the closest possible current fundamentals: profitability, sales growth, size, capital intensity, and leverage. The criterion for judging the similarity is the Mahalanobis distance.⁽⁵⁷⁾ By choosing the reference firms from several non-vulnerable Member States (most of them often referred to as "core") rather than from a single one, we mitigate the risk that our results are driven by an anomaly in the benchmark rather than in the vulnerable Member States. Still, given the composition of our sample, as discussed above, the share of French firms within the control group is high.

Table II.2.3 presents the results for a set of manufacturing industries, as well as for one

⁽⁵⁷⁾ The Mahalanobis distance is a unit-less multidimensional distance measure that is adjusted for the correlation between variables over which it is calculated. For an example of use of the Mahalanobis distance matching see Valta and Frésard (2013).

additional tradable one and two so-called non-tradable ones. The top panel presents the average treatment effect for the "treated" firm (ATT), i.e. by how much a vulnerable Member States firm over- or underinvests. The top panel shows the matching exercise ran in 2005. Most Spanish manufacturing industries show a relative overinvestment in that period, as well as the transport and the construction industry. For Greece, only the construction sector appears to over-invest in that year. Italy and Portugal signal underinvestment in some selected industries.

Moving to the bottom panel of Table II.2.3, we show the results for the same exercise performed in 2011. For Spain, several industries including the whole manufacturing industry, were underinvesting compared to their non-vulnerable Member States peers with comparable fundamentals. Interestingly, the crisis-affected construction industry is not signalling an underinvestment, as their current disinvestment is not abnormal relative to a firm in a non-vulnerable

Member State with comparably weak fundamentals. This latter point is important to note for all other sectors: an underinvestment in 2011 is not a necessary consequence of a pre-crisis overinvestment, as there is no need to disinvest as long as the fundamentals are good (operating performance, financial health). The underinvestment in Greece is even more generalized, as virtually all manufacturing industries are currently disinvesting more than what would be justified by fundamentals. Some cases of underinvestment are also signalled for Portugal and Italy.

In summary, this section showed that the current low levels of corporate investment in some vulnerable Member States go beyond what the company fundamentals would justify, most notably in Greece, Spain and Portugal. Using two complementary empirical strategies we showed that as of 2011 these firms were investing significantly less than what a comparable peer firm in a core MS would. The aim of the last section is to understand whether this underinvestment can be assigned to current financing difficulties.

2.5. ACCESS TO FINANCE AND CORPORATE UNDERINVESTMENT

One of the possible interpretations of the above results is that companies in tradable industries in the vulnerable Member States underinvest because of a lack of access to finance, i.e. due to a credit supply channel. Financing difficulties can either take the form of excessive financing costs, or be related to quantity rationing (a situation where lenders would purposefully not satisfy all demand at the prevailing lending rates). In both cases the implications would be that firms are forced to forgo a part of economically viable investments, thereby trimming their prospects of future performance. Besides these microeconomic consequences, an underinvestment imposed by financing difficulties would also have serious effects at the aggregate level, postponing the readjustment of the productive sector as part of a broader rebalancing in the vulnerable economies. However, other factors than those related to credit supply could be responsible for the recent underinvestment. For example, vulnerable Member States companies could simply apply extreme prudence with respect to debt financing since the

onset of the crisis.⁽⁵⁸⁾ Another explanation could be that the underinvestment is related to an unfavourable economic outlook, and the associated uncertainty.

In order to inspect whether access to finance was as of 2011 a likely factor causing vulnerable Member States tradable sector firms to invest less than what would be economically efficient, we construct a synthetic measure of financing difficulties using the survey on the access to finance of SMEs (SAFE). The SAFE is a half-year survey jointly organized by the European Central Bank and the European Commission with time-varying country coverage. The survey focuses on European firms' (a majority of the sample firms being SMEs, but with some large firms included) recent experience with raising external funds. These survey data have also drawbacks, notably the fact that they rely on perceptions which may be biased in periods of stress. Moreover, they do not fully control for the quality of loan applications and they do not allow one to understand the drivers of loan rejections (regulatory changes as opposed to banks' risk attitude). A deeper analysis of the currently perceived financing constraints by European firms using the SAFE dataset is provided in Chapter 5 of this PMR issue.

Similarly to the mentioned chapter, as well as to Holton et al. (2012), we use the SAFE 2011H1 wave data to construct a model of the probability of encountering financing constraints by a given firm in 2011. We focus on firms that actually requested a bank loan in the survey period. The dependent variable is an indicator variable equal to one if the firm experienced a loan request failure, and zero otherwise (for this purpose we use the question Q7B_a). We define a loan request failure as an event where the firm did not receive the full amount or at least most of it (responses 1 and 5), in line with Holton et al (2012). We use as explanatory variables the sector of the firm, its size category (based on the number of employees), the age of the firm, the recent evolution of net income, and a set of country fixed effects to control for any aggregate effects such as banking sector strength or overall economic activity. We exclude from the

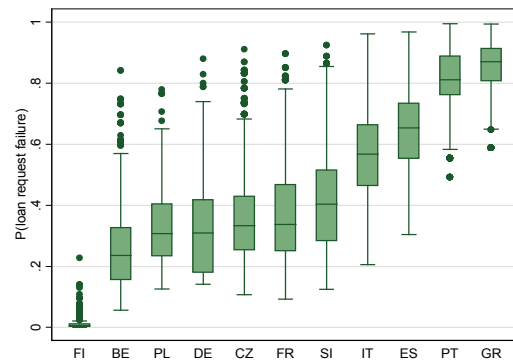
⁽⁵⁸⁾ Note that both approaches in the previous section controlled for indebtedness and therefore a simple deleveraging rationale due to excessive indebtedness cannot explain the underinvestment.

analysis large firms, as some of their variables (most notably their sector of activity) are removed from the dataset for confidentiality reasons.

We use the model parameters estimated on the SAFE dataset to construct a synthetic probability of loan rejection for the larger firm dataset used in the previous sections of this study.⁽⁵⁹⁾ Specifically, we construct, using the same variable definitions, the corresponding variables that were used as explanatory variables in the probit model (a similar approach was used by Coluzzi et al., 2012). We then calculate the estimated probability of loan rejection by applying these variables in the estimated probit equation. This estimated probability is used as an index of difficulties with access to finance. Graph II.2.8 indicates that the index of financing difficulties in the broad firm dataset shows a very high degree of cross-country heterogeneity. At one extreme, SMEs in Greece and Portugal seem to endure a very high degree of financing constraints, with virtually all firms in the sample having a more than 50% probability to face a loan rejection. These two extreme cases are followed by Spain and Italy, where roughly three-quarters of firms face a loan rejection probability higher than 50%. Slovenia is in a more moderate position, though the median firm still has a 40% loan rejection probability, also due to the fact that most of the Slovenian financial sector strains materialized after 2011. The intermediate cases are France, the Czech Republic, Germany, Poland and Belgium. The other extreme is represented by Finland, where the rejection probability among firms is distributed almost entirely below 15%.

The last step of the analysis aims at relating the estimated index of financing difficulties with the observed underinvestment, as given by the investment equation Model 1 (see previous section). We regress the residuals from the investment equation as of 2011 (a positive residual signals overinvestment and vice versa) on the financing difficulties index. We cannot include the financing difficulties index directly in the Model 1 investment equation, as the SAFE data are only available for the most recent periods. To show the

Graph II.2.8: **Distribution of the index of SMEs' potential difficulties with access to finance (estimated probability of loan request failure), 2011**



(1) The index is constructed using the estimates of a model of the probability of loan request failure conditional on firm characteristics, using the SAFE dataset. The estimated model parameters were then applied to the broader Orbis firm-level dataset to construct a synthetic probability of loan rejection.

Source: SAFE, Orbis data, own calculations.

relevance of our index, we control for simple proxies of financing constraints by including firm age (we use as the highest value 10 years or more, similarly to the SAFE dataset) and firm size (logarithm of total assets), identified by Hadlock and Pierce (2010) as the most relevant basic fundamental variables. However, there is a possibility that our investment equation simply fails to capture expected future profitability prospects given the diverging macroeconomic outlook in different countries. This would mean that the observed investment residual is not an anomaly, but rather a rational reaction of the firm (and would therefore qualify as a demand-driven phenomenon). We therefore include an estimate of the firm's profitability in 2011, 2012, and 2013.⁽⁶⁰⁾

⁽⁶⁰⁾ The estimates are obtained using the European Commission's autumn 2011 forecast of growth for all individual countries and the whole EU. Each firm's actual 2010 profitability is extended using the estimated sensitivity of profitability changes to national GDP growth and EU GDP growth.

⁽⁵⁹⁾ Model estimates available upon request.

Table II.2.4: Explaining SMEs over- and under-investment in 2011 by financing difficulties, 2011

	Dependent var.: Investment equation residual				
	All values	All values	All values	All values	Only negative
Fin. difficulties index	-0.012*** (-5.96)	-0.013*** (-6.00)	-0.012*** (-5.47)	-0.008 (-1.42)	-0.018*** (-3.96)
Firm size		0.001 (1.25)	0.001 (1.58)	0.002** (2.93)	-0.002*** (-4.16)
Firm age		-0.001 (-1.94)	-0.001 (-1.49)	-0.000 (-0.43)	-0.000 (-0.14)
ROA 2011e			0.050** (3.06)	0.051** (3.06)	0.055*** (4.03)
ROA 2012e			0.011 (0.46)	0.017 (0.76)	0.002 (0.12)
ROA 2013e			-0.026 (-1.34)	-0.036 (-1.80)	-0.037* (-2.23)
Constant	0.006*** (4.76)	0.008 (1.57)	0.003 (0.51)	-0.012 (-1.73)	-0.025*** (-3.97)
Country FE	No	No	No	Yes	Yes
N	13592.000	13561.000	13535.000	13535.000	7115.000
Adj. R-sq.	0.003	0.003	0.005	0.013	0.028

(1) Investment rates are defined in net terms as net fixed capital increase divided by the previous year stock of total assets. The residual comes from the investment equation presented in Table II.2.2, model 1.

Source: Own calculations.

Results presented in Table II.2.3 indicate that there is a statistically significant negative relationship between the observed investment residual and the measure of financing difficulties, even after controlling for alternative simple financing constraints proxies (column 2) and for expected future profitability implied by the macroeconomic outlook (column 3). If one includes country fixed effects, the statistical significance is lost in the overall case (column 4). However, the coefficient on financing difficulties becomes again strongly significant and higher in absolute terms if one only focuses on underinvesting firms (last column). More importantly, the relationship is economically significant too: an increase of the expected loan rejection probability by 30 percentage points (roughly the difference between the median probability of loan rejection in Germany and Spain, see Graph II.2.8) leads to a lower net investment rate by up to 0.5 percentage points. This is considerable given that for these firms the upper and lower quartiles of net investment in 2011 were respectively -2.7% and 1.4% of total assets. The low explanatory power signalled by the R-squared should be interpreted carefully. One should recall that the underinvestment gap in Graph II.2.6 was itself very low compared to the amplitude of investment residuals (the simple investment equation fails to capture a multitude of firm idiosyncrasies). Still, the macroeconomic effects of what appears to be a moderate underinvestment at the micro-level are likely to be

considerable. The statistically significant coefficient of the financial difficulties index in this analysis suggests that financial difficulties are associated, on average, with a lower investment and the scale of the coefficient points to an economically significant effect.

Our analysis does not exclude possible demand-related factors being also at play in the observed underinvestment in 2011, such as vulnerable Member States firms' higher reluctance to take on debt in the current context, higher pessimism with respect to future economic conditions compared to official forecasts at that period, or other frictions such as those affecting the labour market. Similarly, some of the correlation between firm underinvestment and the loan rejection probability may also reflect genuine differences in individual firms' risks that justify some of the loan rejections. Still, the above findings seem to point to the fact that inadequate financing is among the factors currently hindering the resource reallocation process.

2.6. CONCLUSION

This chapter has provided an overview of the recent developments in profitability and investment between firms in tradable and non-tradable sectors, using a large company dataset. Tradable sectors in the vulnerable Member States have recently become more interesting for investment. Indeed, their typical profitability, although low in absolute terms compared to pre-crisis years, has improved relative to the non-tradable sectors. This occurred both due to a demand collapse of the latter driven by currently depressed macroeconomic conditions, but possibly also due to other factors, such as the incomplete wage-to-cost pass-through in the tradable sectors (see European Commission, 2013). Despite this inversion in the incentives for capital allocation between the two sectors, so far there have been few signs of an increase in tradable sectors' investment, or in any other measure of shifting of resources, such as employment growth or net borrowing. Given the central importance of a reallocation of resources towards the tradable industries as part of on-going rebalancing in the vulnerable Member States, the analysis next aimed at understanding the low investment rates.

Using two complementary approaches we show that, in most vulnerable Member States, firms' low investment rates are even below what would be justified by the currently weakened firm-level fundamentals. Stated differently, we show that two similarly performing firms, of similar size and indebtedness, operating in the same sector, invest significantly differently if one is based in a vulnerable Member States (most strikingly in Greece, Spain, and to some extent Portugal) and the other is not.

Several competing explanations exist to the underinvestment phenomenon. We tried to inspect whether a lack of access to financing is likely among them. Using data from the survey on access to finance of SMEs, we constructed for each firm a synthetic index of financing difficulties given by the estimated probability of facing a rejection after requesting a loan. This index appears as a statistically and economically significant predictor of underinvestment, even controlling for simple alternative measures of financing constraints (firm age and size) and, more importantly, for different expected profitability developments over the next two years implied by that period's EC forecast of domestic and EU GDPs. The increase of the loan rejection probability for SMEs by 30 percentage points leads to an average underinvestment by a given firm of up to 0.5 percentage points (as a share of total assets).

These findings provide several relevant messages for policy-makers. First of all, the so-called bank lending channel seems to be currently binding in most vulnerable Member States, including in Greece, Spain, Portugal, and to some extent Slovenia (the phenomenon in the latter would likely manifest itself more clearly in 2012). Tight credit supply conditions would be among the factors making rebalancing in these countries more protracted and painful. Policies should focus on restoring lending to economically sound firms with viable investment projects, particularly in those vulnerable Member States where fragile banks exert a high level of conservatism on SME lending.

Next, the recent inversion of the typical firm profitability in the tradable and non-tradable sectors, leading to the former's improved attractiveness for investment, has occurred as a result of both a collapse in demand for non-

tradable goods (mostly driven by real estate related activities), as well as of the effects of wage moderation and improved competitiveness. Currently implemented structural reforms, in particular those affecting the product markets in the non-tradable sector, could help to ensure that this normalisation is not temporary and that over the medium term both sectors remain comparably attractive for investment.

Furthermore, developments in relative profitability of tradable and non-tradable sectors can provide complementary signals to the analysis of internal and external imbalances. The analysis in this chapter for example suggests that internal demand over-stimulated through private credit flows tends to favour the development of the non-tradable sector. More generally, changes in the relative profitability gap between the two sectors should be interpreted in the context of developments in internal demand and competitiveness.

Lastly, the currently discussed improvements in macro-prudential policies and bank supervision could play a preventive role going forward. Indeed, the pre-crisis over-allocation of resources into the non-tradable sector in several vulnerable Member States was a result of an underestimation of risks on the part of both borrowers and lenders. Improved bank supervision will contribute to the prevention of self-reinforcing and unsustainable boom dynamics (especially when coupled with a real estate expansion) and subsequent painful rebalancing.

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3. FINANCIAL DEPENDENCE AND INDUSTRIAL GROWTH IN THE EURO AREA DURING THE CRISIS

3.1. INTRODUCTION

The global financial crisis has deeply affected the growth and finance nexus via several channels, including wide-scale private deleveraging, tighter credit constraints for some economic agents, e.g. small and medium-size enterprises (SMEs) and, more generally, possible changes in lending practices due to more cautious risk attitudes. To gain a better understanding of possible changes in the growth and finance nexus in the euro area during the crisis, this chapter examines whether the financial crisis, in some cases linked to the sovereign debt crisis, has had a deeper impact on growth in the industrial sectors that are more dependent on external finance, leading to an important reduction in growth rates in these sectors. These effects should have been stronger in countries with more leveraged financial systems, however less adverse in countries with well-developed financial sectors.

Since the seminal work by Rajan and Zingales (1998), a range of studies have explored the growth-finance nexus by relating growth in industrial sectors to measures of external financial dependence and of financial market development. In particular, the methodology of Rajan and Zingales has been applied to assess the impact of financial and banking crises or to estimate the size of a possible credit crunch in the 2008-09 global recession.⁽⁶¹⁾ The present chapter follows a similar econometric approach to analyse possible changes in the relationship between growth and finance in industries that are more dependent on external funds relative to industries that rely on internal funding both during the 2008-09 global recession and its immediate aftermath (2010-11)⁽⁶²⁾. This allows to check whether the 2008-09 credit crunch documented in some studies⁽⁶³⁾ has been followed by a more lasting alteration of the supply of finance in the euro area with a possibly adverse impact on industrial sectors with larger needs for external financing. The work presented here departs from previous studies by using a country-

specific indicator of external financial dependence, and by extending the analysis to cover services sectors. Due to data limitations, the analysis is carried out only for a small set of euro area Member States covering the four largest ones plus two more, but offers some interesting insights regarding possible differences between Member States in the core and in the periphery.⁽⁶⁴⁾

Regression results show that more developed financial markets as measured by the size of bank loans, bond markets or equity markets have, to some extent, helped cushioning the impact of the crisis on the industries that are more dependent on external funds in the euro area. The balance sheet structure (i.e. the ratio of total assets to loans), which measures the degree of asset diversifications away from bank loans conducted by monetary financial institutions (MFIs), also seems to have played an important role. These effects have been differentiated across industries (manufacturing vs. non-manufacturing/services sectors) and asymmetric across countries (core vs. periphery euro area economies).

Although manufacturing is generally less dependent on external funds than most of services sectors, the differentiated crisis effects on growth in the sectors dependent on external funds relative to the sectors that rely more on internal funding are especially present in the manufacturing sector. The results are robust to the choice of variable to interact with the need of outside financing: either country-wide financial sector development or country-wide structure of MFI balance sheets. Market service industries attracted most of the surge in credit in the euro area economies during the boom years, but the impact of financial development, as measured by the size of equity, bonds or credit markets, or of MFIs' balance sheet structure on growth in the externally dependent market services industries relative to the market services sectors that rely on internal funding does not seem to have changed since the crisis⁽⁶⁵⁾.

⁽⁶¹⁾ See for instance: Bijlsma et al. (2013), Dell' Ariccia et al. (2004), and Kannan (2012).

⁽⁶²⁾ Data for 2012 are not available yet.

⁽⁶³⁾ See for instance Bijlsma et al. (2013).

⁽⁶⁴⁾ Due to data availability, the selected euro area countries are: Belgium, Germany, France (core countries) and Italy, Spain and Portugal (periphery countries).

⁽⁶⁵⁾ Market services are distribution, transport, accommodation and food services, information and communication, real

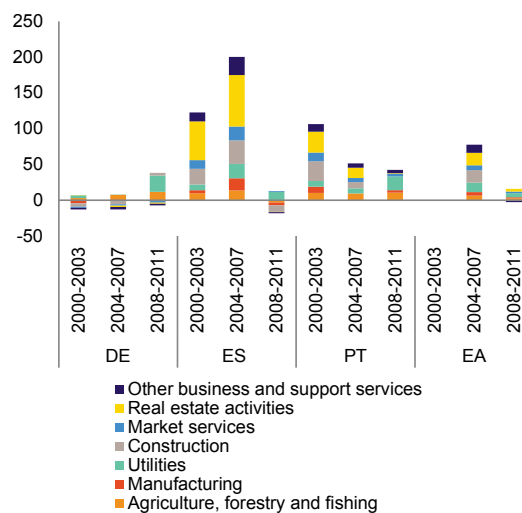
The persistence of some of the estimated effects over the 2010-11 period also suggests that the changes in the supply of finance brought by the crisis have a more medium-term effect. Firms' access to finance appears to have been more severely altered by the crisis and not to have been just temporarily impaired during the sharp recession of 2008-09. In particular, there are some indications that manufacturing industries that have switched funding sources away from bank loans towards bonds and equities have benefited from faster growth in 2010-11. At the same time, in countries with a more diversified balance sheet structure in terms of asset types and in countries with a higher leverage of the financial sector, the crisis seems to have had a more lasting and stronger negative impact on growth after the 2008-09 recession, notably in the manufacturing sectors and in the core euro area economies.

The chapter is divided in five sections. Section 3.1 reviews developments in credit allocation and growth at sectoral level. Section 3.2 presents a range of measures of financial market development and MFIs balance sheet structure and leverage across the countries. In Section 3.3 the external financial dependence of sectors in selected euro area countries is presented. Section 3.4 discusses the main results from the econometric analysis. Section 3.5 concludes.

3.2. CREDIT ALLOCATION AND GROWTH AT THE SECTORAL LEVEL

The first decade of the euro was marked by an extraordinary integration of financial markets through the elimination of intra-area currency risk and a global financial boom. Credit to non-financial industrial sectors in the euro area was growing at an annual average rate of 11% in the years preceding the global financial crisis. Moreover, in the periphery (e.g. ES) some services registered annual average credit growth rates of even up to 70% (see Graph II.3.1).

Graph II.3.1: Credit allocation by industry, euro area (% contribution to total credit growth)



(1) Sectors definition NACE Rev. 2. Utilities: electricity, gas, water and mining (sectors D, E and B). Real estate and other business activities (sectors L, M and N). Other public support services (sectors P to S, incl. health and education).

Source: National central banks and ECB.

The credit boom of the mid-2000s can be observed at the euro area level in almost all sectors. Sectors where it was particularly pronounced were the non-manufacturing/services sectors, with construction, real estate activities, other business and support services taking the top positions, followed closely by distribution industries and utilities. Manufacturing has also registered significant positive credit growth rates, but its share in total credit has been continuously decreasing in the boom years, 2004-07 (see Graph II.3.2).

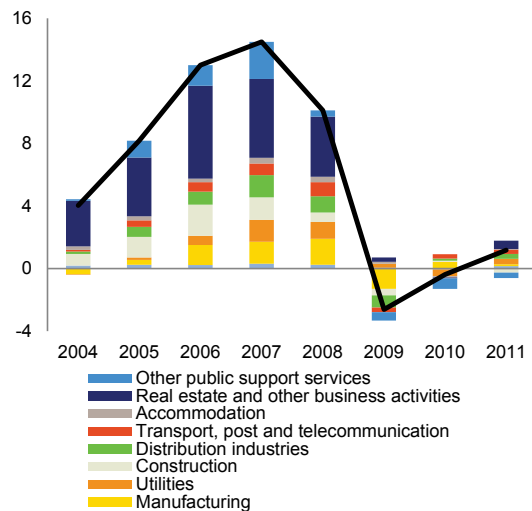
One of the fundamental roles of the financial sector is to facilitate the reallocation of savings towards firms with a shortage of funds and better investment potential. By reducing the transaction costs of savings and investment, the financial sector lowers the cost of capital in the economy in general.

Moreover, to the extent that financial markets are able to overcome problems of moral hazard and adverse selection, financial development should also reduce the wedge between the costs of external finance through credit and/or equity and internal funds, such as profits. Starting with the work of Rajan and Zingales (1998), a number of empirical studies have shown that because of a

estate, professional, scientific and technical activities and administrative and support services.

lower wedge between the cost of external financing and internal funds, sectors that are relatively more in need of external finance tend to grow disproportionately faster in countries with more developed financial markets.

Graph II.3.2: **Credit growth by industry, selected euro area countries**
(avg. annual growth in %)



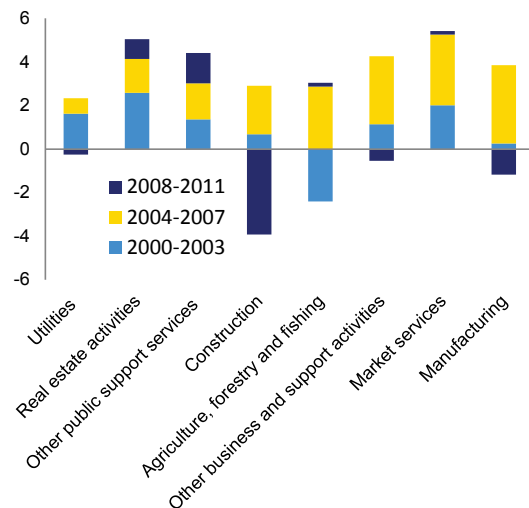
(1) Sectors' definition NACE Rev. 2. Utilities: electricity, gas, water and mining (sectors D, E, and B). Market services: distribution, transport, accommodation and information and communication (sectors G, H, I and J). Other business and support services: sectors M to S.

Source: National central banks and ECB.

Looking at gross value added growth across sectors at the euro area level, the highest growth over the boom years can be observed in the manufacturing sector, while construction, real estate activities and utilities are at the lower range of growth over 2004-2007 (see Graph II.3.3, sectors ordered by average growth in 2004-2007). Moreover, during the crisis years, 2008-2011, with the exception of the construction sector, the non-manufacturing/services sectors seem to have gone through a rather modest fall in activity relative to the manufacturing sector, despite a potentially higher financial exposure due to the large credit accumulation during the boom years. This may reflect several traditional macroeconomic factors, including the fact that the non-tradable sectors, by definition, were not directly exposed to the collapse in world trade and in many cases face a more inelastic demand. However, this could also be an indication of a different relationship between market lending and growth in these industries.

Lenders might extend credit at relatively more favourable terms to firms in the services sectors than to firms in manufacturing sectors. Low competitive pressures in some services markets may encourage lenders to feel safer regarding the repayment prospects of firms in these sectors than regarding repayment by manufacturing firms where product markets are relatively more competitive and profit margins are tighter.

Graph II.3.3: **Gross value added growth, euro area**
(avg. annual growth, in %, volumes)



(1) Sectors definition NACE Rev. 2. Utilities: electricity, gas, water and mining (sectors D, E and B). Market services (sectors G, H, I, and J). Other business and support activities (sectors M and N). Other public services (sectors P to S, including health and education).

Source: Eurostat.

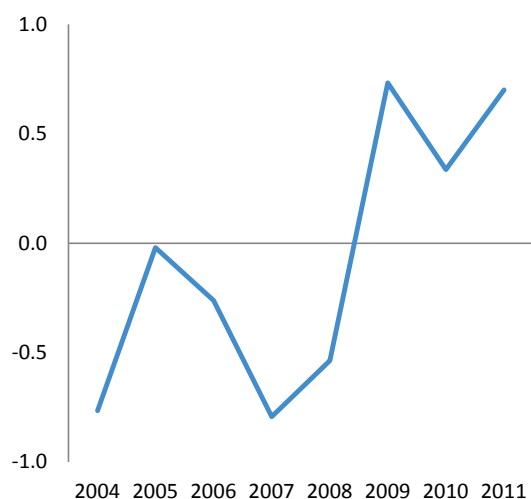
At the euro area level, industrial growth seems to be slightly disconnected from the observed pattern in credit accumulation. The correlation between growth and credit turns negative and increasing in absolute terms over the boom years, 2005-07 (Graph II.3.4).

The persistence of the credit allocation pattern across sectors over the boom years indicates that the decrease in the cost of capital in the first decade of the euro has benefitted the non-manufacturing/services sectors (Graph II.3.2). However the same sectors seem to have been growing less than the manufacturing sector over the boom period, and were more protected during the crisis (Graph II.3.3). The question arises whether there have been significant differences across euro area economies, and whether the

degree of dependence on external finance has played any role.

financial development for industrial growth, in particular during the crisis.

Graph II.3.4: **Growth and bank credit, euro area**
(Pearson correlation coefficient)

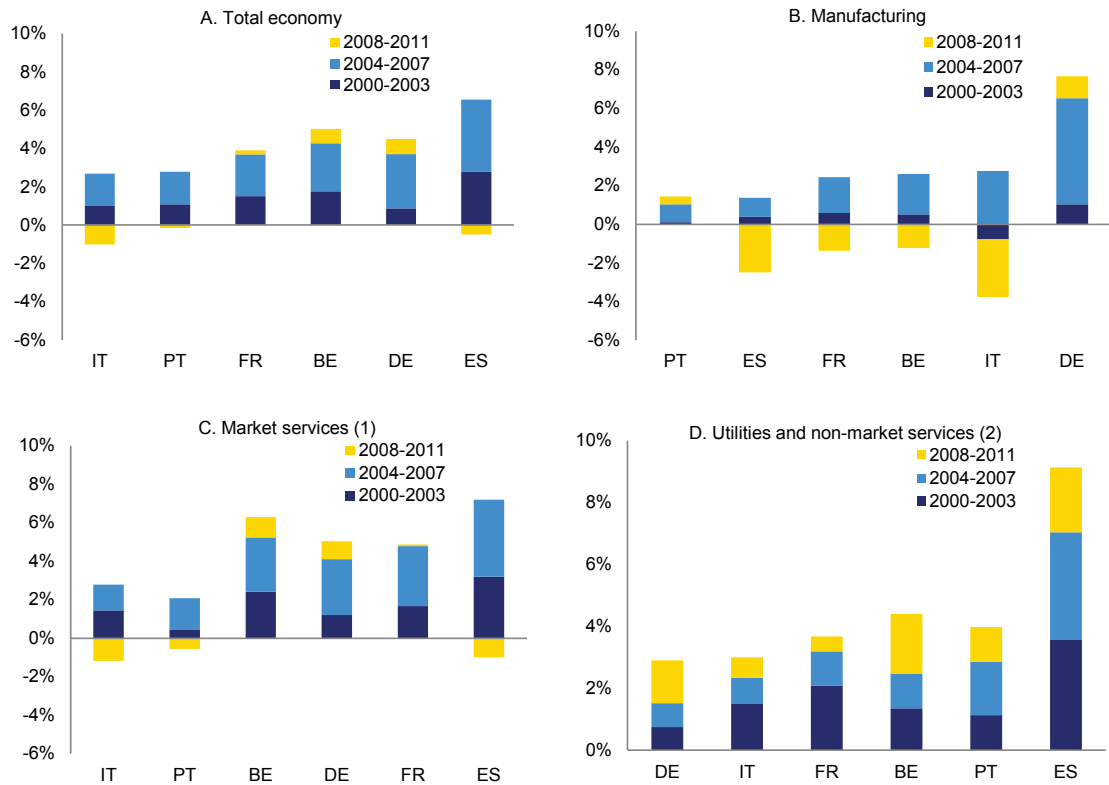


(1) Correlation coefficient calculated among manufacturing (C), market services (sectors G, H, I, J, L, M and N), construction (F) and non-productive services (sectors D, E, P, Q, R, and S). NACE Rev. 2, 1-digit.
Source: European Commission services, based on ECB and Eurostat data.

By looking at country level across selected euro-area economies, market services seem to have seen in general much higher value added growth rates in both core and periphery during the boom years, with the exception of Germany, where the manufacturing sector has been the main growth driver (Graph II.3.5A and II.3.5B). The non-productive public support sectors such as utilities, education, health, and other public support activities have also seen high value added growth rates in the periphery, the latter being accompanied by high credit growth rates over the same period (Graph II.3.1 and Graph II.3.5D). The observed cross-country heterogeneity gives an indication that the negative correlation between credit and growth observed at the euro-area level might not hold at country level, and that credit has favoured industrial growth in some euro-area countries.

The next two sections look further into the nature of dependence of these sectors on external finance and developments in a number of external financing sources across selected euro-area Member States, trying to identify the role played by the degree of financial dependence and

Graph II.3.5: **Gross value added growth, (avg. annual growth in %, volumes)**



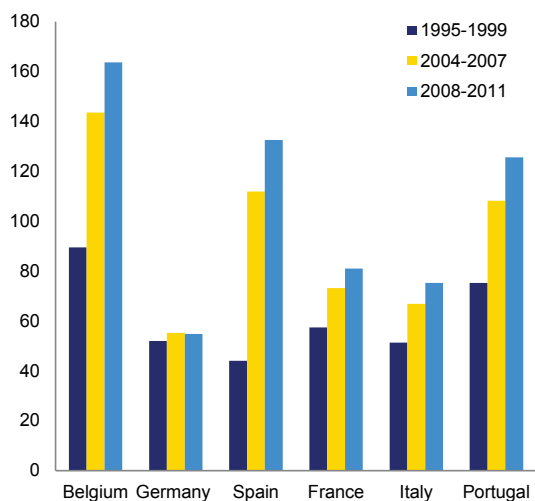
(1) Market services (sectors F, G, H, I, J, L, M and N).
(2) Non-productive services (sectors D, E, P, Q, R, and S).
Source: Eurostat.

3.3. FINANCIAL MARKET DEVELOPMENTS IN THE EURO AREA

The empirical analysis presented in Section 3.4 relies on several country-specific variables of financial development and of monetary financial institutions (MFIs) balance sheets. To reflect the importance of various financial intermediation channels, the former include bank loans, quoted shares of non-financial corporations and bonds of non-financial corporations – all as a ratio to GDP. MFIs' balance sheet variables include the ratio of total assets to loans, which captures the degree to which financial institutions have been able to diversify away from the traditional business model of granting loans. They also include a measure of leverage, defined as the ratio of capital and reserves to total assets/liabilities. The remainder of this section takes a rapid look at each of these variables.

During the first decade of the EMU, financial markets in the euro area have gone through a deep process of integration that together with the global financial boom has led to a sizable growth in the weight of the financial markets in most euro area economies, but in particular in peripheral countries (e.g. ES, PT). In addition, there seems to have been a disproportionate growth of loan markets vis-à-vis bond markets and especially equity markets, in particular in the peripheral countries (e.g. ES and PT, although corporate bond markets in PT and equity markets in ES also grew rapidly) (see Graph II.3.6, Graph II.3.7 and Graph II.3.8).

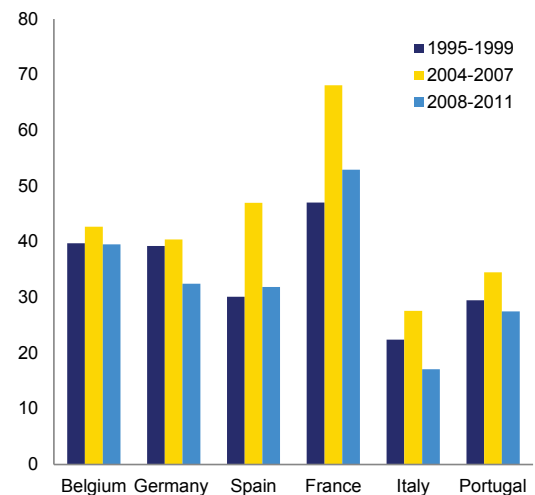
Graph II.3.6: **Credit markets, selected euro area economies (average, in % of GDP)**



(1) Loans liabilities of the non-financial corporate sector as % of GDP.

Source: Eurostat, Financial accounts.

Graph II.3.7: **Equity markets, selected euro area economies (average, in % of GDP)**



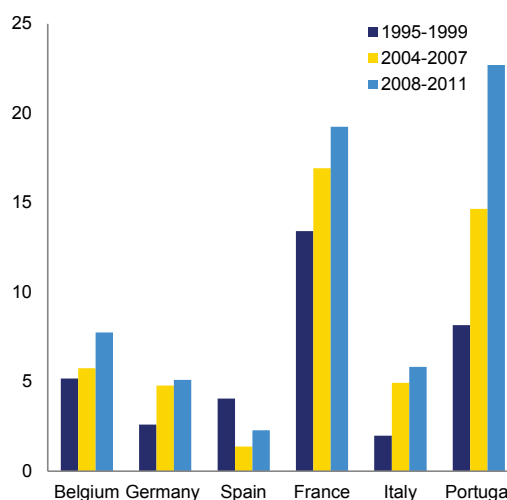
(1) Shares other than securities, liabilities of the non-financial corporate sector as % of GDP.

Source: Eurostat, Financial accounts.

Cross-country differences in corporations' external funding have become particularly large for bank loans and bonds, while the dispersions in equity financing generally follow the ups and downs of the stock market. The corporate sector receives considerably higher outside financing through

bonds and other debt instruments in France and Portugal than in the four other countries analysed in this section. Sectoral data for 2004-07 in the BACH database⁽⁶⁶⁾ suggests that the high level of bond financing in Portugal in this period is concentrated in sectors such as utilities, wood and paper products and information and communication. In these sectors outstanding corporate debt securities compared to and even exceeded bank loans.

Graph II.3.8: **Corporate debt markets, selected euro area economies (average, in % of GDP)**



1) Securities other than shares, liabilities of the non-financial corporate sector as % of GDP.

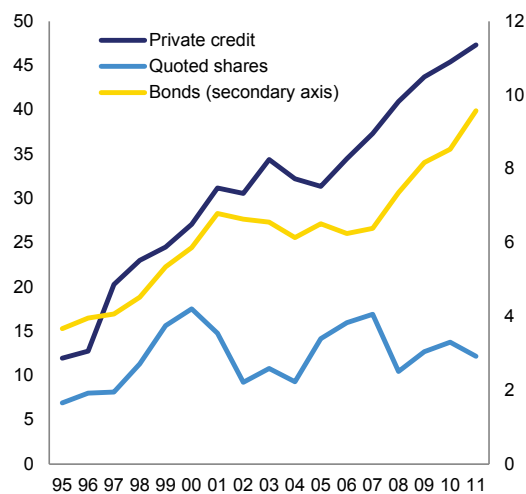
Source: Eurostat, Financial accounts.

The cross-country dispersion of credit (as measured by the standard deviation of outstanding credit to non-financial corporations as % of GDP) has increased by 80% during 2004-07 relative to 1995-99, for the euro area countries selected in the analysis. Equity markets have also experienced a rapid increase in dispersion between the two periods, but somewhat less pronounced, by only 40%, as shown in Graph II.3.9. During the crisis years, 2008-11, the dispersion increased even further in the credit markets, by 30%, while the quoted equity issuance has seen a sharp decrease of 15%, reflecting, on one side, the very slow deleveraging process in the credit markets, and on

⁽⁶⁶⁾ The BACH database aggregates individual firm accounting statements by sector of economic activity. It is published by the European Committee of Central Balance-Sheet Data Offices (ECCBSO).

the other side, the impact of the global recession on equity issuance. The corporate bonds markets have closely followed the developments in the credit markets, although the pattern is less pronounced (Graph II.3.9).

Graph II.3.9: **Cross-country dispersion in credit, equity and bonds markets**
(standard deviation of the ratio to GDP, %)



(1) BE, DE, FR, ES, PT, and IT.

Source: Eurostat, Financial accounts.

The balance sheet structure of financial institutions at the beginning of the crisis, as illustrated by the ratio of total assets to loans, shows to what extent financial sector balance sheets were dominated by non-traditional bank business, such as money market and corporate debt (Graph II.3.10). A higher ratio indicates a financial sector that has diversified more its asset portfolio towards assets other than traditional bank lending.⁽⁶⁷⁾

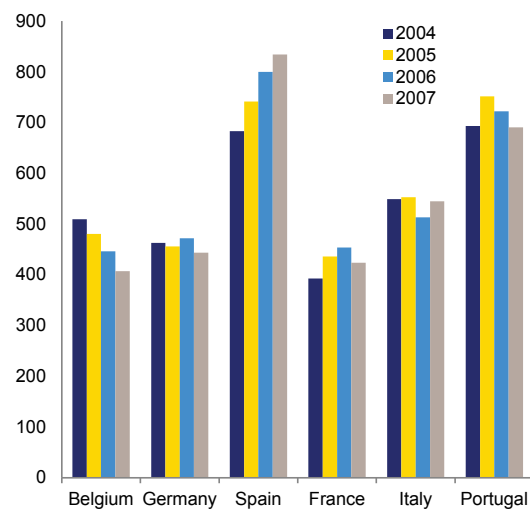
Just before the crisis in 2007, financial institutions in the euro area periphery, notably in Spain and Portugal, had a relatively high weight of asset categories other than bank loans, compared to the core euro area economies (DE, BE and FR). Despite the rapid increase in traditional lending after 2004, the MFIs in these countries, notably in Spain, have also seen a steady increase in the share of their non-core business. By contrast, in the core euro area economies (in particular in Belgium and Germany) the ratio of total assets to loans either

⁽⁶⁷⁾ The ratio does not reveal the relative distribution of non-core business among banks and other financial intermediaries in a given country.

decreased or remained relatively stable, indicating that the financial sector in these countries remained relatively more oriented towards traditional bank lending.

However, financial institutions appear to have been more leveraged in the core euro area economies than in the periphery in the beginning of the crisis, as measured by the ratio of capital and reserves to total assets/liabilities (Graph II.3.11). A lower ratio of capital to total liabilities indicates a higher leverage. Even though financial intermediaries in Spain and Portugal were less leveraged than the ones in the core euro area Member States at the onset of the crisis, the share of capital in their balance sheets had been steadily declining since 2004.

Graph II.3.10: **MFIs balance sheet structure**
(in %)



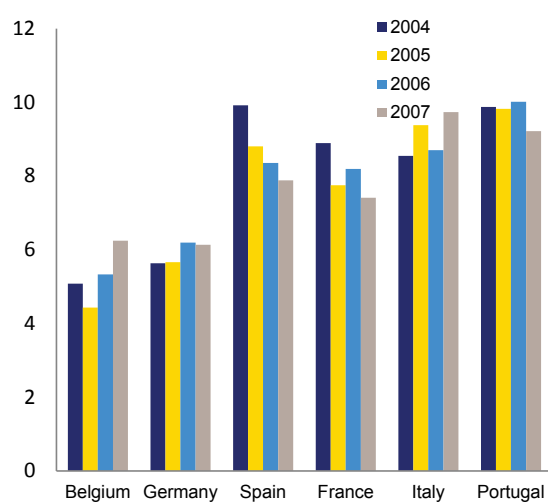
(1) Total financial assets as % of loans, monetary financial institutions.

Source: ECB, MFIs balance sheet database.

The increase in dispersion in the different measures of financial development and sizable differences in the balance sheet structure and exposure of the financial institutions between the core and the periphery are likely to have led to an asymmetric impact of the crisis on financially dependent industries in these economies. Whereas the years after 1999 have been characterised by deepening financial market integration in the wake of the EMU completion, the dispersion in MFI balance sheet structure and financial market size during the pre-crisis boom years has placed the

countries in different positions vis-à-vis MFIs' deleveraging and tighter credit conditions post-2008. The econometric analysis presented later in this chapter tests the differential impact of worsening financing conditions in the core and the periphery of the euro area during the crisis with a view to explain growth differentials.

Graph II.3.11: **Capital and reserves to total assets/liabilities (in %)**



(1) Capital and reserves as % of total assets/liabilities, monetary financial institutions.

Source: ECB, MFIs balance sheet database.

3.4. QUANTIFYING EXTERNAL FINANCIAL DEPENDENCE

Estimating the sector-specific external financial dependence is a key step in assessing the impact of finance on growth. Actual data on credit flows to economic sectors contain information regarding credit demand and supply realized on a particular financial market at a given moment in time. Therefore financial dependence needs to be measured in relation to a sector's own cash flow, which is usually the first source of investment expenditure. It also needs to be considered part of time-invariant characteristics specific for each sector. Moreover, even when measured as the gap between own and outside funding for investment, external financial dependence is likely to be affected by a range of factors. For instance, business cycle fluctuations may play a role. A technology shock in one sector will boost its investment spending and will temporarily push

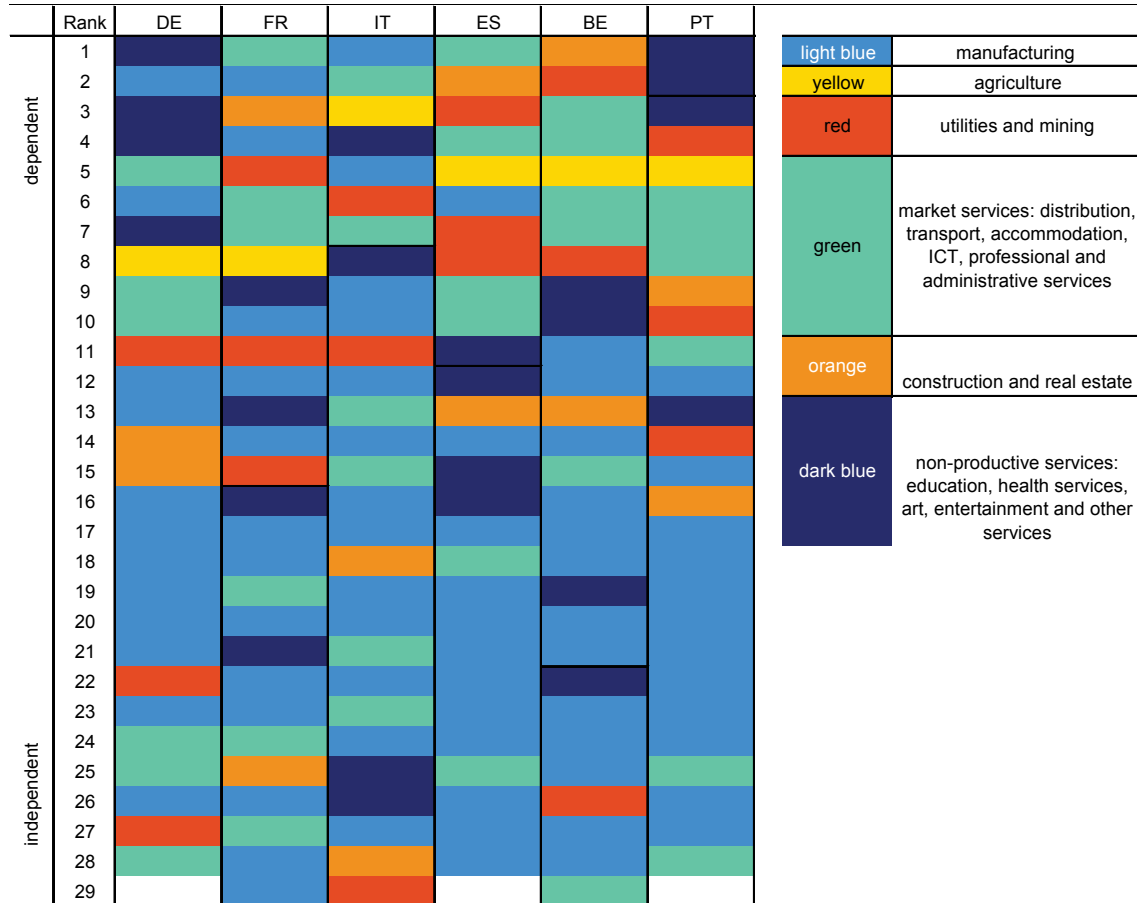
measured external dependency up. Measures of external dependency can also be affected by credit rationing. Credit rationing plays a role in financial intermediation because of information asymmetry between borrowers and lenders. The asymmetry increases the costs of capital and smaller firms in particular often fall short of securing the amount of outside capital that their sector-specific technology requires.

The information contained in external funding data creates difficulties in disentangling demand and supply determinants of external dependency. Combined with data scarcity this has led Rajan and Zingales (1998), as well as subsequent studies, to use a measure of external financial dependence that is not only sector-specific, but also common to all countries. In Rajan and Zingales (1998) this measure is the sectoral gap between investment and operating cash flow, based on large-company US data. If, as assumed by the authors, the supply of capital for large firms in the US is very elastic, the gap mostly represents the extent to which firms in a given sector are in need of outside funding due to reasons beyond credit supply. The authors assume further that this measure of dependency should be a good proxy for the underlying demand for external funds as driven by technological and structural factors (not related to financial development) in all other countries in their sample.

In practice, the assumption of common underlying external funding needs across countries has never been tested due to the lack of data. There are, however, reasons to suspect that these needs could vary across countries in some sectors. In particular, growth in the non-tradable/services sectors tends to be driven by country-specific factors rather than EU (or worldwide) trade-related factors. This may translate into different underlying funding needs. There are also factors which affect corporate savings (e.g. taxation and the level of competition), which vary to some degree across the euro area. Finally, even in manufacturing sectors, demand for external funding may vary across countries if the sub-sector composition of this sector varies across countries.

In order to account for the heterogeneity among countries, a sector and country-specific measure of external financial dependence of economic sectors in the pre-boom-EMU years, 2000-04, is used here. It is calculated as the gap between operating

Table II.3.1: Dependence on external finance, 29 sectors (avg., 2000-2004)



Source: BACH database.

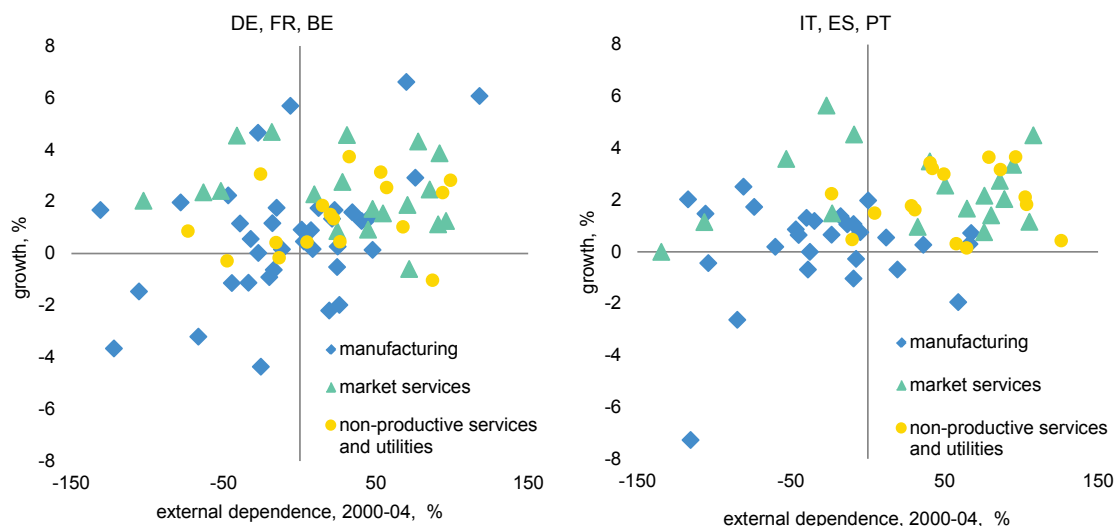
profits and investment in tangible fixed assets, scaled by investment in tangible fixed assets. Data on operating profits and investment come from the BACH database. The analysis includes six euro-area Member States (DE, FR, BE, IT, ES, and PT) and 29 sectors (13 manufacturing sectors disaggregated at 2-digit NACE Rev. 2 level, and 16 sectors, including market services and other public support sectors disaggregated at 1-digit, NACE Rev. 2 level).⁽⁶⁸⁾ The period choice is dictated by several considerations. The measure should be taken as an average over a period long enough to mitigate short-term fluctuations in activity. As the econometric analysis presented later in the chapter focuses on the crisis and its aftermath, a pre-crisis value of the indicator of external financial dependence is required to mitigate endogeneity that arises from the fact that

sectors that grow faster would also tend to become more reliant on outside funding. This is because the quantity and possibly also the quality of collateral increases as firms' output grows. Hence their borrowing terms improve, increasing credit demand. Pre-crisis boom years (2005-07) may be associated with some cyclical distortions in funding needs and should preferably be excluded. Finally, pre-2000 data cannot be considered due to limitations in data availability in the BACH database.

The measure of external dependence varies significantly across sectors. This is illustrated in Table II.3.1, where the different sectors of economic activity are ordered by rank from more externally dependent to less dependent. This divergence motivates the use of a country- and sector-specific external dependence indicator in the empirical analysis in the chapter. The average

⁽⁶⁸⁾ See Annex I for more information on the sectors included in the analysis.

Graph II.3.12: **Dependence on external finance and growth, selected sectors**
(avg., 1996-2011)



(1) External dependence is the gap between investment in tangible fixed assets and net operating profit. Market services are distribution, transport, accommodation and food services, information and communication, real estate, professional, scientific and technical activities and administrative and support services. Non-productive services are education, health services, art, entertainment and other services. NACE Rev. 2. Coefficients of correlation (DE, FR, BE) manufacturing: 27.6%*; market services: 9.6%; non-productive services and utilities: -12.9%. Coefficients of correlation (IT, ES, PT) manufacturing: -20.0%; market services: 18.3%; non-productive services and utilities: 19.2%.

* denotes statistical significance at 10% confidence level.

Source: Source: BACH, Eurostat.

external dependence at the beginning of the 2000s is consistently high in certain sectors and low in others in all countries.⁽⁶⁹⁾ The non-tradable/services sectors, with the exception of distribution industries and information and communication, come out more dependent on external funding than the manufacturing sectors.

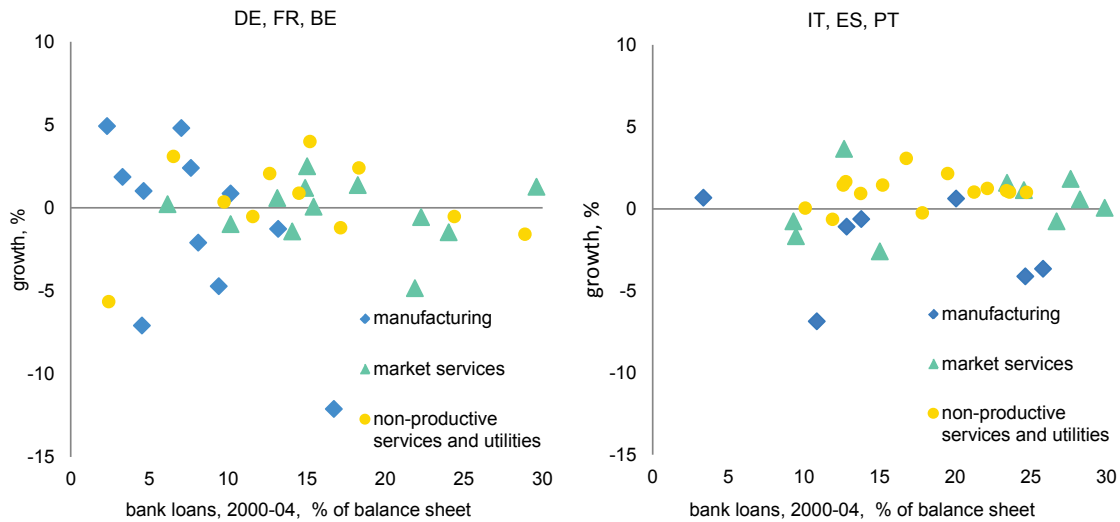
Among the manufacturing sectors, only computers and electronics and the motor vehicle industries seem to be as dependent on external funds as most

non-tradable/services sectors.⁽⁷⁰⁾ Non-tradable/services sectors appear to have more external funding needs than the manufacturing sectors in all countries, likely to reflect a technological need for more infrastructure investment than the manufacturing sector, but also lower operating profitability for some non-tradable sectors, such as construction and real estate. A good example of both of these reasons behind higher dependence being valid at the same time is air transportation, which is very capital-intensive, while suffering from low profitability, likely because of high oil prices, environmental taxes and competition, which are expected to remain such. Agriculture is consistently high in the rankings of externally dependent sectors due to relatively thin profit margins coupled with moderate to high investment needs in what has in recent decades become a much more capital intensive sector. The pharmaceutical industry on the other hand appears

⁽⁶⁹⁾ Similarly to the US data, aggregated from a sample of large publicly traded manufacturing firms, presented in Rajan and Zingales (1998), manufacturing sectors such as textiles and wearing apparel are relatively externally independent, while others such as motor vehicles are relatively externally dependent in the euro area countries included. This is not surprising as the technological characteristics of manufacturing sectors and their capital intensity should not differ substantially between the euro area Member States and US. Yet, some variation of the relative position of sectors between the euro area data for the early 2000s and the US data in Rajan and Zingales (1998) (data computed for the 1980s) can be expected. A notable example is the pharmaceutical sector, which was very externally dependent in the US in the 1980s and much less dependent in the euro area countries in the early 2000s. This fact explains why an average external dependence over a recent period is used in the empirical analysis.

⁽⁷⁰⁾ Computer and electronics and motor vehicles are relatively less dependent on external financing in the smaller countries in the sample – Belgium and Portugal. It is perhaps due to the fact, that some firms in these sectors are foreign owned and are less able to engage in independent investment.

Graph II.3.13: **Bank credit and growth, externally dependent sectors**
(avg., 2009-2011)



(1) The graph shows only sectors that are in the top half of the ranking from externally dependent to externally independent sectors. Market services are distribution, transport, accommodation and food services, information and communication, real estate, professional, scientific and technical activities and administrative and support services. Non-productive services are education, health services, art, entertainment and other services. NACE Rev. 2. Coefficients of correlation (DE, FR, BE) manufacturing: -61.6%**; market services: -3.5%; non-productive services and utilities: 9.8%. Coefficients of correlation (IT, ES, PT) manufacturing: -28.6%; market services: 11.4%; non-productive services and utilities: 20.6%. Cross-country dispersion in credit, equity and bonds markets (1)

** denotes statistical significance at 5% confidence level.

Source: BACH, Eurostat.

less dependent on outside funding in all six countries, likely due to robust profits during the early 2000s that are assumed to be a more or less permanent feature of this sector.

Beyond these similarities, important country differences stand out. A range of services with a relatively low degree of market competitiveness, defined as non-productive services, such as arts and entertainment, health services and utilities, likely to be more regulated and influenced by national public spending policies, show a marked divergence in external dependence in the six countries. These are joined by construction and real estate which also follow more country-specific developments, such as booming demand in local housing and commercial property markets.

There seems to be no significant correlation between external dependence and average sectoral growth between 1996 and 2011 either in the core or the periphery countries in the sample. There is one exception, the manufacturing industries in the core euro-area economies. (Graph II.3.12) This fact supports the approach of looking at the

finance-growth nexus by comparing the growth performance of sectors that are in need of outside capital and at the same time operate in different financial intermediation conditions.

For example, Graph II.3.13 shows a negative correlation between average sectoral growth after 2009 and the pre-crisis ratio of bank credit to total assets in the externally dependent manufacturing sectors in the core countries. Given an ex-ante developed credit market, finance-hungry manufacturing sectors that were more exposed to bank credit in 2000-2004, could be expected to be growing slower since the start of the crisis, when bank balance sheets shrank and credit conditions deteriorated.

On the other hand externally dependent services in the core countries as well as all externally dependent sectors in the periphery do not show a significant correlation between the indicator of ex-ante bank credit development and growth during the crisis, reflecting a differentiated crisis impact on the various industries and countries. In the euro core, manufacturing took a bigger hit during the

steep drop in demand in the initial crisis years than the non-productive services and utilities, and perhaps in these countries a pre-crisis exposure to financial intermediation played a more important role relative to other factors in exacerbating the negative demand impact on growth.

The next section looks further into the differentiated impact of the crisis on sectoral growth stemming from the interaction between financial development and sectors' financial dependence by using a panel econometric framework. It also sheds some light on possible changes brought by the crisis in the growth-finance relationship.

3.5. FINANCIAL DEPENDENCE ON EXTERNAL FUNDS AND GROWTH DURING THE CRISIS

Have the industries that are more dependent on external finance been hit harder during the current crisis in the euro area? In a well-functioning complete financial market, there should be no cost wedge between internal and external financing for a firm, and industrial growth should not be affected by the source of funding. However, such a wedge occurs when there is a differential in financial development or a change in finance supply during a crisis. The wedge leads to a differentiated impact of a crisis on industrial growth in industries that are dependent on external funds relative to industries that rely more on internal funding. Therefore, the econometric analysis presented below aims at measuring this differentiated impact of the crisis on growth in industries that are more dependent on external finance and how this impact depends on country differences in the development of the main market funding channels or country differences in MFIs balance sheets.

3.5.1. Data and methodology

Following Rajan and Zingales (1998), a number of studies have analysed the growth finance nexus using industry data on growth and applying across all countries in the sample an industry-specific indicator of external financial dependence built by Rajan and Zingales (1998) using U.S. firm-level data for the manufacturing sector. The methodology used here to identify the differentiated impact of the crisis on industrial

growth in industries that are more dependent on external funds follows largely the approach proposed by Bijlsma et al. (2013), and previously by Dell'Araccia et al. (2008), using a country and industry specific indicator of external financial dependence.

As already highlighted in Section 3.3, for the purpose of the analysis in this chapter, which is to look at the differentiated impact of the current crisis on industrial growth among euro-area economies with a similar stage of development in financial markets, a financial dependency indicator is constructed from data collected in each country in the early euro period, 2000-2004. The indicator differs across countries, and it is more suitable than a common indicator for all countries as it captures to a large extent the pre-crisis, pre-boom, country-specific financial market demand and supply determinants in the euro area. Besides all manufacturing industries of the previous studies it also includes all market services and a number of non-market public support services sectors such as art and entertainment, education and health services.

To better understand the possible channels through which the crisis may have affected growth in industries that are more dependent on external finance, the regressions include interaction terms combining the external dependence indicator and various measures of financial development and/or financial institutions' balance sheet structure. These include measures of the size of equity, bond and credit markets as well as measures of MFIs' balance sheet structure and leverage. Contrary to the external dependency variable which is available by country and by industry, a majority of the financial development and MFIs indicators are available only at the country level.⁽⁷¹⁾ Interacting the external dependence indicator with these financial development measures allows testing for a differentiated crisis effect on growth in industries that are more dependent on external funds due to country-specific differences in financial development, or differences in MFIs' balance sheet structure.

Similarly to the financial dependence indicator, the financial development variables are averaged for

⁽⁷¹⁾ The two exceptions are the bond and the credit indicators which are available at the industry and country levels.

the period 2000-04. The period should be sufficiently distant from the main period of interest in this analysis (the global financial crisis and its aftermath) to reduce as much as possible any endogeneity issues. However, it should also cover the early years of the euro to include possible structural breaks caused by the introduction of the single currency while avoiding any distortions brought by the overheating seen in some Member States at the peak of the cycle. The measures of MFIs' balance sheet structure and leverage are taken for the year 2007 to capture vulnerabilities in the financial sector existent at the onset of the crisis.

To capture country differences in financial development, several measures have been considered: 1) quoted shares liabilities of the non-financial corporate sector to GDP, by country k ($qshares_gdpk$); 2) two measures that vary also by industry j : bonds issued by industry j in country k ($bondsj,k$) and bank credit of industry j in country k ($bank_creditj,k$), as a share of the industry j balance sheet, and 3) the ratio of total assets of MFIs to loan assets ($MFI_bs_structurek$) by country k , as a measure of financial sector balance sheet structure. The measure of the MFIs' balance sheet structure (i.e. the ratio of total assets to loans) is interpreted as the degree of asset diversifications away from bank loans in financial intermediation conducted by monetary financial institutions (MFIs). An additional variable measuring exposure of MFIs through leverage has also been included: 4) the ratio of capital and reserves to total assets/liabilities ($MFI_leveragek$) by country k . Data for the variables (1) are from Eurostat, financial accounts balance sheet database, for the variable (2) and (4) from ECB, MFIs balance sheets, while the data for both industry-country specific variables (3) are from the BACH database.

Growth in real gross value added has been defined as the natural logarithm of real gross value added at time t minus $t-1$, while the size of the sectors has been computed as the natural logarithm of the ratio of real gross value added in industry j in country k to real total gross value added of country k at time t . Data are from Eurostat for the period 1995-2011, chain-linked volumes, reference year 2005.

The empirical results are derived from a panel regression analysis based on industry and financial

data for six euro area countries for the period 1995-2011. While the regressions are run for the period 1995-2011, the analysis focuses on possible changes in the growth-finance relationship since the global financial crisis. This is done by testing changes in the overall estimated relationship with dummies for the period 2008-11. As this period covers several cyclical phases, the last two years (2010-11) are also looked at separately in order to disentangle the possible recessionary effects of a credit crunch episode caused by the global financial crisis from more persistent effects also observed during the ensuing (and short-lived) recovery. As the available data end in 2011, it is unfortunately not possible to analyse the full effects of the sovereign crisis. Several alternative crisis dummies have been considered in the benchmark regression to account for different developments during the crisis: dummy for 2008/09-11, dummy for 2010-11, and dummy only for 2011.

The regressions include several control variables such as country-time effects to control for macroeconomic fluctuations at the country level as well as industry-country fixed effects. Moreover, in order to account for shocks which could affect specific industries across all countries (e.g. related to internal market integration or to changes in common euro area risk premia), industry-time effects are also included.

Growth in value added in industry j at time t in country k ($y_{j,k,t}$) is regressed on three sets of fixed effects - industry-country ($d_{j,k}$), country-time ($d_{k,t}$), and industry-time ($d_{j,t}$) - and an interaction term given by the product of the financial dependence measure for industry j in country k ($ExtDep_{j,k}$), the crisis dummy for year t ($CRISIS_t$), and a measure of financial development in country k ($FINDEV_k$).⁽⁷²⁾ As in Rajan and Zingales (1998), the lagged share of industry j in

⁽⁷²⁾ The interaction between the external dependence indicator and the crisis dummy has been also included alone to control for omitted variable bias due to the fact that the external dependence indicator used in this analysis varies both by country and by industry, and the three sets of fixed effects (country-industry, country-time, and industry-time) do not capture shocks that vary simultaneously across countries, industrial sectors and time. The interaction between the country-specific financial development indicator and the crisis dummy does not need to be included alone in the regression as its effect would be captured by the country-time fixed effects.

country k (SIZE_{j,k,t-1}) is included to account for "convergence" effects, i.e. larger sectors tend to experience slower growth. The benchmark regression is:

$$y_{j,k,t} = \sum_k \alpha_{j,k} d_{j,k} + \sum_k \beta_{k,t} d_{k,t} + \sum_{jt} \gamma_{j,t} d_{j,t} + \delta_1 \text{EXTDEP}_{j,k} + \delta_2 \text{EXTDEP}_{j,k} \cdot \text{CRISIS}_t + \delta_3 \text{EXTDEP}_{j,k} \cdot \text{CRISIS}_t \cdot \text{FINDEV}_k + \dots + \gamma \text{SIZE}_{j,k,t-1} + \varepsilon_{j,k,t} \quad (1)$$

A negative and significant δ_1 indicates that the crisis has had a relatively worse impact on industries that are more financially dependent on external funds, while a negative and significant δ_2 indicates that the crisis has had a differentiated relatively worse impact on industries that are more dependent on external finance relative to industries that rely more on internal funding even in countries with a more ex-ante developed financial market. The fixed effects control for most shocks affecting industry performance, global shocks to the industry and aggregate country-specific shocks, correcting for omitted variable bias. The external dependence variable alone also captures to a certain extent shocks varying simultaneously across countries, industrial sectors and time. Yet, it is not a perfect industry-country-time fixed effect as its variability in time is limited to the 2000-04 average and some shocks that vary simultaneously across countries, industrial sectors and time might not be accounted for.

3.5.2. Results

Table II.3.2 reports the results for the model specification in equation (1) above for different measures of financial development and/or MFIs balance sheet structure, including all market sectors. In this specification value added growth is related to dependence on external finance, the interaction term given by the product between the financial dependence indicator and the different measures of financial development and/or MFIs balance sheet structure, and the size of the industry. The results obtained with the different measures of financial development are presented separately as different specifications of the model in Columns (1) to (5). All specifications include fixed effects for country-industry, country-year and industry-year combinations (not reported). A dummy for the peripheral euro-area economies (i.e. ES, PT and IT), *Periphery*, is also considered in the regressions, interacted with the regressors related to the financial dependence indicator. The

estimated coefficient should be interpreted as a differential relative to the estimate for the rest of the countries in the sample (i.e. DE, FR and BE), and is reported in the second row after the results for each regressor in the tables below.

Table II.3.4, Table II.3.6 and Table II.3.7 report the results for the model specification in equation (1) above for the same measures of financial developments and/or MFIs balance sheet structure, when restricting the industry sample to manufacturing, market services and non-productive public services sectors respectively. The results show that industries that are more dependent on external finance have been hit during the crisis differently depending on whether they belong to the manufacturing or non-manufacturing/services sectors or whether they are located in the periphery or the core of the euro area. The results should be interpreted as the differentiated impact over the crisis on growth in industries that are more dependent on external funds relative to growth in industries that rely on internal funding (for example internal cashflow).

3.5.3. All market sectors

The results for the whole sample (all sectors except the non-market public support services sectors and utilities) show that the differentiated effect over the crisis period, 2009-11, on the sectors that are more dependent on external funds relative to the sectors that rely more on internal funding has actually been positive, notably in the core countries where either credit or bonds markets were ex-ante more developed. More developed financial markets have, to some extent, helped cushioning the impact of the crisis. Well-developed credit markets seem to have helped in the early stage of the crisis (2008-09) even if this effect turns negative during the ensuing limited recovery (2010-11) (Column (3)). Well-developed bond markets appear to have been a positive factor for growth in externally dependent sectors and more significantly so over the 2010-11 period, probably reflecting intensified pressures on the corporate sector to diversify credit sources and move away from bank credit (Column (2)). When looking at the second stage of the crisis, in 2011, the effects on growth in industries dependent on external funds are coming mainly through changes which occurred in the MFIs' balance sheet structure and leverage (Column (4) and (5)).

Table II.3.2: Impact on growth in value added, all market sectors

Market sectors										
Variable	1		2		3		4		5	
	2009-11	2010-11	2009-11	2010-11	2009-11	2010-11	2009-11	2011	2009-11	2011
Crisis dummy (C)										
Interaction: ExtDep x C	-0.0636	-0.084	-0.0056	-0.0159*	-0.0409*	0.0347	2.3319**	5.9537***	-0.2553	-0.6251**
Periphery x ExtDep x C	0.0828	-0.1418	-0.0044	0.0023	0.0118	-0.0274	-2.2829**	-5.9536***	0.2342	0.6365**
Interaction: ExtDep x C x QSHARES (k)	0.0193	0.0212								
Periphery x ExtDep x C x QSHARES (k)	-0.0263	0.044								
Interaction: ExtDep x C x BONDS (j, k)			0.0099*	0.022***						
Periphery x ExtDep x C x BONDS (j, k)			-0.0115**	-0.0229***						
Interaction: ExtDep x C x BANK CREDIT (j, k)					0.0238**	-0.021*				
Periphery x ExtDep x C x BANK CREDIT (j, k)					-0.0135	0.0167				
Interaction: ExtDep x C x MFI bs structure (k)							-0.3838**	-0.9853***		
Periphery x ExtDep x C x MFI bs structure (k)							0.3756**	0.9845***		
Interaction: ExtDep x C x MFI leverage (k)									0.1649*	0.3839**
Periphery x ExtDep x C x MFI leverage (k)									-0.1565	-0.3922**
Size of industry j in country k (t-1)	-0.1408***	-0.1401***	-0.1607***	-0.1582***	-0.1216***	-0.1339***	-0.1367***	-0.1355***	-0.1389***	-0.1375***
industry-country, f.e.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
industry-time, f.e.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
country-time, f.e.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Note: ***, ** and * denote respectively statistical significance at 1, 5 and 10%

The number of observations is 2006. The number of regressors including fixed effects is 418. Periphery is a dummy for the euro-area periphery economies (ES, PT, and IT).

The estimate for the countries in the sample other than the periphery is reported on the rows called Interaction. The estimated coefficient for the Periphery should be interpreted as the differential relative to the estimate for the rest of the countries in the sample, to be added to the row Interaction.

Source: European Commission Services.

Finally, the development of equity market does not seem to have played a particular role during the crisis period. This obviously does not mean that equity markets do not matter for long-term growth but rather that their effect on growth in industries that are more dependent on external funds has not changed during the crisis (Column (1)).

Turning to the effect of MFIs balance sheets, a higher degree of diversification of MFIs balance sheet away from traditional bank lending (as measured by the ratio of MFIs total assets to loans) seems to have acted as a magnifier of the impact of the crisis on growth in industries more dependent on external funding, probably reflecting MFIs' poor management of non-loan assets in the pre-crisis period (Column (4)). A high leverage appears to have had a similar effect (Column (5)). As further discussed hereafter, these two effects are, however, essentially visible in core euro area economies and not in the periphery.

While the above general picture holds broadly true for core economies, results in the periphery sometimes differ significantly (see Table I.1, Columns (1) to (5), Row (Periphery)). The cushioning effect of deep bond markets appears to be essentially present in core countries and small or insignificant in the periphery. More importantly, MFIs balance sheet effects appear to be quite different in the periphery. A financial sector with a diversified assets structure appears to have been

much less detrimental for growth in externally dependent sectors in the periphery, the impact being much less negative or even close to zero in the periphery relative to the core, reflecting a less unfavourable effect stemming from the MFIs diversified asset structure in the periphery (Column (4), Row (Periphery)).

Lower leverage of MFIs balance sheet, as measured by the ratio of capital to total liabilities, has benefited industrial growth in the core euro area economies. The favourable impact has, however, been much lower or even close to zero in the periphery although this should be weighed against an overall much lower leverage in the periphery than in the core at the onset of the crisis. (Column (5), Row (Periphery)).

The estimated asymmetric effect of the development of financial markets in the periphery relative to the core is likely to be explained by special features of the crisis, including a burst in the asset price bubble and a correction in weak MFI balance sheets. It should not be interpreted as a long-term impact of financial development on growth.

The estimated coefficients in Table II.3.2 are economically sizeable, notably for the interaction terms with the MFIs balance sheet structure variables (Column (4) and (5)). This holds mostly for the core euro-area economies, the estimated

effects for the periphery being very close to zero (Table II.3.3). It is important to note that MFIs' balance sheet structure as measured by the ratio of total assets to loans seems to have had a much higher impact in magnitude on industrial growth in financially dependent sectors than the MFIs leverage.

An increase in financial dependence on external funds from its 25th percentile to its 75th percentile in a country with the most diversified MFIs' balance sheet structure (highest ratio of assets to loans) in comparison to a country with the least diversified MFIs' balance sheet structure (lowest ratio of assets to loans), or in a country with the lowest MFIs leverage (highest ratio of capital to total liabilities) in comparison to a country with the highest MFIs leverage (lowest ratio of capital to total liabilities), has the following impact on value added growth rates in percentage points:

impact, likely due to enhanced connection between financial markets and trade-oriented sectors. Third, the positive effect of bond markets on growth in externally dependent sectors is also present in the periphery.

Table II.3.3: **Average effects of the MFIs' balance sheet structure and leverage on growth in industries dependent on external funds over the crisis**

MFIs balance sheet structure		95% confidence interval	
2009-11	Core	-0.550	-0.002
	Periphery	-0.559	0.547
2011	Core	-1.147	-0.271
	Periphery	-0.885	0.884
MFIs leverage			
2009-11	Core	-0.020	0.202
	Periphery	-0.236	0.245
2011	Core	0.033	0.391
	Periphery	-0.390	0.381

Source: European Commission Services.

3.5.4. Further sectoral breakdown: tradable vs. non-tradable sectors

The general picture for all industries holds by and large also true for manufacturing. However, econometric results differ in three ways when the sample is restricted to manufacturing industries (see Table II.3.4, Columns (1) to (5)). First, equity markets now seem to matter: deep equity markets have helped cushioning the impact of the crisis of externally dependent sectors over the later part of the sample (2010-11) both in the core and the periphery. Second, the impact of MFIs balance sheet is qualitatively the same as in the overall sample but much larger, and the above-mentioned differences between the core and the periphery are also much larger. This suggests that manufacturing industries that are dependent on external funds have been relatively more exposed to the crisis

Table II.3.4: Impact on growth in value added, manufacturing sectors

Manufacturing										
Variable	1		2		3		4		5	
Crisis dummy (C)	2009-11	2010-11	2009-11	2010-11	2009-11	2010-11	2009-11	2011	2009-11	2011
Interaction: ExtDep x C	-0.3102	-0.4791*	-0.0278	-0.0337	-0.0776**	0.0177	4.962*	16.7036***	-0.6977**	-1.8691***
Periphery x ExtDep x C	0.3584	0.1987	0.0089	0.0098	0.0423	-0.0011	-4.9113*	-16.7342***	0.6293*	1.7169***
Interaction: ExtDep x C x QSHARES (k)	0.0819	0.1159*								
Periphery x ExtDep x C x QSHARES (k)	-0.0982	-0.0353								
Interaction: ExtDep x C x BONDS (j, k)			0.0025	0.0246**						
Periphery x ExtDep x C x BONDS (j, k)			-0.0042	-0.0217						
Interaction: ExtDep x C x BANK CREDIT (j, k)					0.0449***	-0.0354*				
Periphery x ExtDep x C x BANK CREDIT (j, k)					-0.0327	0.0263				
Interaction: ExtDep x C x MFI bs structure (k)							-0.8207*	-2.7721***		
Periphery x ExtDep x C x MFI bs structure (k)							0.8116*	2.7753***		
Interaction: ExtDep x C x MFI leverage (k)									0.4271**	1.1108***
Periphery x ExtDep x C x MFI leverage (k)									-0.3974*	-1.0396***
Size of industry j in country k (t-1)	-0.1473***	-0.1458***	-0.1472***	-0.1436***	-0.1111***	-0.1396***	-0.1338***	-0.13***	-0.1411***	-0.14079***
industry-country, f.e.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
industry-time, f.e.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
country-time, f.e.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Note: ***, ** and * denote respectively statistical significance at 1, 5 and 10%.

The number of observations is 1116. The number of regressors including fixed effects is 268. Periphery is a dummy for the euro-area periphery economies (ES, PT, and IT).

The estimate for the countries in the sample other than the periphery is reported on the rows called Interaction. The estimated coefficient for the Periphery should be interpreted as the differential relative to the estimate for the rest of the countries in the sample, to be added to the row Interaction.

Source: European Commission Services.

The picture is rather different for market services sectors, which seem to have been driven mostly by country-specific characteristics others than the level of development of financial markets (see Table II.3.6, Columns (1) to (5)). Service sectors more dependent on external funding have generally not been hit more severely by the crisis than the less financially dependent ones. Furthermore, there is no clear evidence that the level of financial market development or MFIs balance sheets made any significant difference.

3.5.5. Manufacturing

When restricting the sample to the manufacturing sectors, the estimated impact coefficients grow in magnitude relative to the estimates with the entire sample. Among all interaction variables, the greatest impact on growth comes from the interaction of industrial financial dependence with MFIs balance sheet structure/leverage (Column (4) and (5)), the effect being again asymmetric in the core vis-à-vis the periphery (see Table II.3.4, Columns (1) to (5), Row (Periphery)).

In the manufacturing sector, an increase in financial dependence on external funds from its 25th percentile to its 75th percentile in a country with the most diversified MFIs' balance sheet structure (highest ratio of assets to loans) in comparison to a country with the least diversified MFIs' balance sheet structure (lowest ratio of assets to loans), or in a country with the lowest

MFIs leverage (highest ratio of capital to total liabilities) in comparison to a country with the highest MFIs leverage (lowest ratio of capital to total liabilities), has the following impact on value added growth rates in percentage points:

Table II.3.5: Average effects of the MFIs' balance sheet structure and leverage on growth in industries dependent on external funds over the crisis - manufacturing sector

MFIs balance sheet structure		95% confidence interval	
2009-11	Core	-1.046	0.032
	Periphery	-1.089	1.078
2011	Core	-2.545	-0.880
	Periphery	-1.672	1.676
MFIs leverage			
2009-11	Core	0.024	0.381
	Periphery	-0.370	0.399
2011	Core	0.242	0.812
	Periphery	-0.577	0.645

Source: European Commission Services.

This holds mostly for the core euro-area economies, the estimated effects for the periphery being largely around zero (Table II.3.5). It is important to note that both the MFIs' balance sheet structure and leverage have a much larger effect during the second phase of the crisis, notably in 2011.

Table II.3.6: **Impact on growth in value added, market services sectors**

Services sectors	1		2		3		4	
Variable	2009-11	2010-11	2009-11	2010-11	2009-11	2010-11	2009-11	2011
Crisis dummy (C)								
Interaction: ExtDep x C	0.0578	0.0563	0.0055	0.0056	0.0546**	-0.0054	-0.8345	-0.0673
Periphery x ExtDep x C	-0.1184	-0.1422	-0.0017	-0.0049	-0.1188**	-0.0987	0.6561	-0.3686
Interaction: ExtDep x C x QSHARES (k)	-0.0141	-0.0154						
Periphery x ExtDep x C x QSHARES (k)	0.0329	0.0399						
Interaction: ExtDep x C x BONDS (j, k)			0.0041	-0.0067				
Periphery x ExtDep x C x BONDS (j, k)			-0.0014	0.0073				
Interaction: ExtDep x C x BANK CREDIT (j, k)					-0.0209*	-0.0039		
Periphery x ExtDep x C x BANK CREDIT (j, k)					0.0449**	-0.0331		
Interaction: ExtDep x C x MFI bs structure (k)							0.1387	0.0112
Periphery x ExtDep x C x MFI bs structure (k)							-0.1106	0.0554
Size of industry j in country k (t-1)	-0.1113***	-0.1074***	-0.14***	-0.1266***	-0.1256***	-0.1122***	-0.1113***	-0.1068***
industry-country, f.e.	yes	yes	yes	yes	yes	yes	yes	yes
industry-time, f.e.	yes	yes	yes	yes	yes	yes	yes	yes
country-time, f.e.	yes	yes	yes	yes	yes	yes	yes	yes

Note: ***, ** and * denote respectively statistical significance at 1, 5 and 10%.

The number of observations is 712. The number of regressors including fixed effects is 193. Periphery is a dummy for the euro-area periphery economies (ES, PT, and IT).

The estimate for the countries in the sample other than the periphery is reported on the rows called Interaction. The estimated coefficient for the Periphery should be interpreted as the differential relative to the estimate for the rest of the countries in the sample, to be added to the row Interaction.

Source: European Commission Services.

3.5.6. Market services sectors

When restricting the sample to market services sectors, all interaction terms come out as mostly non-meaningful, with the exception of the interaction with the bank credit variable, indicating that differences in financial development and/or MFIs balance sheet structure/leverage have not played an important role for growth over the crisis period in the services sectors that were more dependent on external funds. This holds true for both core and the periphery euro area economies. The development in credit markets seems to have benefited market services sectors in the periphery, while it seems to have had a slightly negative effect in the core (see Table II.3.6).

3.5.7. Public support services sectors and utilities

The benchmark specification has also been used for a sample restricted to non-productive public support services (education, health, and other public support services, including utilities) given the credit flows observed towards these sectors during the boom years (see Table II.3.7). Growth in those non-market services sectors that are more dependent on external funds appears to have been affected by the crisis through several channels such as bank credit and equity. While the development of equity and bonds markets seem to have made growth in the financially dependent industries of these sectors worse during the crisis,

the development in credit markets appears to have had a positive effect (Column (1), (2) and (3)). This might reflect the degree of openness to private funding of these sectors, which also benefit from public spending. More developed credit markets could be beneficial to growth in these industries given that normally they do not issue equity, while they can still borrow from the credit market given public guarantees.

Growth in the non-productive sectors that are dependent on external funds such as utilities and other public support industries has been affected during the crisis only through the interaction with bank credit development and equity and bonds markets (Column (1), (2) and (3)). The MFIs balance sheet structure does not seem to come out as a significant factor affecting growth in the financially dependent industries of this sector. However, these results should be interpreted with caution due to sample size limitations.

3.6. CONCLUSIONS

The analysis presented in this chapter reveals that the financial crisis has had a negative impact on industrial sectors in the euro area that are more dependent on external funds. However, this impact has been rather asymmetric in the core vs. the periphery euro area economies and differentiated across manufacturing vs. non-manufacturing / services sectors.

Table II.3.7: Impact on growth in value added, non-productive public services sectors

Non-productive services sectors								
Variable	1		2		3		4	
Crisis dummy (C)	2009-11	2010-11	2009-11	2010-11	2009-11	2010-11	2009-11	2011
Interaction: ExtDep x C	0.8291**	0.7581*	-0.0503***	-0.0202	-0.1549***	-0.0021	-2.3537	-1.067
Periphery x ExtDep x C	-0.9878**	-1.3192**	0.0082	0.02145	0.1736	0.103	2.0273	1.0183
Interaction: ExtDep x C x QSHARES (k)	-0.2339**	-0.2046*						
Periphery x ExtDep x C x QSHARES (k)	0.2806**	0.3731**						
Interaction: ExtDep x C x BONDS (j, k)			-0.017*	-0.0223**				
Periphery x ExtDep x C x BONDS (j, k)			0.013	0.0219**				
Interaction: ExtDep x C x BANK CREDIT (j, k)					0.0494**	0.007		
Periphery x ExtDep x C x BANK CREDIT (j, k)					-0.0553	-0.0379		
Interaction: ExtDep x C x MFI bs structure (k)							0.3846	0.1784
Periphery x ExtDep x C x MFI bs structure (k)							-0.333	-0.1692
Size of industry j in country k (t-1)	-0.226***	-0.2093***	-0.2365***	-0.2067***	-0.2256***	-0.2092***	-0.2202***	-0.2086***
industry-country, f.e.	yes	yes	yes	yes	yes	yes	yes	yes
industry-time, f.e.	yes	yes	yes	yes	yes	yes	yes	yes
country-time, f.e.	yes	yes	yes	yes	yes	yes	yes	yes

Note: ***, ** and * denote respectively statistical significance at 1, 5 and 10%. The number of observations is 534. The number of regressors including fixed effects is 163. Periphery is a dummy for the euro-area periphery economies (ES, PT, and IT). The estimate for the countries in the sample other than the periphery is reported on the rows called Interaction. The estimated coefficient for the Periphery should be interpreted as the differential relative to the estimate for the rest of the countries in the sample, to be added to the row Interaction.

Source: European Commission Services.

There is some evidence that more developed financial markets as measured by the size of bank loans, bond markets or equity markets have, to some extent, helped cushioning the negative growth effect of the crisis. This effect varies, however, depending on the phase of the crisis. In particular, well developed markets for bank loans seem to have been a supporting factor in the early stages of the crisis but not over the most recent 2010-11 period. The empirical analysis also shows that MFIs balance sheet structure matters. A high degree of diversification of MFIs balance sheets away from traditional bank lending and high leverage seem to have acted as a magnifier of the impact of the crisis on the growth of industries more dependent on external funding.

These results hold for the core countries included in the analysis. In the euro area periphery some results differ significantly. This is particularly true when considering the effect of MFIs balance sheet structure, with both the diversification of MFIs asset side away from loans and MFIs high leverage having much smaller effects in the periphery than in the core.

Despite a higher dependence on external funding, the market services sectors seem to have been more sheltered than the manufacturing sector from the impairment of the market funding channels and the changes in the supply of finance since the crisis. Market services industries seem to have attracted most of the available credit in the euro area during the boom years. Yet, since the crisis,

industrial growth in these sectors has been mostly influenced by country-specific characteristics and not by their higher dependence on external funds and changes in market funding channels.

Overall, the analysis suggests that country-specific and sector-specific considerations play an important role in explaining the changing relationship between external financial dependence and growth since the onset of the crisis. The effects have been generally stronger over the later years of the crisis suggesting a more lasting impact on industrial growth mainly stemming from MFIs' balance sheet restructuring. Firms' access to finance appears to have been more severely altered by the crisis and not to have just been temporarily impaired during the sharp recession of 2008-09.

3.7. REFERENCES

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ANNEX 1

Dependence on external finance

Table II.A1.1: Dependence on external finance, 29 sectors (in %, avg., 2000-2004)

Sector	BE	DE	ES	FR	IT	PT
Agriculture	81.7	52.9	73.9	22.5	85.7	95.1
Mining	70.6	-36.6	51.5	-8.6	-617.2	75.0
Manufacture of:						
food beverages and tobacco	12.4	1.3	-73.9	-27.1	-60.1	-39.9
textile and wearing apparel	-33.6	-66.5	-84.9	-122.0	-155.4	59.0
wood and paper	40.6	19.4	-9.3	7.4	19.4	36.2
coke and refined petroleum	-105.6		-458.1	-25.6	-115.4	
chemical products	24.6	22.9	-46.7	21.1	-9.2	-38.9
pharmaceutical products	-6.1	-27.4	-212.0	-163.2	-222.3	-161.6
rubber and plastic products	45.9	-11.7	-23.6	-15.2	-7.6	-4.9
basic metals and metal products	34.6	8.4	-37.6	2.7	12.0	0.3
computer and electronics	24.9	118.0		70.1	66.2	-45.6
electrical equipment	-44.6	-17.9	-152.0	-16.9	-45.0	-116.9
machinery and equipment n.e.c.	-130.9	-39.2	-320.2	-78.3	-105.6	-17.6
transport equipment	26.1	76.0	67.4	47.9	190.7	-34.7
furniture, other manufacturing, repair	-19.9	-32.2	-80.9	-46.9	-103.9	-13.3
Electricity, gas, steam supply	-47.7	-73.3	42.1	32.6	4.4	40.7
Water supply, sewerage	93.8	26.4	86.5	20.1	64.4	96.4
Construction	37.8	16.0	1.4	-60.8	-91.4	6.1
Wholesale and retail trade	-159.9	-63.2	-184.6	-102.6	-134.5	-224.6
Transportation and storage	90.9	47.7	76.0	28.0	105.3	94.6
Accommodation and food services	71.9	44.8	32.6	24.7	-23.2	80.3
Information and communication	31.0	-41.3	-26.9	-18.3	-8.9	-53.1
Real estate activities	96.0	9.7	88.9	54.7	-262.1	75.8
Professional, scientific and technical activities	91.9	-289.0	107.8	-51.8	-106.3	64.6
Administrative and support services	77.7	85.3	40.4	70.7	50.5	86.1
Education	53.2	67.7	30.7	4.8	-178.7	57.6
Health services	15.0	87.1	-10.1	-25.7	-177.0	103.5
Art, entertainment and recreation	-15.5	207.9	28.6	-13.4	49.5	102.5
Other services	57.0	99.0	-23.5	22.2	78.9	126.0

Source: BACH database.

4. FINANCING THE REAL ECONOMY: PERCEIVED ACCESS TO BANK LOANS FOR EU FIRMS IN TIMES OF CRISIS

4.1. ACCESS TO FINANCE AND THE CHARACTERISTICS OF FIRMS

Financial institutions such as banks play a key role in channelling financial resources towards their most efficient use in the real economy. High-productive firms expand their business and gain market share at the expense of the less efficient firms. Financing growth often requires external capital, and the provision of such financing is essential to support the adjustment trajectory out of the crisis. Limited access to finance can hamper the process of economic recovery, and as there is a widespread concern about restricted provision of bank loans to the private sector, policymakers need to be informed about this phenomenon in more detail in order to take appropriate action. A recurrent theme in the policy discussion is whether the decline in bank loans as observed during the economic crisis is driven by reduced demand or by tightening of supply (a so-called credit crunch), or perhaps by both factors simultaneously. This is important as effective policy responses will differ.

In this chapter we use a large-scale survey among EU enterprises on access to finance, the SAFE survey. This survey contains questions regarding demand and supply of finance to corporations as perceived by their senior management. The survey also includes a series of questions on important characteristics of the enterprises, allowing us to control for a wide range of factors. For example we study the relationship between access to finance and firm size and age. Previous studies have found that larger firms face fewer difficulties to attract credit, and this is typically explained from their greater ability to provide collateral, and their direct access to capital markets whereas Small and Medium-sized Enterprises (SMEs) mostly depend on bank loans. Also, older firms may have easier access to finance because they have had more time to build reputation and establish a credible track record with their financiers (cf. Canton et al., 2013).

A new element in this project is that we link the survey data base with other sources, so that we can study the influence of characteristics of the financial sector and macro-economic conditions in

greater detail. Regarding the features of the financial sector we include data on market structures (such as the percentage of foreign banks and market concentration) and on financial performance (including return on equity, solvency rates, leverage ratios). Indeed it can be expected that banks with unhealthy balance sheets will be more prudent in their lending decisions. As many banks in the EU are cleaning their balance sheets by revaluing bad loans to households, firms and the sovereign, we consider it important to explicitly take this reality into account when studying access to finance. This should give insight into bottlenecks in access to finance and can provide guidance to policymakers on how to relieve financial constraints. We also include the unemployment rate and general government gross debt in percentage of GDP to take account of the depth of the economic downturn and the sovereign debt crisis. Finally, other macroeconomic conditions (not captured by the unemployment rate and the public debt ratio) are captured by the inclusion of country dummies in the regressions.

In a related study, Ferrando and Mulier (2013) include firm balance sheet information obtained from the AMADEUS database. They construct a number of financial ratios, and use these as independent variables in a regression analysis to explain perceived and actual financing constraints (both based on the SAFE survey, we will get back to this later in the chapter). Some of the recent papers in which the issue of demand- and supply-effects in credit markets is investigated include Hempell and Sorensen (2010), Cuerpo et al. (2013), Goldman Sachs (2013), ECB (2013), and Holton et al. (2013). Goldman Sachs (2013) concludes that the sovereign crisis from mid-2010 led to a deterioration in credit supply conditions, especially in the peripheral countries most affected by sovereign financing problems. Goldman Sachs also concludes that the recent weakness of bank lending to the corporate sector in the euro area is mainly due to weak cyclical conditions in the periphery, rather than to negative credit supply shocks stemming from problematic functioning of the financial sector. Cuerpo et al. (2013) develop stress maps including various indicators of demand and supply pressures, finding for example evidence for supply-side pressures in Cyprus and

Portugal, and deteriorating credit demand conditions in Ireland, Portugal, Cyprus, Spain and the Netherlands. Hempell and Sorensen (2010) use data from the Bank Lending Survey. They find that a mix of demand and supply factors are at work, and a large majority of euro area banks reported in the survey that disruptions in their access to market funding and in their ability to transfer credit risk had significantly contributed to the net tightening of credit standards.

The structure of this paper is as follows. In Section 4.2 we describe the perceptions of firms regarding demand and supply of bank loans at EU level, and also look at differences across countries. Section 4.3 introduces the country-level data which are used to capture characteristics of the banking sector. The regression results are discussed in Section 4.4. Section 4.5 concludes.

4.2. THE SAFE SURVEY ON ACCESS TO FINANCE BY FIRMS

The main database we use in our project is the SAFE survey on access to finance. Starting from 2009, this survey is held twice a year. Either all EU countries are included, or (selected) euro area countries. The latest wave containing all EU countries is 2011H1. We use this 2011H1 wave for our analysis. The results of the 2011H1 survey are presented in ECB (2011). The survey was conducted between 22 August and 7 October 2011 on behalf of the European Central Bank and the European Commission. The total sample consists of 13,859 firms in the EU 27, of which 91 % are SMEs with less than 250 employees.⁽⁷³⁾ The survey collects data on the financial situation, financing needs and access to external financing of SMEs and large firms during the period from April to September 2011. Due to missing observations (and we treated "don't know also as a missing observation), the actual number of observations per question will deviate from the total number of firms in the survey. For example, 9,630 out of the 13,859 firms answered the question on the change in their needs for a bank loan.

⁽⁷³⁾ The firms are randomly selected from the Dun & Bradstreet database, stratifying the sample by firm size class, economic activity and country.

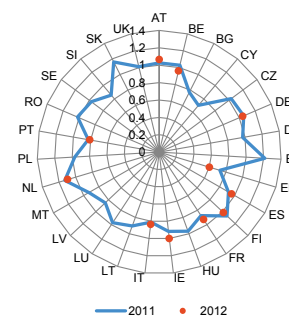
In addition to the 2011H1 wave covering all EU countries, we also use the most recent survey (2012H2). This survey refers to the period October 2012 to March 2013, and covers 11 euro area countries.⁽⁷⁴⁾ The survey interviews were conducted between 18 February and 21 March 2013. The total euro area sample size was 7,510 firms, of which 6,960 had less than 250 employees.

The data have a panel component in the sense that some firms will be both in the 2011H1 wave and in the 2012H2 wave (i.e. an unbalanced panel), but we do not dispose of the unique identifier of these firms. This also implies that some caution is warranted when comparing the results of the two waves (especially in case of countries for which the number of observations is relatively small), as the samples are different.

4.2.1. Demand for bank loans

The SAFE survey contains two questions that shed light on the demand for bank loans. The first question is on the needs of firms for bank loans, and the second one reflects potential demand that does not materialize because firms are discouraged to apply for a bank loan as they fear their request will be rejected.

Graph II.4.1: **Change in the needs of firms for bank loans over the past 6 months**



(1) This figure summarises the responses to the question whether the firm's needs for bank loans increased (0), remained unchanged (1) or decreased (2) over the past 6 months.

Source: SAFE survey.

Source:

Graph II.4.1 and Table II.A1.1 present data on the change in the **needs of firms for bank loans** over

⁽⁷⁴⁾ AT, BE, DE, EL, ES, FI, FR, IE, IT, NL, PT.

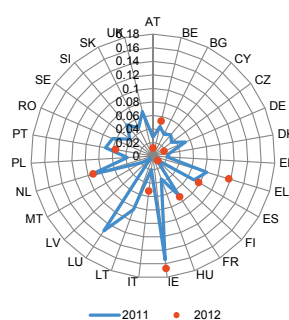
the past six months.⁽⁷⁵⁾ The figure shows the data for all firms (more precisely, all firms replying to the question), while the annex table also presents the data for various cross-tabulations (but only for 2011; figures for 2012 are available from the authors upon request). This change in the needs for bank loans is a direct indicator to capture the demand side of access to finance. Individual firms can reply that their needs for bank loans have remained unchanged (1), have decreased (2) or have increased (0).⁽⁷⁶⁾ Graph II.4.1 and Table II.A1.1 report averages, so 1 means that on average the needs for bank loans remained unchanged, while a number larger (smaller) than 1 points at increased (decreased) needs for bank loans. We observe a moderate increase in the needs for bank loans at the EU level, with an average of 1.06 (in Annex; Panel A of Table II.A1.1 shows the results for all firms). This EU average hides substantial differences across countries. In Bulgaria, Cyprus and Greece there was a strong increase in the needs for bank loans. It should be noted here that firms may need a bank loan to finance an investment project, or they may need loans for inventories and working capital, so an increased need for bank loans can point at liquidity difficulties⁽⁷⁷⁾. There are only a few countries where the needs for bank loans decreased. Strong reductions in the needs are observed in Estonia, the Netherlands, and Slovakia. We also observe a more or less similar situation for the smaller group of countries included in the 2012 survey. This may suggest a continuation of the pattern observed in 2011 (e.g. a further increase in the needs for bank loans in Italy, and a further reduction in the needs in the Netherlands), but the period of observation is not consecutive so it cannot be firmly concluded.

Panel B shows country averages cross-tabulated by firm age (younger than 10 years or at least 10 years). The EU average suggests that both categories of firms have an increased need for bank loans, but the increase is somewhat less pronounced for the firms of 10 years and older

⁽⁷⁵⁾ The note to the Annex tables presents the exact definition of the variables.
⁽⁷⁶⁾ We have redefined some variables in the survey, so that higher values point at weaker demand or tightening of supply.
⁽⁷⁷⁾ The SAFE survey also contains a question on the reasons why firms need a bank loan, but we have not included this question in our further analysis because of the limited number of replies to this question.

(1.08 and 1.05 for the young and older firms, respectively). In some countries (Austria, Belgium, Czech Republic, Finland, Sweden) the young firms indicate (on average) an increased need for bank loans, while the older firms report a decreased need. Older firms more often report an increased need for bank loans relative to the young firms in Spain, Romania and the United Kingdom.

Graph II.4.2: Discouraged borrowers (fraction of firms)



(1) This figure summarises the responses to the question whether firms did not apply for a bank loan because they thought they would be rejected (1), and the indicator takes value 0 when the firm applied for a bank loan or when the firm did not apply because of sufficient internal funds or for other reasons.

Source: SAFE survey.

In Panel C we report cross-tabulations by firm size. The EU averages do not report a clear relationship between firm size and the change in the needs for bank loans, and the large firms indicate most often an increased need for bank loans (though the differences are minimal).

Graph II.4.2 and Table II.A1.2 report on the question whether firms did not apply for a bank loan because they thought they would be rejected. In line with other studies we refer to this as the **discouraged borrower phenomenon**. The fraction of firms being discouraged to apply for a bank loan is generally quite low, with an EU27 average of 5.4% in 2011. But the potential cost to society of this phenomenon can be non-trivial if also economically viable firms become discouraged (an issue to which we will return when discussing the econometric results).

Countries with the largest percentages of discouraged borrowers are Greece, Ireland, Lithuania, Luxembourg, the Netherlands, Portugal, and Spain. The result for Luxembourg is based on a small sample of 91 firms, so this finding may not

be representative. The results for 2012 show an increase in the percentage of discouraged borrowers in Greece, Ireland and Italy, a more or less stable percentage in Belgium, Spain, Finland, France, the Netherlands, and a reduction in Austria, Germany and Portugal.

Panel B of the table (in the annex) shows that the discouraged borrower phenomenon is observed less often for older firms. There are however some exceptions to this rule, and we find a reverse trend in Austria, the Czech Republic, Greece, Hungary, the Netherlands and Romania.

In Panel C we investigate cross-tabulations between the discouraged borrower effect and the size of the firm. As expected the general pattern is that the incidence of the discouraged borrower effect declines with firm size, and at EU level the percentage of discouraged borrowers is for micro firms approximately four times larger than for large firms.

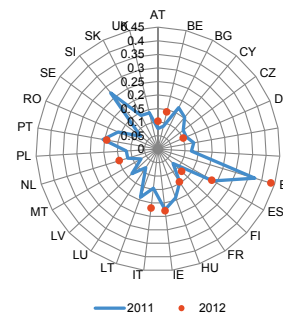
4.2.2. Supply of bank loans

Next to the demand-side questions described in the previous sub-section, the SAFE survey includes several questions regarding the (perceived) supply of bank loans by financial institutions. These questions shed light on financing conditions from different perspectives, but necessarily also overlap to a certain extent. As we have no a priori view on which question would capture access to finance difficulties most accurately, we describe in this sub-section four relevant indicators measuring the supply of bank loans.

Graph II.4.3 and Table II.A1.3 show the percentage of firms indicating that **access to finance is the most pressing problem**. Alternative answers are: finding customers; competition; costs of production or labour; availability of skilled staff or experienced managers; regulation; other; don't know. Access to finance is the most pressing problem for about 15% of the companies in the EU. There are however substantial cross-country differences. For Spain, Ireland, Portugal and Slovenia this percentage is above 20%, and for Greece 37%. Countries in which relatively few firms indicate access to finance as the most pressing problem include Austria, Belgium, Finland, Luxembourg, Malta and Sweden. The situation in 2012 did not

change importantly, with the exception of a further increase in the fraction of firms indicating access to finance as their most pressing problem in Belgium, Greece, Italy and the Netherlands.

Graph II.4.3: **Firms indicating access to finance as the most pressing problem (fraction of firms)**



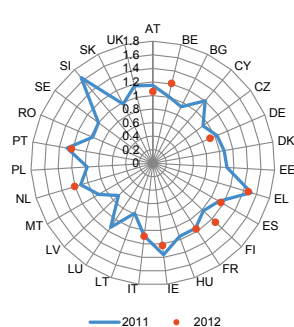
(1) This figure summarises the responses to the question what is the most pressing problem the firm is facing. The indicator takes value 1 if the firm replies "access to finance" and 0 otherwise. Alternative answers are: finding customers; competition; costs of production or labour; availability of skilled staff or experienced managers; regulation; other; don't know.

Source: SAFE survey.

In the table we also present cross-tabulations between firms indicating access to finance as the most pressing problem and firm age (panel B) and firm size (panel C). Panel B shows that older firms are less likely to perceive access to finance as their most pressing problem. That is, about 18% of the firms younger than 10 years indicate access to finance as the most pressing problem, against 14.5% of the firms of 10 years and older. Notice that the Czech Republic, Spain, Greece, Latvia, Portugal and Slovakia deviate from this general pattern. In these countries older firms mention access to finance as the most pressing problem more frequently than firms younger than ten years. Age apparently does not function as an effective signalling device to banks on the creditworthiness of companies (cf. Canton et al., 2013) in these countries. In other countries the frequency with which firms mention access to finance falls rapidly with age. This is the case in for instance Denmark, Finland, France and Sweden. Note that the number of firms with at least 250 employees represents a small fraction of our dataset (9%); this explains the fact that some cells are empty (averages could then not be calculated because the sample was too small).

Regarding firm size (Panel C of Table II.A1.3), we find that larger firms are less likely to state that access to finance is the most pressing problem they are facing. This can be illustrated by the EU 27 percentages across the size categories: 16.7% (1-9 employees), 15.6% (10-49), 14.3% (50-249) and 11.5% (at least 250).

Graph II.4.4: **Change in the availability of bank loans over the past 6 months**



(1) This figure summarises the responses to the question whether the availability of bank loans has improved (0), remained unchanged (1) or deteriorated (2).

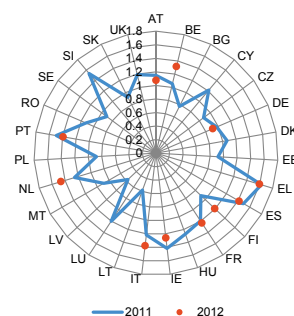
Source: SAFE survey.

A second supply-side indicator is the perceived availability of bank loans. Graph II.4.4 and Table II.A1.4 summarise the responses to the question whether there has been a change in the **availability of bank loans** in the past six months. We transform the answers into a single indicator, taking value 0 in case of an increase, 1 in case of no change, and 2 in case of a decrease. Values above 1 point at a contraction, and below 1 indicate an expansion. We find a contraction in most EU countries. Dramatic reductions in (perceived) availability of bank loans are witnessed in Greece and Slovenia, but also the data for Ireland and Portugal are reason for concern. Against this general pattern of contraction we observe an expansion in several New Member States, notably in Lithuania and Latvia. The situation is more or less the same in 2012, though a somewhat larger fraction of firms in Belgium and Finland reported reduced availability of bank loans over the past six months.

Panel B in Table II.A1.4 shows that the availability of bank loans is not systematically related with firm age for the EU average (the availability of bank loans is actually marginally lower for older firms), and this observation is broadly confirmed

when we look at the country-level data. In Panel C we report cross-tabulations with firm size. Here we find that availability of bank loans gradually increases with firm size, which is consistent with a story that larger firms find it easier to get bank loans as they can offer more collateral.

Graph II.4.5: **Change in willingness of banks to provide a loan over the past 6 months**



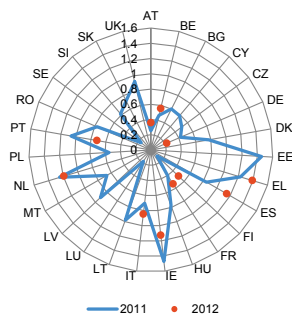
(1) This figure summarises the responses to the question if the willingness of banks to provide a loan has improved (0), remained unchanged (1), or deteriorated (2).

Source: SAFE survey.

Thirdly, the SAFE questionnaire provides data on the willingness of banks to provide loans. As expected this indicator shows a relatively strong correlation with the previously discussed indicator on the availability of bank loans (the correlation coefficient is 0.58; Table II.A1.7 shows the correlation table). Graph II.4.5 and Table II.A1.5 report on the firms' perceptions of the **willingness of banks to provide loans**. Specifically, a value of 2 indicates that, according to firms' perceptions, banks have become less willing to provide loans in the past six months, a value of 1 means that there has been no change, and a value of 0 indicates an increased willingness. In general, banks have become less willing to provide bank loans, given the average value of 1.14 for the EU 27. The variation across countries is substantial. That is, strong negative perceptions about the banks' willingness to provide loans are seen in Greece, Ireland, Portugal, Slovenia and Spain. An increased willingness can be observed in several new Member States, in particular for Lithuanian and Latvian firms. The situation in 2012 is broadly similar, with a modest increase in the willingness of banks to provide a loan in Ireland, but a further deterioration in Belgium, Finland, Italy and the Netherlands. The values in Panel C (distinguishing between several size categories) reveal that larger

firms are less negative about the willingness of banks to provide loans.

Graph II.4.6: Part of financing received



(1) This figure summarises the responses to the question on the outcome of the loan application process. The indicator gets value 0 if the firm applied and got everything, 1 if the firm applied and got most of it (between 75% and 99%), 2 if the firm applied but only got a limited part of it (between 1% and 74%), and 3 if the firm applied but refused because the cost was too high or applied but was rejected.

Source: SAFE survey.

A fourth supply-side indicator measures how banks deal with loan applications. Graph II.4.6 and Table II.A1.6 present data on **whether the firm has received all the financing** it has requested in the past six months. Five answers were possible, and we calculated a single indicator in the following way. If the firm answered that it applied for a bank loan but it refused the loan because the cost was too high or if the bank rejected the application, the indicator takes value 3. The indicator takes value 2 if the firm applied but got only a limited part of the loan (between 1% and 74%). The indicator takes value 1 if the firm applied and got most of the bank loan (between 75% and 99%). Finally, the indicator is set at 0 if the firm applied and got everything.⁽⁷⁸⁾ The EU average is 0.68. The best scoring countries are Austria, Finland, Luxembourg and Sweden. Countries where firms experience more difficulties in their loan applications are Estonia, Greece, Ireland, the Netherlands and Portugal.

Recall that the Netherlands has a relatively high percentage of discouraged borrowers (cf. Graph II.4.2), which may be related with the observation that loan applicants in the Netherlands often only

receive part of the requested amount (at least so it is perceived by the firms).

In 2012 the situation improved in Ireland and Portugal, but deteriorated in Greece, Spain and Italy.

4.2.3. Summary: Demand- versus supply-side factors behind reduced bank lending

In this section we present a synthesis of our results, cf. Table II.4.1. We show in this table the four Member States with the highest scores on the underlying questions in the survey. The SAFE survey can inform us about the scores on a certain indicator in a cross-country comparison, but it does not provide insight on the role of demand vis-à-vis supply in a given country. Firms in Estonia, Finland, Luxembourg and Slovakia report most frequently a decreased need for a bank loan or discouragement to apply for a loan (without signalling strong supply reductions).⁽⁷⁹⁾ Tightening of supply (without reporting strong demand reductions) is most often perceived by firms in Spain, Portugal and Slovenia. These countries show symptoms of a credit crunch. A third group of countries is composed of the Netherlands, Greece, and Ireland, where firms most often indicate both reduced demand as well as squeezed credit supply.

Table II.4.1: Summary: Demand or supply?

Reduced demand	Tightening of supply
Decreased needs of firms for bank loans Top 4: EE, FI, NL, SK	Firms indicating access to finance as the most pressing problem Top 4: ES, EL, IE, SI
Discouraged borrowers Top 4: EL, IE, LU, NL	Decreased availability of bank loans Top 4: EL, IE, PT, SI
	Decreased willingness of banks to provide a loan Top 4: ES, EL, PT, SI
	Received not all the financing requested Top 4: ES, EL, IE, NL

Source: SAFE survey.

⁽⁷⁸⁾ Ferrando and Mulier (2013) interpret this variable as firms' actual financial obstacles, as it is based on their actual experience in applying for credit.

⁽⁷⁹⁾ One can argue whether we should interpret the discouraged borrowers phenomenon as a demand-side factor, as it can also be related with the supply side.

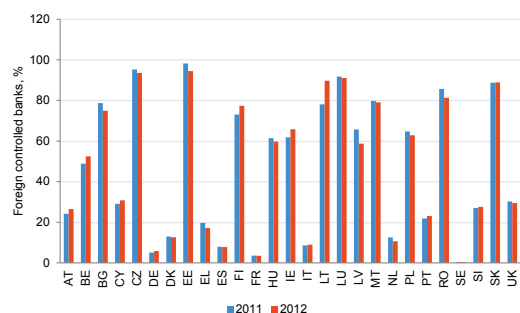
4.3. CHARACTERISTICS OF THE BANKING SECTOR

In the previous section we have discussed perceptions on access to finance by firms (more precisely, by their senior managers). The lending behaviour by banks is possibly related with the market structure in which they operate and with their financial health. In this section we present a series of indicators describing the banking sector's market structure and the financial health of the banking sector⁽⁸⁰⁾, which will be used later in this chapter in the multivariate analysis.

4.3.1. Market structure indicators

As in Canton et al. (2013) we employ the following indicators on the market structure: (i) percentage of foreign banks, (ii) bank size, and (iii) the Herfindahl index for market concentration.⁽⁸¹⁾ Graph II.4.7 presents the percentage of foreign owned banks, defined as total assets of foreign-controlled subsidiaries and branches as a percentage of total assets of all credit institutions in the country. Foreign ownership varies strongly across the EU countries. Banks are close to full foreign ownership in the Czech Republic, Estonia, Lithuania, Luxembourg and Slovakia. Foreign ownership is very low in Germany, Spain, France, Italy and Sweden.⁽⁸²⁾

Graph II.4.7: Foreign controlled banks, %



Source: ECB.

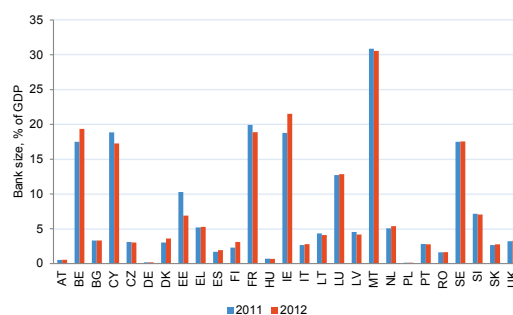
⁽⁸⁰⁾ We have not included data on non-performing loans in the analysis, because data comparability across countries is limited due to different definitions.

⁽⁸¹⁾ Ryan et al. (2013) use the Lerner index as an approximation for banking market competition.

⁽⁸²⁾ In BE the share of foreign-controlled banks has increased following the crisis, but this mainly occurred before 2011 and is therefore not visualised in Graph II.4.7.

Graph II.4.8 shows the bank size as percentage of GDP. It is defined as the total assets of all credit institutions in a country divided by the number of credit institutions in that country, as a percentage of the country's GDP. A large average bank size is found in Belgium, Cyprus, France, Ireland, Malta and Sweden. The average bank size is small in Austria, Denmark, Spain, Poland and Romania.

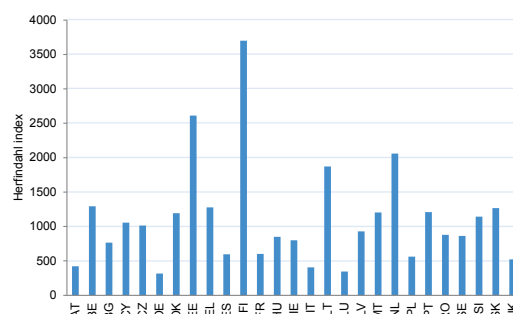
Graph II.4.8: Bank size



Source: ECB.

Graph II.4.9 shows the Herfindahl index for the banking sector in the EU countries, which is theoretically between 0 and 10,000, where higher values indicate stronger market concentration. The Herfindahl index is relatively high for Estonia, Finland, Lithuania and the Netherlands. The market structure in these countries is characterised by the presence of a few banks with large market shares. In contrast, low market concentration is found in for example Austria, Germany and Luxembourg.

Graph II.4.9: HHI



(1) Data are only available for 2011.

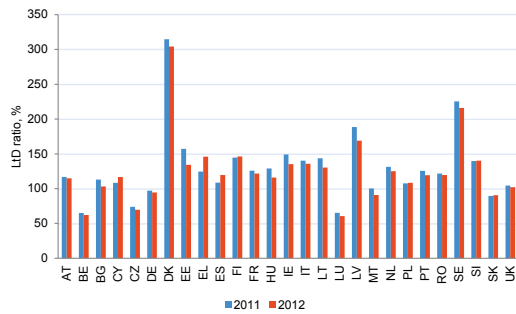
Source: ECB.

4.3.2. Financial indicators

(I) Liquidity: loans-to-deposits ratio

The loans-to-deposits ratio (LtD) is an indicator for the liquidity of banks (cf. Borgioli et al., 2013). It indicates the financial institutions' ability to cover withdrawals made by their clients. If the ratio is lower than 100%, a bank only needs to rely on its deposits to provide loans. If the ratio is higher than 100%, the bank has to borrow from another financial institution, or the central bank, to cover the gap between loans and deposits. Banks with a low LtD-ratio have relatively low revenues from their lending activities. On the other hand, banks with a high LtD-ratio may run into liquidity problems in times of economic hardship. Graph II.4.10 shows the LtD-ratios for the EU countries. It shows that financial institutions in Denmark, Sweden and Latvia have the highest LtD-ratios in the EU.⁽⁸³⁾ The financial sector in these countries is thus most vulnerable in terms of liquidity. In Belgium, the Czech Republic and Luxembourg the financial sector is characterised by relatively low LtD-ratios.

Graph II.4.10: Loans-to-deposits ratio (LtD), %



Source: DG ECFIN (April for 2011 and October for 2012).

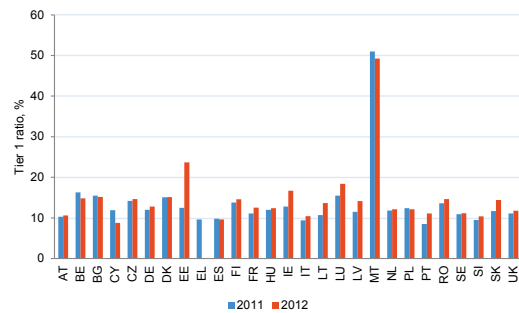
(II) Solvency: Tier 1 ratio

Solvency indicators measure the banks' ability to meet long-term obligations. The Tier 1 ratio is defined as regulatory Tier 1 capital over risk-weighted assets (cf. Maurin and Toivanen, 2012). Graph II.4.11 shows the Tier 1 ratio. Before the financial crisis, the Tier 1 ratio was around 8% (cf.

⁽⁸³⁾ The high figure for DK may be related with the fact that Danish banks are obliged to securitize mortgages and sell them in the market; this is a specific feature of the Danish system.

ECB, 2007). The lowest solvency rates in 2011 are in Portugal and Slovenia (respectively 8.5% and 9.5%).

Graph II.4.11: Tier 1 ratio, %



Source: ECB, consolidated banking data.

(III) Efficiency: return on equity

A third indicator refers to efficiency of the financial institutions. A commonly used indicator is the return on equity (ROE). The ROE measures the financial institutions' efficiency at generating profits from every unit of shareholders' equity. Graph II.4.12 shows the data for the EU countries. Strongly negative ROEs are observed in Cyprus (2012), Ireland (2012) and Greece (2011; data for 2012 are not available). The financial sector in the Czech Republic and Estonia exhibits the highest return on equity.

Graph II.4.12: Return on equity, %



Source: ECB, consolidated banking data.

(IV) Leverage: asset-to-equity ratio

Finally, we inspect the financial institutions' leverage ratios, defined as total assets as percentage of total equity (AtE). Graph II.4.13 shows that financial institutions in Denmark,

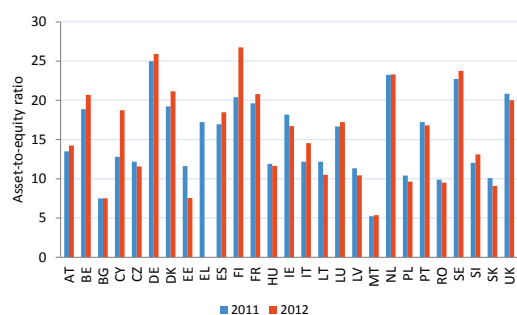
Table II.4.2: **Dependent variables**

Abbreviation	Explanation	Implementation
NEEDS	The firm's needs for bank loans over the past 6 months	0: increased 1: remained unchanged 2: decreased
DISC	Discouraged borrowers	0: firm applied for a loan or firm did not apply because of sufficient internal funds or for other reasons 1: firm did not apply for a loan because it thought it would be rejected (Response to the question what is the most pressing problem the firm is facing.)
PROBFIN	Access to finance as the most pressing problem	0: otherwise 1: access to finance
AVAIL	Availability of bank loans	0: improved 1: remained unchanged 2: deteriorated
WILLBANK	Willingness of banks to provide a loan	0: improved 1: remained unchanged 2: deteriorated (Response to the question on the outcome of the loan application process.)
RECEIV	Part of financing received	0: firm applied and got everything 1: firm applied and got most of it (between 75% and 99%) 2: firm applied and but only got a limited part of it (between 1% and 74%) 3: firm applied but refused because the cost was too high or applied but was rejected
INTEREST	The level of interest rates	0: decreased 1: remained unchanged 2: increased
COLLAT	Collateral requirements	0: decreased 1: remained unchanged 2: increased

Source:

Germany, Finland, the Netherlands and Sweden have the highest leverage.

Graph II.4.13: **Asset-to-equity ratio**



Source: ECB, consolidated banking data.

4.4. ECONOMETRIC ANALYSIS

The employed methodology builds forth on an earlier project using the Eurobarometer dataset (cf. Canton et al., 2013), and the analyses presented in the previous edition of the Product Market Review (cf. European Commission, 2010). The work presented in this chapter differs in a number of

respects. Firstly we use more recent data, namely data pertaining to the period April 2011-September 2011 (covering all EU countries) and to the period October 2012-March 2013 (for a selection of euro area countries). Secondly we use various dependent variables to capture credit market developments, some pertaining to the demand-side and others to the supply-side (but all of them seen through the eyes of the firm). Thirdly, we aim to analyse the influence of the market structure of the financial sector, as well as the specific contribution of financial distress in the banking system. This is done by including a series of indicators on the financial health of the consolidated banking sector at country level.

The following variables are used in the analysis. Firstly, the series of dependent variables are shown in Table II.4.2.

Secondly, we use a series of firm characteristics as part of the independent variables. These are shown in Table II.4.3.

The 2012 survey is less elaborate than the 2011 wave, so we cannot use exactly the same questions. The definition of the ownership dummy

Table II.4.3: Firm characteristics

		2011		2012	
		Observations	Percent	Observations	Percent
Age		14132		8075	
	< 10 years		23.90%		19.70%
	≥ 10 years		76.10%		80.30%
Size		14760		8513	
	1-9 employees		31.90%		33.50%
	10-49 employees		32.30%		33.50%
	50-249 employees		27.30%		25.40%
	≥ 250 employees		8.50%		7.60%
Firm's growth over last 3 years		14431			
	Growth		53.50%		
	No growth		19.50%		
	Got smaller		27.10%		
Firm's turnover over past 6 months				8477	
	Increased				30.60%
	Remained unchanged				28.40%
	Decreased				41.10%
Firm's growth expectations		14206			
	Grow		59.70%		
	Stay the same		26.90%		
	Become smaller		13.40%		
Other shareholders		14525	21.80%	8444	17.10%
Male CEO		14263	87.30%	8153	87.90%
Product innovation		14700	36.60%		
Process innovation		14603	25.00%		
Applied previously for loan		14672	65.50%	8478	74.70%
Sector		13508		7863	
	Industry		24.30%		24.10%
	Construction		11.10%		11.30%
	Trade		29.00%		26.80%
	Services		35.60%		37.80%

(1) Numbers are unweighted averages. "Other shareholders" is defined as follows. The survey contains a question on the ownership of the firm. The dummy variable "other shareholders" takes value 0 if the answer is "family or entrepreneurs", "a natural person, one owner only", or "other". It takes value 1 if the answer is "public shareholders, as the company is listed on the stock market", "other firms or business associates", or "venture capital firms or business angels". The dummy variable "Male CEO" takes value 1 (0) if the gender of the owner/director/CEO of the firm is male (female). The dummy variable "product innovation" takes value 1 if the firm during the past 12 months has introduced a new or significantly improved product or service to the market, and 0 if this is not the case. The dummy variable "process innovation" takes value 1 if the firm during the past 12 months has introduced a new or significantly improved production process or method, and 0 if this is not the case. The dummy variable "applied previously for loan" takes value 1 if the firm has used a bank loan in the past 6 months or has experience with this source of financing, and value 0 if the firm did not use a bank loan as this source of financing has never been relevant to the firm.

Source: Own calculations.

is taken from Ferrando and Mulier (2013). The idea here is that unquoted firms or firms that do not belong to a business group cannot use internal capital markets.

Finally, we use a series of country-level variables, namely the variables introduced in Section 4.3 on the market structure and the financial health of the banking sector and the unemployment rate to capture business cycle conditions.

So in the econometric analysis we look at the characteristics of the company (e.g. age of the firm, firm size, sector, ownership structure) and determine their importance in explaining perceived access to finance. We also include country-level data on the general economic conditions, and structural and financial indicators on the banking sector. Some of the control variables are of a structural nature (firm's characteristics and market structure of the financial sector), and do not typically change in response to cyclical conditions.

Other control variables (notably financial health of the banking sector, growth prospects of firms and macroeconomic conditions) are cyclical.

We estimate LOGIT regressions⁽⁸⁴⁾ for the two waves separately, and the results are presented in Table II.4.4 (for the 2011 wave) and II.4.5 (for the 2012 wave).⁽⁸⁵⁾ Our estimation strategy differs between the two waves, in the sense that we have decided to replace the country-specific variables with country dummies in the 2012 wave (which yields more reliable and robust econometric results). The reason is that we have only 11 countries in the 2012 wave (against 27 in the 2011 survey), which puts limitations to the number of country-specific variables that can be included in the regressions. For the regressions on NEEDS and DISC we include the whole sample. For the other regressions, we exclude the group of discouraged borrowers (in order to decrease sample selection bias). We do not have data on sectoral classification for the large firms. In the reported regressions we included the sector dummies (implying that the large firms are dropped from the sample), but our main conclusions do not change when large firms are included (so if we do not control for sectors).

The results for 2011 show that **age** of the firm is an important determinant for bank lending perceptions. Older firms (age of 10 years and older) less often report an increased need for a bank loan (regression 1), are less often a discouraged borrower (regression 2), less often mention access to finance as the most pressing problem (regression 3), less often report that the willingness of banks to provide loans has deteriorated (regression 5), and less often only receive part of the loan they applied for (regression 6).

The firm's **size** is also an important determinant in the regressions for DISC, WILLBANK and RECEIV, but not for the other regressions. Larger

firms are less often discouraged to apply for a loan, less often perceive deteriorated willingness of banks to provide loans, and less often only receive part of the loan.

The firm's **growth rate** over the past 3 years appears with statistically significant negative regression coefficients in the regressions for DISC, AVAIL, WILLBANK, and RECEIV. The interpretation is that firms with positive growth are less often a discouraged borrower, less often report that the availability of bank loans has decreased, less often indicate that the willingness of banks to provide loans has deteriorated, and less often receive only part of the financing requested.

A similar picture emerges for the firm's **growth expectations**. But now the regression coefficient is also negative (and significantly significant) for NEEDS, i.e. firms expecting to grow less often report an increased need for bank loans.⁽⁸⁶⁾ The firm's growth expectations do not show a statistically significant relationship with DISC, and the coefficient is positive (and significantly significant) for PROBFIN. This says that firms expecting to grow more often indicate access to finance as their most pressing problem.

The **ownership** dummy appears with a statistically significant negative coefficient in three regressions, PROBFIN, AVAIL and WILLBANK. Quoted firms and firms owned by other firms have access to internal capital markets, and the results suggest that these firms less often mention access to finance as their most pressing problem, less often mention that the availability of bank loans has deteriorated, and less often indicate that the willingness of banks to provide loans has declined.

In case of **product innovation**, firms more often indicate an increased need for bank loans and more frequently are discouraged borrowers. This may be an important finding, as it suggests that it is not only the young, small firms with negative growth that are likely to be discouraged, but also the innovative firms. So the group of discouraged borrowers may not only consist of firms with limited viability, but also of high-potential innovative firms. Indeed, access to finance can be

⁽⁸⁴⁾ More precisely, we use LOGIT regressions for the binary variables DISC and PROBFIN, and ordered LOGIT regressions (OLOGIT) for the ordered variables NEEDS, AVAIL, WILLBANK, and RECEIV.

⁽⁸⁵⁾ The Annex also shows the correlation coefficients between (1) the dependent variables, (2) the firm-level control variables, (3) the market structure indicators of the banking sector, and (4) the financial health indicators of the banking sector. Correlations are in general quite low, so we do not expect any multi-collinearity issues.

⁽⁸⁶⁾ This somewhat counterintuitive result could be due to for example the availability of alternative financing sources for firms expecting positive growth.

more difficult in the case of innovative firms because of the inherent uncertainty of innovative projects, the difficulties innovators face in appropriating their benefits, and asymmetric information permeating the relationships between lenders, borrowers and equity investors (Hall and Lerner, 2010). We will get back to this in our policy discussion in the concluding section. Regarding the supply side variables, we find that firms engaged in product innovation less often indicate that the willingness of banks to provide loans has deteriorated (recall that we omit the group of discouraged borrowers from the sample in models (3)-(6)).

Also firms reporting **process innovation** are more often discouraged borrowers, and they more frequently indicate that they received only part of the financing.

Firms that have **applied previously** for a loan are more often discouraged borrowers, more often indicate that access to finance is their most pressing problem, more often answer that the willingness of banks to provide loans has deteriorated, but also less often mention that they have received only part of the financing.

Regarding the **sector** dummies, firms in the construction sector more often indicate decreased availability of bank loans, deterioration in the banks' willingness to provide bank loans, and that they received only part of the financing. Firms in the trade sector are less often discouraged. Firms in the services sector more often mention that the willingness of banks to provide loans has deteriorated. The benchmark in these regressions is the manufacturing sector.

The **unemployment rate** appears with a positive and statistically significant regression coefficient in the models for NEEDS, PROBFIN, WILLBANK, and RECEIV.

To investigate the impact of the sovereign debt crisis we include the **public debt** as a percentage of GDP. Public debt only appears with a significant coefficient in the model for RECEIV, and the result indicates that a 10%-point increase in the public debt (as percentage of GDP) would increase the probability that firms receive less financing by about 1%-point.

Turning to the market structure indicators, the regression results show that a higher percentage of **foreign banks** is associated with an increased chance of being a discouraged borrower and a slightly higher chance that the firm will only receive part of the financing⁽⁸⁷⁾, but firms also less often report that the willingness of banks to provide loans has deteriorated. In countries with a larger average **bank size** firms are more often discouraged borrowers, but this variable appears with insignificant coefficients in the supply-side regressions.

Finally we review the results for the financial health indicators. Theoretically, the relationship between the **loans-to-deposit ratio** and perceived access to finance difficulties can be positive or negative. A higher LtD can be associated with easier access to finance in the sense that more loans are available given a certain depository situation of banks. It can also be associated with more difficult access to finance when banks face (potential) liquidity difficulties. Empirically, the loans-to-deposit ratio is found to exert a negative effect on the probability to become a discouraged borrower, and it appears with significantly positive coefficients in the regressions for PROBFIN and RECEIV (but the effects are weak). The **Tier 1 ratio** appears with a statistically significant negative coefficient in the regression for AVAIL, suggesting that firms less often indicate decreased availability of bank loans when the Tier 1 ratio of the banks in their country is higher (i.e. when the banking sector is more solvent). The banks' **return on equity** appears with statistically significant negative coefficients in regressions (3), (4) and (5). Firms are less often discouraged borrowers, less often mention access to finance as their most pressing problem, less often indicate that availability of bank loans has decreased, and less often indicate that the willingness of banks to provide loans has deteriorated. The **asset-to-equity** ratio (as a proxy for leverage) shows up with a positive coefficient in the regression for DISC, so a more leveraged banking sector is associated with an increased chance for a firm of being a discouraged borrower.

⁽⁸⁷⁾ The presence of foreign owned banks could be detrimental to lending due to repatriation of funds (the Vienna initiative from 2009 was taken to counterbalance this phenomenon).

Table II.4.4: Perceived demand and supply conditions for bank loans in 2011

	Demand		Supply			
	NEEDS (1)	DISC (2)	PROBFIN (3)	AVAIL (4)	WILLBANK (5)	RECEIV (6)
Age ≥ 10 years	0.027*** (0.007)	-0.025*** (0.005)	-0.037*** (0.010)	0.002 (0.010)	-0.020** (0.010)	-0.043*** (0.013)
Size 10-49 employees	0.011 (0.008)	-0.024*** (0.007)	-0.005 (0.009)	-0.021* (0.012)	-0.027* (0.016)	-0.029** (0.014)
Size 50-249 employees	-0.011 (0.009)	-0.044*** (0.006)	-0.010 (0.012)	-0.018 (0.013)	-0.032** (0.013)	-0.051*** (0.019)
Firm's growth over last 3 years	0.006 (0.005)	-0.018*** (0.003)	-0.004 (0.005)	-0.050*** (0.006)	-0.062*** (0.005)	-0.029*** (0.009)
Firm's growth expectations	0.007* (0.004)	-0.003 (0.004)	0.012** (0.006)	-0.037*** (0.006)	-0.056*** (0.006)	-0.013* (0.007)
Other shareholders	-0.006 (0.008)	-0.001 (0.005)	-0.031*** (0.012)	-0.018* (0.010)	-0.020** (0.009)	-0.011 (0.014)
Male CEO	0.005 (0.010)	0.007 (0.007)	0.010 (0.015)	-0.003 (0.009)	-0.000 (0.011)	0.029* (0.015)
Product innovation	-0.024** (0.010)	0.008 (0.006)	0.006 (0.009)	0.006 (0.010)	-0.023** (0.009)	0.019 (0.014)
Process innovation	-0.010 (0.011)	0.011* (0.006)	0.010 (0.011)	-0.015 (0.009)	0.003 (0.010)	0.029** (0.013)
Applied previously for loan	-0.009 (0.007)	0.014* (0.008)	0.081*** (0.008)	-0.003 (0.010)	0.026* (0.014)	-0.218*** (0.033)
Construction sector	-0.013 (0.009)	0.003 (0.008)	0.026 (0.023)	0.036** (0.017)	0.064*** (0.017)	0.046** (0.023)
Trade sector	-0.004 (0.011)	-0.015*** (0.005)	-0.011 (0.016)	-0.005 (0.009)	0.009 (0.012)	-0.010 (0.014)
Services sector	-0.000 (0.011)	-0.005 (0.005)	-0.005 (0.016)	0.012 (0.011)	0.042*** (0.009)	0.016 (0.013)
Unemployment	-0.003* (0.002)	0.001 (0.001)	0.008*** (0.001)	-0.002 (0.002)	0.006 (0.004)	0.007*** (0.002)
Public debt	-0.001 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.001)	0.000 (0.001)	0.001* (0.000)
Percentage foreign banks		0.001** (0.000)	0.000 (0.000)	-0.000 (0.001)	-0.0013** (0.0007)	0.001* (0.001)
Bank size		0.002*** (0.000)	-0.001 (0.000)	0.002 (0.001)	0.000 (0.002)	-0.001 (0.001)
HHI-index financial sector		-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Loans-to-deposits ratio		-0.0002** (0.0001)	0.0002* (0.0001)	0.000 (0.000)	-0.000 (0.000)	0.0004* (0.0002)
Tier 1 ratio		-0.005 (0.005)	-0.002 (0.001)	-0.005** (0.003)	-0.003 (0.003)	0.000 (0.003)
Return on equity (ROE)		-0.001** (0.000)	-0.003*** (0.000)	-0.004*** (0.001)	-0.005* (0.003)	-0.000 (0.001)
Asset-to-equity ratio		0.004*** (0.001)	-0.001 (0.001)	0.002 (0.003)	-0.001 (0.005)	0.003 (0.002)
Observations	7,682	10,767	9,859	6,610	7,553	2,027

(1) The reported coefficients are marginal effects (using STATA's margins procedure). Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Own calculations.

The results for the 2012 wave are shown in Table II.4.4. These results are broadly in line with the estimations for 2011. Some noteworthy differences are the following. The variable "other shareholders" now shows up with a statistically significant negative coefficient in the regression for DISC. The probability of being a discouraged borrower is lower when the company is quoted or owned by other firms. A firm that has applied previously for a loan more often indicates that its need for a bank loan has increased, whereas for the 2011 sample the effect was insignificant. Finally, the sector dummies appear with somewhat

different coefficients. The dummies for construction sector are not significant, which could indicate that banks have changed their policies compared with the 2011 situation in which firms in the construction sector more often faced actual financing constraints.

Table II.4.5: Perceived demand and supply conditions for bank loans in 2012

	Demand		Supply			
	NEEDS	DISC	PROBFIN	AVAIL	WILLBANK	RECEIV
	(1)	(2)	(3)	(4)	(5)	(6)
Age ≥ 10 years	0.041*** (0.008)	-0.019*** (0.005)	-0.059*** (0.018)	-0.025* (0.013)	-0.052*** (0.013)	-0.038* (0.017)
Size 10-49 employees	-0.001 (0.012)	-0.016*** (0.006)	-0.007 (0.011)	-0.014 (0.020)	-0.038** (0.015)	-0.050*** (0.014)
Size 50-249 employees	-0.009 (0.013)	-0.041*** (0.009)	-0.01 (0.024)	-0.04 (0.025)	-0.058*** (0.014)	-0.041** (0.016)
Firm's growth over last 6 months	0.014* (0.007)	-0.012** (0.005)	0.007 (0.008)	-0.051*** (0.009)	-0.082*** (0.008)	-0.034*** (0.009)
Other shareholders	0.007 (0.013)	-0.034*** (0.011)	-0.076*** (0.012)	-0.006 (0.018)	0.011 (0.018)	-0.005 (0.023)
Male CEO	0.006 (0.011)	0.004 (0.009)	0.025 (0.033)	0.002 (0.023)	0.001 (0.013)	0.030** (0.012)
Applied previously for loan	-0.033** (0.014)	0.022** (0.010)	0.109*** (0.025)	0.019 (0.022)	0.051* (0.029)	-0.184*** (0.061)
Construction sector	0.004 (0.010)	-0.025* (0.013)	0.021 (0.055)	0.018 (0.028)	0.043 (0.047)	0.013 (0.036)
Trade sector	-0.010 (0.017)	-0.015 (0.011)	-0.007 (0.038)	0.020 (0.020)	0.006 (0.016)	-0.022 (0.016)
Services sector	-0.019 (0.013)	-0.002 (0.009)	-0.018 (0.033)	0.010 (0.018)	0.02 (0.016)	-0.020 (0.016)
BE	-0.054*** (0.004)	0.042*** (0.001)	0.048*** (0.002)	0.044*** (0.002)	0.107*** (0.007)	0.019*** (0.003)
DE	-0.006** (0.002)	0.013*** (0.000)	0.005 (0.003)	-0.082*** (0.003)	-0.087*** (0.003)	-0.045*** (0.007)
ES	-0.046*** (0.006)	0.077*** (0.002)	0.126*** (0.007)	0.023*** (0.007)	0.187*** (0.010)	0.144*** (0.007)
FI	-0.033*** (0.004)	-0.001*** (0.000)	0.041*** (0.003)	0.138*** (0.004)	0.052*** (0.007)	-0.015*** (0.003)
FR	-0.061*** (0.004)	0.066*** (0.001)	0.034*** (0.003)	0.034*** (0.005)	0.047*** (0.008)	0.002 (0.002)
EL	-0.166*** (0.006)	0.115*** (0.007)	0.363*** (0.013)	0.218*** (0.014)	0.274*** (0.010)	0.207*** (0.012)
IE	-0.033*** (0.003)	0.158*** (0.003)	0.089*** (0.005)	0.058*** (0.004)	0.076*** (0.004)	0.206*** (0.014)
IT	-0.099*** (0.006)	0.050*** (0.002)	0.095*** (0.012)	-0.005 (0.006)	0.159*** (0.008)	0.063*** (0.004)
NL	0.016*** (0.006)	0.083*** (0.002)	0.076*** (0.007)	0.047*** (0.006)	0.224*** (0.005)	0.198*** (0.010)
PT	-0.114*** (0.005)	0.047*** (0.002)	0.095*** (0.006)	0.110*** (0.007)	0.152*** (0.007)	0.029*** (0.004)
Observations	4,805	6,258	2,127	4,104	4,451	1,459

(1) The reported coefficients are marginal effects (using STATA's margins procedure). Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Own calculations.

Price- and non-price conditions

Thus far we have studied the bank lending situation with respect to quantities (i.e. volumes of bank lending and borrowing). Another aspect that is relevant to firms refers to price- and non-price conditions linked to loan applications. This issue may be of particular importance in light of the alleged fragmentation of financial markets in the euro area. The SAFE survey contains a question on whether the terms and conditions of bank financing have changed over the past 6 months, and we consider the firms replies concerning the level of interest rates (as a price condition) and the collateral requirements (as a non-price condition). A similar econometric strategy is adopted, and the

results are presented in Table II.4.6. Regarding **interest rates** (regression (1)), the results suggest that firms which have grown over the past 6 months less often indicate an increase in interest rates.

Table II.4.6: **Perceived interest rates and collateral requirements for bank loans in 2012**

	INTEREST (1)	COLLAT (2)
Age ≥ 10 years	-0.011 (0.017)	-0.028 (0.043)
Size 10-49 employees	0.008 (0.023)	0.016 (0.019)
Size 50-249 employees	-0.016 (0.036)	0.019 (0.028)
Firm's growth over last 6 months	-0.040*** (0.008)	-0.023** (0.009)
Other shareholders	0.003 (0.017)	-0.074*** (0.018)
Male CEO	-0.010 (0.018)	-0.025 (0.039)
Applied previously for loan	-0.055** (0.025)	0.011 (0.037)
Construction sector	-0.009 (0.034)	0.044 (0.029)
Trade sector	-0.036** (0.018)	0.002 (0.029)
Services sector	-0.004 (0.021)	0.038 (0.028)
BE	-0.035*** (0.005)	0.037*** (0.004)
DE	-0.092*** (0.005)	-0.098*** (0.006)
ES	0.534*** (0.018)	0.204*** (0.007)
FI	0.339*** (0.010)	0.088*** (0.006)
FR	-0.089*** (0.005)	0.079*** (0.004)
EL	0.271*** (0.017)	0.186*** (0.015)
IE	0.335*** (0.011)	0.106*** (0.009)
IT	0.457*** (0.020)	0.091*** (0.007)
NL	0.188*** (0.009)	0.069*** (0.006)
PT	0.431*** (0.016)	-0.082*** (0.004)
Observations	1,973	1,966

(1) The reported coefficients are marginal effects (using STATA's margins procedure). Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Own calculations.

Also firms which have previously applied for a loan and firms in the trade sector less often perceive an increase in interest rates. The country dummies reveal that there are important differences across countries. Controlling for firm characteristics, companies in Belgium, Germany and France on average less often report an increase in interest rates, while the opposite holds true in the other countries, with particularly strong effects in Spain, Italy and Portugal. The second regression shows the results for **collateral requirements**. Firms which have grown over the past 6 months

and firms that are quoted or owned by other companies less often indicate stricter collateral requirements. In Germany but also in Portugal firms on average report less often an increase in collateral requirements.

4.5. CONCLUSIONS

Lack of access to finance can hamper firms to realise their growth potential and can lead to wasteful destruction of structurally viable and sound companies.

In this project we have investigated the perceptions of firms regarding access to finance. The data set is collected from a large-scale survey among firms in the EU.⁽⁸⁸⁾ Compared with its predecessor, the Flash Eurobarometer Surveys on Access to Finance, the SAFE survey allows for a more detailed inspection of indicators referring to bottlenecks in bank lending both at the demand- and supply-side of credit markets. There exists substantial heterogeneity in the various indicators across countries, but, not surprisingly, firms' financial constraints are most obvious in Greece, Ireland, Portugal, Slovenia and Spain.

The purpose of the econometric analysis was to search for determining factors of such perceived bank lending difficulties. Part of the understanding of perceptions is found in the firms' characteristics. In particular the firm's age, size and its growth performance are important explanatory variables. For example, the phenomenon of the discouraged borrower is predominantly observed among young, small firms with negative recent growth of their turnover. Product innovation does not seem to help escaping financial constraints, which may imply that innovation is delayed and the process of creative destruction in which young innovative firms replace inefficient firms is frustrated. Cyclical conditions, as captured by the unemployment rate, also exert a statistically significant influence on firm's financial constraints: firms in countries with higher unemployment rates more often flag financing difficulties. We found however only a weak and positive impact of the unemployment rate on the

⁽⁸⁸⁾ New data covering all EU countries have become available in November 2013 (after completing the analysis for this chapter), which will be used in follow-up research.

change in the needs for a bank loan, which can flag that firms more heavily rely on bank loans in times of economic hardship for their working capital and to finance inventories. It should be noticed that in this analysis we only studied the role of cyclical conditions by exploiting cross-country variations in the unemployment rate; a more elaborate analysis should take into account the dynamic properties of business cycle indicators also along the time series dimension. A third series of factors explaining perceptions is related with the market structure of the banking sector. We found some evidence regarding the presence of foreign banks, which tends to increase, from the firms' point of view, the willingness of banks to provide loans. Finally, we inspected the relationship between firms' perceptions and financial health of the banking sector. In particular the return on equity of the banking sector turns out to be a relevant explanatory factor. When financial markets are well-functioning, we would not expect an impact of the banking sector's profitability on the allocation of capital in the economy, so this finding may signal some form of systemic failure within the banking industry.

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ANNEX 1

Cross-tabulations and correlations

Table II.A1.1: **Change in the needs of firms for bank loans, 2011**

Country	Obs.	Panel A: all firms			Panel B: by firm age		Panel C: by firm size			
					< 10 years	≥ 10 years	1-9	10-49	50-249	≥ 250
EU	13859	0.945	0.915	0.953	0.943	0.965	0.929	0.922		
AT	502	1.027	0.931	1.04	1.01	1.053	1	1.038		
BE	500	1.028	0.96	1.056	1.025	1.012	1.102	0.923†		
BG	501	0.772	0.782	0.771	0.718	0.795	0.756	0.911		
CY	100	0.703	0.889†	0.632	0.652	0.615	1.056†	0.286†		
CZ	500	1.03	0.986	1.04	0.948	1.0	1.063	1.139		
DE	1006	1.056	1.015	1.061	1.017	1.11	1.024	1.081		
DK	500	0.972	0.947	0.984	0.987	0.988	0.929	1.0		
EE	100	1.214	1.0†	1.316†	1.4†	1.0†	1.25†	1.25†		
EL	500	0.728	0.672	0.737	0.836	0.721	0.578	0.538†		
ES	1001	0.918	0.956	0.909	0.913	0.942	0.916	0.853		
FI	500	1.071	0.933	1.094	1.09	1.071	1.063	0.923†		
FR	1002	0.873	0.877	0.871	0.934	0.859	0.851	0.795		
HU	500	0.969	0.893	0.995	0.889	0.989	0.949	1.156		
IE	502	0.918	0.696	0.95	0.863	0.955	0.969	0.923†		
IT	1001	0.811	0.794	0.808	0.836	0.834	0.795	0.718		
LT	300	0.903	0.809	0.96	0.915	0.839	0.915	1.0		
LU	100	0.971	0.933†	0.981	0.9	0.952	1.043	1.0†		
LV	200	0.85	0.82	0.881	0.864	0.821	0.851	0.917†		
MT	100	0.931	0.75†	0.977	0.933†	0.909	1.0	0.0†		
NL	500	1.131	1.014	1.157	1.033	1.163	1.212	1.182		
PL	1000	0.97	0.932	0.986	1.005	0.968	0.99	0.817		
PT	502	0.827	0.831	0.827	0.726	0.938	0.75	0.905		
RO	541	1.021	1.056	1.011	1.098	1.082	0.927	0.885		
SE	500	0.972	1.063	0.944	1.057	1.009	0.806	1.118		
SI	100	0.857	0.786†	0.875	0.833†	1.048	0.727	0.778†		
SK	300	1.161	1.095	1.186	0.969	1.227	1.23	1.111†		
UK	1001	1.01	1.057	1.002	1.031	1.07	0.972	0.913		

(1) This table summarises the responses to the question whether the firm's needs for bank loans increased (0), remained unchanged (1) or decreased (2) over the past 6 months. For example, in Panel A for BE, a number of 1.028 means that there are slightly more firms in BE reporting an increase rather than a decrease in the needs for a bank loan, so that the average firm in BE reports a modest increase in the needs for a bank loan. The symbol † indicates that the number of observations is smaller than 20, so the reported numbers have limited reliability. The number of observations refer to the number of surveyed firms.

Source: Own calculations.

Table II.A1.2: Discouraged borrowers, 2011

Country	Obs.	Panel A: all firms		Panel B: by firm age		Panel C: by firm size			
				< 10 years	≥ 10 years	1-9	10-49	50-249	≥ 250
EU	13596	0.054	0.073	0.049	0.081	0.054	0.032	0.021	
AT	499	0.028	0.022	0.03	0.03	0.021	0.046	0	
BE	494	0.045	0.122	0.019	0.081	0.01	0.035	0.067†	
BG	497	0.036	0.063	0.023	0.073	0.02	0.027	0	
CY	97	0.041	0.077†	0.013	0	0.069	0.033	0.1†	
CZ	496	0.034	0.009	0.043	0.05	0.047	0.02	0	
DE	1001	0.052	0.079	0.045	0.09	0.052	0.027	0.01	
DK	488	0.025	0.039	0.018	0.027	0.021	0.028	0.021	
EE	97	0.021	0.065	0	0.033	0.036	0	0†	
EL	494	0.083	0.067	0.089	0.131	0.071	0.012	0†	
ES	998	0.07	0.127	0.056	0.107	0.071	0.043	0.024	
FI	495	0.008	0.015	0.007	0.005	0.005	0.024	0†	
FR	1000	0.069	0.116	0.055	0.12	0.07	0.03	0.031	
HU	497	0.036	0.032	0.038	0.081	0.02	0.013	0.02	
IE	495	0.154	0.194	0.151	0.2	0.141	0.083	0.111†	
IT	992	0.02	0.028	0.018	0.04	0.007	0.01	0.029	
LT	297	0.084	0.119	0.068	0.146	0.1	0.034	0	
LU	91	0.132	0.105†	0.141	0.138	0.179	0.111	0†	
LV	170	0.006	0.013	0	0	0.019	0	0†	
MT	98	0.02	0.05	0.013	0.074	0	0	0†	
NL	468	0.096	0.091	0.1	0.129	0.082	0.078	0.04	
PL	995	0.038	0.049	0.033	0.033	0.057	0.023	0.041	
PT	496	0.071	0.085	0.068	0.084	0.078	0.056	0	
RO	535	0.065	0.051	0.07	0.106	0.053	0.038	0.063	
SE	449	0.042	0.057	0.039	0.088	0.03	0.022	0	
SI	100	0.06	0.087	0.052	0.033	0.1	0.067	0†	
SK	298	0.047	0.063	0.041	0.037	0.099	0.011	0.031	
UK	959	0.067	0.116	0.053	0.086	0.09	0.045	0	

(1) This table summarises the responses to the question whether firms did not apply for a bank loan because they thought they would be rejected (1), and the indicator takes value 0 when the firm applied for a bank loan or when the firm did not apply because of sufficient internal funds or for other reasons. The symbol † indicates that the number of observations is smaller than 20, so the reported numbers have limited reliability.

Source: Own calculations.

Table II.A1.3: Firms indicating access to finance as the most pressing problem, 2011

Country	Obs.	Panel A: all firms	Panel B: by firm age		Panel C: by firm size			
			< 10 years	≥ 10 years	1-9	10-49	50-249	≥ 250
EU	13447	0.152	0.181	0.145	0.167	0.156	0.143	0.115
AT	489	0.076	0.11	0.07	0.098	0.071	0.066	0.028
BE	494	0.087	0.106	0.08	0.117	0.075	0.048	0.067†
BG	491	0.171	0.192	0.162	0.24	0.137	0.131	0.18
CY	98	0.153	0.077†	0.158	0.138	0.207	0.033	0.4†
CZ	473	0.116	0.101	0.118	0.118	0.127	0.126	0.058
DE	967	0.114	0.16	0.113	0.107	0.147	0.104	0.062
DK	478	0.134	0.199	0.105	0.139	0.14	0.137	0.089
EE	97	0.124	0.161	0.106	0.241	0.033	0.143	0†
EL	498	0.373	0.349	0.377	0.312	0.425	0.405	0.333†
ES	984	0.234	0.223	0.232	0.251	0.218	0.263	0.123
FI	483	0.077	0.164	0.063	0.073	0.092	0.037	0.133†
FR	984	0.146	0.211	0.13	0.228	0.133	0.094	0.101
HU	498	0.191	0.27	0.162	0.2	0.208	0.201	0.08
IE	498	0.225	0.27	0.212	0.264	0.192	0.224	0.167†
IT	977	0.145	0.211	0.136	0.14	0.164	0.119	0.18
LT	275	0.189	0.225	0.167	0.262	0.179	0.171	0.069†
LU	97	0.082	0.15	0.067	0.167	0.103	0	0†
LV	197	0.132	0.094	0.175	0.15	0.085	0.136	0.211†
MT	97	0.072	0.105†	0.067	0.077	0.075	0.077	0†
NL	492	0.116	0.135	0.108	0.12	0.123	0.11	0.069
PL	966	0.117	0.165	0.1	0.132	0.115	0.085	0.172
PT	494	0.206	0.19	0.213	0.149	0.168	0.327	0.333
RO	532	0.16	0.19	0.153	0.17	0.174	0.132	0.17
SE	435	0.08	0.123	0.066	0.106	0.067	0.1	0
SI	96	0.271	0.227	0.284	0.31	0.276	0.25	0.2†
SK	294	0.139	0.127	0.144	0.096	0.205	0.163	0†
UK	963	0.137	0.16	0.133	0.137	0.157	0.14	0.072

(1) This table summarises the responses to the question what is the most pressing problem the firm is facing. The indicator takes value 1 if the firm replies "access to finance" and 0 otherwise. Alternative answers are: finding customers; competition; costs of production or labour; availability of skilled staff or experienced managers; regulation; other; don't know. The symbol † indicates that the number of observations is smaller than 20, so the reported numbers have limited reliability.

Source: Own calculations.

Table II.A1.4: **Change in the availability of bank loans, 2011**

Country	Panel A: all firms		Panel B: by firm age		Panel C: by firm size			
	Obs.		< 10 years	≥ 10 years	1-9	10-49	50-249	≥ 250
EU	8923	1.093	1.086	1.098	1.159	1.099	1.043	1.016
AT	339	1.15	1.131	1.165	1.303	1.081	1.133	0.955
BE	383	1.013	1.041	1.0	1.066	1.006	0.906	1.0†
BG	375	0.931	0.984	0.897	1.009	0.965	0.846	0.853
CY	64	1.203	1.444†	1.149	1.2†	1.0	1.353†	1.571†
CZ	296	0.922	0.937	0.921	1.077	0.988	0.836	0.743
DE	647	1.031	1.023	1.029	1.175	0.951	1.01	0.972
DK	276	1.069	1.011	1.098	1.025	1.145	1.074	0.97
EE	31	1.097	1.1†	1.095	1.333†	1.0†	1.071†	1.0†
EL	324	1.515	1.485	1.516	1.543	1.486	1.544	1.462†
ES	711	1.124	1.165	1.132	1.135	1.155	1.103	1.062
FI	322	1.025	1	1.028	1.025	1.023	1.018	1.071†
FR	815	1.148	1.2	1.134	1.285	1.121	1.053	1.145
HU	259	1.151	1.116	1.164	1.191	1.197	1.128	1.029
IE	355	1.361	1.289	1.366	1.413	1.371	1.258	1.167†
IT	718	1.084	1.097	1.08	1.1	1.04	1.096	1.137
LT	165	0.788	0.724	0.837	0.87	0.796	0.808	0.5†
LU	60	1.133	1.091†	1.146	1.263†	1.059†	1.048	1.333†
LV	112	0.696	0.683	0.717	0.727	0.528	0.841	0.6†
MT	50	0.92	0.917†	0.917	1.083†	0.952	0.75†	1.0†
NL	348	1.112	1.191	1.11	1.134	1.156	1.076	0.864
PL	572	0.97	0.965	0.97	0.975	1.012	0.944	0.921
PT	305	1.285	1.254	1.294	1.236	1.28	1.284	1.5
RO	359	0.967	0.959	0.968	1.092	1.0	0.853	0.857
SE	292	1.0	1.049	0.978	1.047	0.893	1.022	1.091
SI	65	1.646	1.733†	1.62	1.579†	1.579†	1.765†	1.7†
SK	164	0.976	0.951	0.984	0.941	1.106	0.969	0.737†
UK	516	1.174	1.214	1.187	1.255	1.255	1.096	1.0

(1) This table summarises the responses to the question whether the availability of bank loans has improved (0), remained unchanged (1) or deteriorated (2). The symbol † indicates that the number of observations is smaller than 20, so the reported numbers have limited reliability.

Source: Own calculations.

Table II.A1.5: Change in the willingness of banks to provide a loan, 2011

Country	Obs.	Panel A: all firms		Panel B: by firm age		Panel C: by firm size			
				< 10 years	≥ 10 years	1-9	10-49	50-249	≥ 250
EU	10230	1.136	1.145	1.136	1.228	1.152	1.06	1.011	
AT	388	1.149	1.2	1.154	1.319	1.124	1.07	0.833	
BE	412	1.053	1.13	1.026	1.118	1.067	0.904	0.929†	
BG	342	0.772	0.797	0.759	0.893	0.728	0.722	0.679	
CY	79	1.215	1.2†	1.194	1.227	1.16	1.217	1.333†	
CZ	361	0.878	0.857	0.892	0.908	1.019	0.845	0.561	
DE	697	0.977	1.081	0.959	1.179	0.915	0.928	0.831	
DK	348	1.066	1.019	1.086	1.05	1.111	1.083	0.95	
EE	24	0.917	0.917†	0.917†	1.333†	1.143†	0.8†	0.5†	
EL	375	1.624	1.603	1.634	1.635	1.599	1.642	1.714†	
ES	849	1.491	1.623	1.468	1.595	1.496	1.431	1.333	
FI	366	0.913	1.024	0.898	0.928	0.921	0.869	0.867†	
FR	871	1.197	1.224	1.203	1.382	1.128	1.101	1.185	
HU	347	1.271	1.295	1.261	1.386	1.363	1.142	1.079	
IE	364	1.415	1.438	1.412	1.455	1.486	1.221	1.231†	
IT	799	1.215	1.317	1.185	1.285	1.218	1.125	1.286	
LT	180	0.578	0.636	0.541	0.84	0.5	0.545	0.211†	
LU	69	1.203	1.2†	1.189	1.304	1.19	1.053†	1.333†	
LV	139	0.568	0.519	0.622	0.513	0.455	0.721	0.615†	
MT	55	0.891	0.636†	0.952	0.929†	0.95	0.842†	0.5†	
NL	359	1.256	1.288	1.262	1.352	1.263	1.171	1.0	
PL	818	0.879	0.925	0.856	0.903	1.0	0.749	0.86	
PT	340	1.494	1.471	1.509	1.536	1.443	1.512	1.538	
RO	459	1.126	1.161	1.121	1.256	1.075	1.097	1.024	
SE	305	0.905	0.877	0.915	0.886	0.815	0.989	0.971	
SI	71	1.535	1.6†	1.518	1.55	1.45	1.571	1.6†	
SK	211	0.924	0.904	0.931	0.745	1.169	0.861	0.815	
UK	602	1.191	1.333	1.164	1.292	1.257	1.118	0.984	

(1) This table summarises the responses to the question if the willingness of banks to provide a loan has improved (0), remained unchanged (1), or deteriorated (2). The symbol † indicates that the number of observations is smaller than 20, so the reported numbers have limited reliability.

Source: Own calculations.

Table II.A1.6: **Part of financing received, 2011**

All firms		
Country	Obs.	
EU	2574	0.682
AT	87	0.253
BE	111	0.468
BG	68	0.603
CY	17	0.588†
CZ	89	0.506
DE	172	0.424
DK	44	0.773
EE	11	1.455†
EL	150	1.227
ES	292	0.842
FI	71	0.113
FR	316	0.405
HU	57	0.772
IE	70	1.471
IT	273	0.703
LT	47	0.979
LU	17	0.176†
LV	33	0.909
MT	9	0.667†
NL	48	1.25
PL	164	0.549
PT	95	1.063
RO	74	0.77
SE	69	0.159
SI	34	0.618
SK	54	0.722
UK	102	0.922

(1) This table summarises the responses to the question on the outcome of the loan application process. The indicator gets value 0 if the firm applied and got everything, 1 if the firm applied and got most of it (between 75% and 99%), 2 if the firm applied but only got a limited part of it (between 1% and 74%), and 3 if the firm applied but refused because the cost was too high or applied but was rejected. The symbol † indicates that the number of observations is smaller than 20, so the reported numbers have limited reliability.

Source: Own calculations.

Table II.A1.7: **Correlations - (1) Dependent supply-side variables**

	PROBFIN	AVAIL	WILLBANK	RECEIV
PROBFIN	1			
AVAIL	0.21	1		
WILLBANK	0.28	0.58	1	
RECEIV	0.4	0.32	0.36	1

Source: Own calculations.

Table II.A1.8: **Correlations - (2) Firm-level control variables**

	Age	Size	Past growth	Future growth	Ownership	Male CEO	Product innov.	Process innov.	Prev. loan
Age	1								
Size	0.18	1							
Past growth	-0.09	0.13	1						
Future growth	-0.06	0.15	0.32	1					
Ownership	-0.01	0.29	0.03	0.06	1				
Male CEO	0.05	0.11	0.02	0.03	0.06	1			
Product innov.	-0.03	0.07	0.08	0.15	0.05	0.02	1		
Process innov.	-0.02	0.1	0.07	0.09	0.03	0.02	0.38	1	
Prev. loan	0.08	0.12	0	0.03	-0.05	0.03	0.03	0.04	1

Source: Own calculations.

Table II.A1.9: **Correlations - (3) Controls for structure of the banking sector**

	Percentage foreign banks	Bank size	HHI-index
Percentage foreign banks	1		
Bank size	0.03	1	
HHI-index	0.32	-0.03	1

Source: Own calculations.

Table II.A1.10: **Correlations - (4) Controls for financial health of the banking sector**

	Loans-to-deposit ratio	Tier 1 ratio	Return on equity	Asset-to-equity ratio
Loans-to-deposit ratio	1			
Tier 1 ratio	-0.16	1		
Return on equity	-0.11	0.05	1	
Asset-to-equity ratio	0.19	-0.39	-0.14	1

Source: Own calculations.

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