Structural reforms in Spain

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INTRODUCTION

The Spanish economy has been growing at over 3% since 2015, above the average for the EU and the euro area. Unemployment, although still 10 percentage points above the EU average, has fallen from a high of 26.1% in 2013 to 17.2% in 2017. Interest rates are at historical lows thanks to the expansive monetary policy of the European Central Bank. The public deficit has fallen substantially in recent years and is close to, but still above, 3%, and there has been a current account surplus for several years. Therefore, Spain's macroeconomic situation appears healthy. However, major vulnerabilities still threaten to hinder long-term growth: high unemployment and mismatches in the labour market; high structural public deficit and external debt; and low productivity growth.

Spain must address these vulnerabilities via structural reforms. Structural reforms are a critical factor for long-term growth. If correctly designed and implemented, such reforms can improve the functioning and integration of markets, enhance the degree of fair and open competition, increase incentives for innovation and help the economy to more efficiently allocate resources. In turn, these outcomes can help create the right conditions for increased productivity, which paves the way for higher growth and competitiveness. However, it is crucial to both monitor the progress of national reform programmes and evaluate their effectiveness at the macro- and microeconomic levels.

This report provides a microeconomic analysis of the structural reforms taking place in Spain. It pays close attention to four areas:

1. Spain's internal market

Market segmentation continues to exist in Spain for which political boundaries are likely to be playing a significant role. In this report, we focus on trade flows and use gravity models to present an up-to-date estimation of the internal border effect in Spain. We aim to shed light on whether internal market barriers affect the operations of firms across regions and whether this is reflected in the volume of trade between Spanish regions. We aim to understand the extent to which Spanish regions trade more with themselves than with other regions, and look at whether this has changed since the coming into effect of Spanish Law 20/2013 on the Guarantee of the Market Unity. We use the most recent data on regional trade flows available, which has not been analysed by other researchers to date. In our gravity models, as well as the trade flows between Spanish regions, we include international trade flows. This is essential as international trade flows may affect the magnitude of the internal border effect, as shown in previous papers. We also assess whether market fragmentation may affect the size of regional trade flows from a qualitative point of view and, where we can,we establish differences, across regions, industries and over time.

2. Business entry regulations

In this section, we examine the relationship between entry barriers and business dynamics to identify the economic rationale for further reforms to the administrative environment governing business entry in Spain. We combine quantitative indicators of the barriers to entry for new firms with the latest available data on business demography, thus we take into account the progress made by Spain in the early stages of its reform process (2012–15). We undertake analyses at the national level, comparing Spain with other major European economies, but also at the regional level, exploring the implications of inter-regional heterogeneity in entry requirements between Spain's autonomous cities and communities. In both samples, we find that the height of entry barriers depresses firm birth rates and raises the average size of newly born enterprises. Our results suggest that further reforms to the administrative environment governing business entry in Spain — both nationally and regionally — would yield economic benefits in terms of higher rates of business creation, which could in turn be expected to raise overall levels of business dynamism and growth.

3. Financial health of businesses

The 2008 financial crisis made necessary the correction of disequilibria accumulated in the years of credit-fuelled expansion, particularly the excessive debt levels and burden. In 2008, the Spanish economy, particularly the corporate sector, underwent an intense process of deleveraging. This section describes this process and assesses the financial strength of the non-financial business sector of the economy in the period 2008 to 2015, the last available year. We also examine the role of the financial sector in the reallocation of capital across firms. To this end, several dimensions of firm health are examined: liquidity; indebtedness; leverage; debt burden and profitability. The analysis is carried out using a representative sample of 848,000 Spanish firms obtained from the SABI database (INFORMA). We also estimate the outstanding debt, firms and employment at risk in the corporate sector, despite the favourable economic tailwinds. Furthermore, we simulate the effect had on these vulnerabilities under different scenarios of Spanish GDP growth and interest rate increases. Finally, we illustrate the relationship between the indebtedness of firms and the efficient allocation of capital.

4. Public procurement

A range of problems are frequently identified in public procurement in Spain: a lack of coordination between governments; conflicts between governments with respect to their powers; cost overruns in investment projects; a lack of transparency in contracting and corruption. All these issues can generate inefficiencies in the functioning of governments, to the extent of needlessly increasing the costs of acquiring inputs or reducing service provision standards.

The analysis in this section entails the following three steps:

1) We assess the differences in public procurement expenditure by level of government (central, regional, local) and expenditure function (health, education, etc.).

2) We identify the determinants of the differences in public procurement expenditure. The differences in regional government expenditure stem not only from the prices paid for services, but also from the differences in the services supplied, how the public service is provided (publicly, privately or by subsidisation), the characteristics of each region (demographic, geographic, etc.) and differences in their resources.

3) We examine the differences in the intensity of competition and efficiency of public contracts awarded by the different governments (type of procedure, type of contract, number of bids, savings, duration of procedure, etc.).

The rest of the report is structured as follows. Section 1 analyses the Spanish internal market and the barriers to internal trade. Section 2 looks at how entry regulations and other obstacles affect firm growth. Section 3 assesses the financial health of the corporate sector, while Section 4 examines the inefficiencies of public procurement procedures in Spain. Finally, Section 5 summarizes the main findings.

1. THE IMPACT OF ENTRY REGULATIONS ON BUSINESS GROWTH

1.1. Introduction

The creation of new businesses is a key part of the process of creative destruction that is argued to be a key ingredient in spurring economic growth. Young firms are not only seen to have an important role in bringing innovations to the market and in aiding the diffusion of new technologies, but also in raising the competitive pressure on incumbents. This provides incentives for incumbent firms to raise their own efficiency, as well as aiding the reallocation of resources from lower to higher productivity businesses, all of which gives a further stimulus to productivity and economic growth.

The business sector in Spain has, however, historically been characterised by relatively low birth rates, a relatively high share of low-productivity, micro firms and a relatively low incidence of high-growth firms. It has been argued that one contributory factor is the set of entry requirements for new businesses in Spain (see, for example: Gonzalez-Pandiella, 2014; Bank of Spain, 2015); these entry requirements are relatively high when compared with a number of other European countries. Such entry barriers have a clear justification in the presence of market failures and for reasons of public protection. However, theory and empirical evidence supports the view that higher entry requirements can hamper the creation of new firms, thereby muting the dynamism of the market, with attendant consequences for business competitiveness and growth.

The government of Spain has undertaken a number of reforms since 2012 to reduce the barriers to entry for new firms. For instance, the process of business registration has been made easier and faster, and some administrative requirements for small firms have been simplified. These have led to measurable improvements in the business environment facing potential entrepreneurs in Spain. However, the barriers facing potential entrants remain higher than in many other major, advanced economies. They also vary to notable degrees across Spain's nineteen Autonomous Cities and Communities. The extent of such barriers is seen as an impediment to further progress in boosting the dynamism and competitiveness of Spain's economy (OECD, 2017a; European Commission, 2017).

In this chapter, we examine the relationship between entry barriers and business dynamics in order to identify the economic rationale for further reforms to the administrative environment governing business entry in Spain. We combine quantitative indicators of the barriers to entry for new firms with the latest available data on business demography, thus taking account of the progress made by Spain in the early stages of its reform process (2012-15). We undertake analyses at the level of the nation state, comparing Spain with other major European economies, but also at the regional level, exploring the implications of inter-regional heterogeneity in entry requirements between Spain's Autonomous Cities and Communities.

In both samples, we find that the height of entry barriers depresses firm birth rates and raises the average size of newly-born enterprises. Our results imply that further reforms to the administrative environment governing business entry in Spain – both at the national and regional level – would yield economic benefits in terms of higher rates of business creation. However, our results also indicate that the lowering of entry barriers is not sufficient, on its own, to raise overall levels of business dynamism and growth.

The chapter proceeds as follows. Section 1.2 first provides a review of theory and empirical evidence on the relationship between entry regulations and rates of business creation, and the relationship between business entry and other aspects of market dynamism. Section 1.3 then provides an overview of the degree of business dynamism and the extent of entry barriers in Spain, by way of context for our empirical analysis. ection 1.4 outlines the

methodology for our analysis, with the results being presented in Section 1.5. Finally, Section 1.6 concludes and discusses some of the potential policy implications of our findings in more detail.

1.2. Theoretical framework and existing literature

Although the positive contribution of entrepreneurship to business dynamics and growth is widely recognised (Audretsch et al, 2006; Syverson, 2011), most countries place some restrictions on those wishing to register a new firm. In some cases, this may simply involve a requirement to register with the national tax office. In others, the entrepreneur may have to give notification to the local municipal authorities, obtain an official identification number for the business or even obtain a licence to operate. Many countries require those wishing to establish a limited liability company to undertake additional steps, including the deposit of a minimum amount of paid-up capital.

A certain amount of regulation or bureaucracy may be justified on the basis of public interest, particularly where there is risk of market failure (Pigou, 1938). For instance, governments may seek to screen new entrants in order to protect consumers from low quality goods or services or to protect third parties from negative externalities such as pollution. Registration and screening can also provide protection for creditors and generate information to aid aspects of public administration – notably tax collection. However, there is a growing recognition that high entry barriers may also have economic costs, reducing the rate at which new firms enter the marketplace and thus muting the disciplinary effects of competition on economic growth.[1]

The first-order effects come from the impact that greater procedural or capital requirements have in raising the overall cost of entry.[2] Such entry costs may discourage entrepreneurs from establishing new businesses, thus lowering the overall entry rate. Since these costs are largely fixed, they may also particularly discourage those with limited resources, thereby limiting the inflow of small young firms. The second-order effects come via the reduction in competitive pressure that these small, young entrants would otherwise exert on incumbents. Lower entry rates thus tend to go hand-in-hand with lower exit rates and lower growth trajectories for incumbent firms (see Brandt, 2004).

Evidence on the potential first-order effects comes from a variety of sources. Desai et al (2003) use a cross-country approach with industry fixed effects to estimate regressions of the impact of entry regulations on firm entry and size with a single year of industry*country data for Europe. Using indicators of start-up procedures from the World Bank (Djankov, 2002), they find that countries with higher entry barriers have lower firm entry rates (once other institutional factors are controlled for) and higher average firm size. Van Stel et al (2006) extend this approach by adding a time dimension to their industry*country panel (albeit with a broader focus on rates on entrepreneurship) and find that higher minimum capital requirements are a key factor. Scarpetta et al (2002) and Brandt (2004) also use industry*country panels but employ indicators of the barriers to entrepreneurship from the OECD's *Product Market Regulation database*. Both find a negative association between the extent of administrative barriers on start-up firms and firm entry rates.[3]

However, despite the inclusion of industry fixed-effects, causal inference is difficult in this empirical framework as omitted country characteristics may be jointly driving the nature of regulation and economic outcomes. Some have addressed this problem through the use

[1] Entry barriers are, of course, only one determinant of rates of business creation. For a wider view of the large array of potential determinants of entrepreneurship, see OECD (2016: 13).

[2] Cost is broadly defined here in terms of the monetary cost arising from fees and capital requirements but also the opportunity cost of complying with administrative procedures.

[3] Bjornskov and Foss (2008) and Nystrom (2008) pursue similar approaches to those studies mentioned here, using data from the Fraser Institute's Economic Freedom Index' (although this index contains no detailed measure of entry requirements, providing only more-general indicators of the business environment).

of a 'difference-in-differences' (DiD) approach, taking a lead from Rajan and Zingales' (1998) efforts to identify the impact of a country's financial development on economic growth. The key insight in this approach is that the costs or benefits arising from the institutional environment are not felt equally by all firms, and so the difference in outcomes between those most and least affected firms will vary across institutional environments at a given point in time. This focus on the interaction between an industry characteristic and the institutional environment permits an econometric specification in which it is possible to include both industry and country fixed-effects, thereby reducing concerns about omittedvariables.

Those applying the DiD methodology to the case of entry regulations assume that some industry sectors have higher 'natural' rates of entry than others, and that the difference in economic outcomes between these 'naturally high-entry' and 'naturally low-entry' industry sectors will vary across countries with more or less-stringent entry regulations.[4] Klapper et al (2006) and Ciccone and Papaioannou (2007) both use the World Bank indicators from Djankov et al (2002) to estimate the impact of entry regulations on firm birth rates in a country*industry cross-section, using this approach. Klapper et al (2006) focus particularly on the financial costs of entry, whilst Ciccone and Papaioannou (2007) focus on the time taken. Both find that higher entry requirements reduce firm entry rates, whilst Klapper et al (2006) also show a positive effect on the size of entrants.

A further set of studies have focused on particular countries. Bripi (2013) uses the DiD approach to study the effects of differences in start-up procedures across the provinces of Italy, finding that lengthier and more costly procedures reduce entry rates for limited liability firms. Similarly, Garcia-Posada and Mora-Sanguinetti (2014) use the approach to look at the impact of the judiciary on firm entry rates in Spain, employing a regional measure of the efficiency of the judicial system as their institutional indicator.

Others have focused on specific instances of policy reform within particular countries. Branstetter et al (2014) studied the establishment of 'one-stop shops' in Portugal which simplified incorporation procedures (reducing the time required for incorporation from several months to approximately one hour) and significantly reduced administrative fees (from around 2,000 Euro to less than 400 Euro). They found that the reforms increased the number of monthly start-ups by approximately 17% and the number of new jobs by 22%, although many of the new firms were of low quality. Yakovlev and Zhuracskaya (2007) studied the effects of reforms that were introduced in Russia between 2001 and 2004. The reforms required that registering a business would involve a visit to just one government agency and would take no more than one week, that each inspecting agency would come to inspect a business no more once every two years, and that some business activities which previously had required licenses would become exempt from licensing. They found that the reforms had a large, significant positive effect on entry rates and employment for small and medium-sized firms. Elsewhere, Bruhn (2011) and Kaplan et al (2011) studied the creation of a Rapid Business Opening System (SARE) for 'low-risk' industries in Mexico which led to reductions in: the average number of days required to register a business (from 30 to1); the number of procedures (from 8 to 3); and the required number of office visits (from 4 to 1). They found that the reform increased the entry rate and wage levels, reduced the income of incumbents and also reduced prices.[5]

Second-order effects

[4] The key assumption is that there are no omitted variables at the country*industry level which affect firm birth rates.

[5] Other related studies include those by Monteiro and Assuncao (2012), Chari (2011), Sharma (2009) and Bertrand and Kramarz.(2002).

As noted earlier, if entry barriers limit the establishment of small, young firms, then they could also have second-order negative effects by limiting the process of creative destruction which would otherwise incentivise incumbents to grow or even push older, low-productivity firms out of the market. A number of theoretical models give new entrants a prominent role in bringing new technologies or product innovations to the market (Cabellero and Hammour, 1994; Aghion and Howitt, 1992; Grossman and Helpman, 1991), thereby pressuring or replacing incumbents which rely on older vintages of capital or out-dated products and processes.

A variety of studies have shown the importance of entry rates in driving dynamism and growth in this vein. For instance, Foster et al (1998) decompose aggregate productivity growth in the US into the contributions of entrants, exiters and incumbents, showing that the process of firm entry and exit played a substantial role in reallocating resources from low to higher productivity units. Aghion et al (2004) use panel data on British establishments to show that higher levels of entry by foreign firms led to faster total factor productivity growth of domestic incumbent firms and thus to faster aggregate productivity growth. More generally, Brandt (2004) shows that high rates of firm entry tend to coincide with rapid growth of productivity, output and employment. For Spain, Callejon and Segarra (1999) and Martin-Marcos and Jaumandreu (2004) both show that both entry and exit rates have both contributed positively to the growth of total factor productivity in industries and in regions, whilst Lopez-Garcia and Puente (2009) point to the high growth rates of new entrants.

Nevertheless, only a few studies have looked directly at the association between entry regulations and 'second-order' indicators such as firm growth and productivity. Klapper et al (2006) do so and find a sizeable impact of entry regulations on rates of productivity growth among inbumbent firms, but the magnitude of the effect reduces once an attempt is made to address potential endogeneity bias via instrumental-variables estimation. Bripi (2013) also finds modest effects (though without attempting to address endogeneity). The modest effects in these studies thus serve as a reminder that entry rates are only one factor in shaping broader levels of business dynamism and growth, which can also be critically affected *inter alia* by the presence of size-dependent regulations, credit conditions and barriers to trade and investment (see Gonzalez-Pandiella, 2014: 17-19).

In summary, then, theory and empirical evidence support the view that higher entry requirements can hamper the creation of new firms, thereby potentially muting the dynamism of the market, with attendant consequences for business competitiveness and growth. This is not to say that lowering entry requirements are universally beneficial. As noted earlier, some element of administrative screening can be in the public interest. Lowering entry barriers has also been shown to have short term employment costs (Bassanini and Cingano, 2018), and may bring in firms that are below average quality (Branstetter et al, 2010), such that the medium-term benefits are below expectations. It is also the case that other features of the institutional environment – such as credit conditions – can hold back growth. However, if these other features are favourable, the longer-term expectation is of a more dynamic business sector, which promotes positive outcomes at the level of the economy as a whole.

1.3. Business dynamics and entry barriers in Spain

Having reviewed some of the theory and prior evidence, we now go on to provide some contextual evidence on levels of business dynamism and entry barriers in Spain, as a prelude to our empirical analysis.

Business dynamics in Spain

Evidence on comparative levels of business dynamism in Spain is provided by Eurostat as part of its suite of Business Demography statistics. We use the latest-available wave of data, which gives various indicators of business dynamics for the year 2015 across 25

European countries, including Spain.[6] We focus on aggregate figures for NACE Rev. 2 Sections B-N, after excluding the activities of holding companies (NACE Rev. 2 Group 64.2).

The first panel of Figure 1.1 shows that the firm birth rate in Spain is just below average by EU standards, standing at 9% in 2015. The rate itself has risen slightly in recent years, but Spain's ranking among EU countries has remained fairly stable over this time. The rate itself is less than two-thirds of that found in the UK and Portugal, with the latter having seen a notable increase in its own entry rate (from 12% to 16%) over the period 2012-15. The second panel of Figure 1.1 then examines the average size of newly-born enteprises in 2015. The average size of new firms in Spain is just above the EU average. This is notionally in line with Spain's lower-than-average birth rate and, indeed, a number of countries with relatively low birth rates also have relatively large entrants (Greece, Austria and Germany, for example). However, the corrleation between the two series is weak overall, and the UK is notable for sitting to the right of both charts.

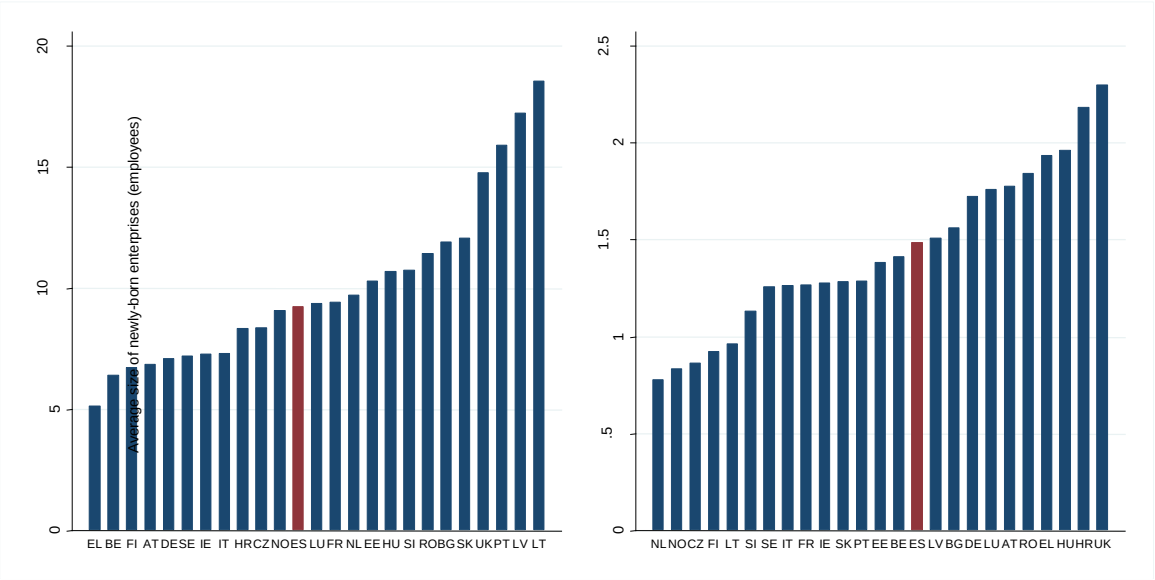
Figure 1.2 goes on to examine the death rate of firms and the overall rate of churn in the business population ('churn' being defined as the sum of the birth and death rates). Spain again sits in the middle of the set of 25 EU countries, some way below the UK and Portugal. Figures 2.3 and 2.4 then show the shares of high-growth firms and young high-growth firms (gazelles) in each country. Spain performs relatively well in 2015 in terms of the share of high-growth firms, but this point-in-time comparison hides considerable upward movement over time, with Spain having ranked in the lower third of countries just two years prior. This may reflect the comparatively strong performance of the Spanish economy in the period 2014-2015. The share of gazelles is observed for only 12 of the 25 countries but, here, Spain's ranking has remained stubbornly low, with no notable improvement over the period.

This picture of relatively low rates of growth among new firms is supported by Figure 1.5, which shows the average size of enterprises born in 2011, by age. In the UK and Germany, the average 5-year old firm in this cohort was around 70 per cent larger than the average 1-year old firm had been four years previously. In Portugal, the figure was around 55 per cent. However, in Spain (and Italy), the average 5-year old firm was just 25 per cent larger than the average 1-year old firm.

Spain therefore tends currently to sit either in the middle or towards the lower end of the EU distribution on most of the measures of business dynamism presented here. It is generally ranked some way below the most dynamic economies, such as the UK, but also some way behind its near neighbour Portugal, which has seen the benefits of recent reforms to its entry procedures for new firms (see previous section). Spain has improved on some measures, but there is notable room for further progress, particularly in respect of the share of young start-ups.

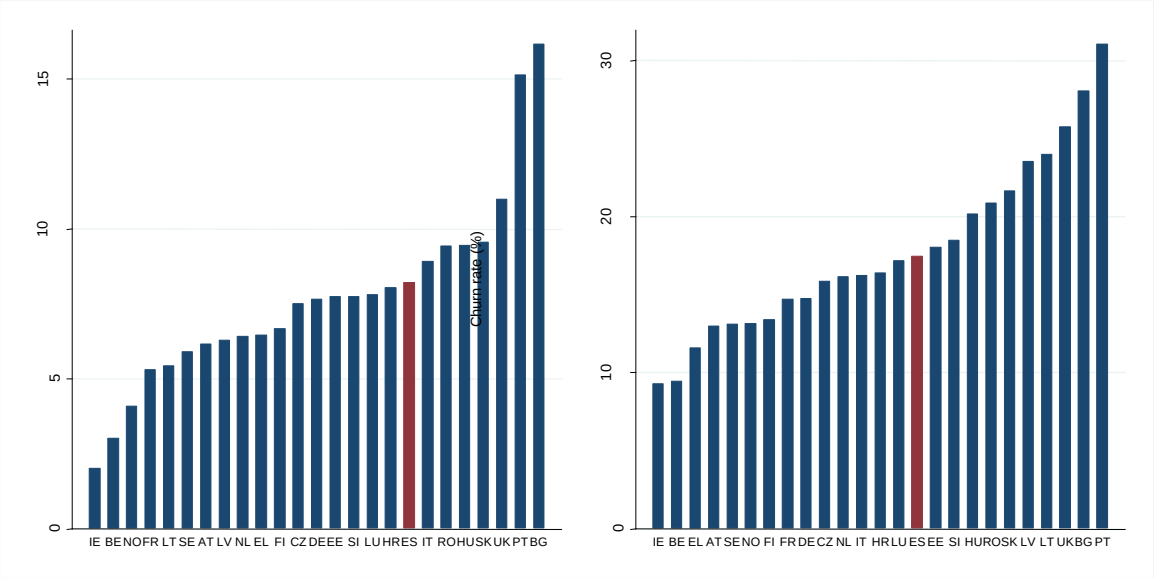
[6] The 25 countries comprise 24 Member States and Norway. The remaining Member States of Denmark, Malta, Cyprus and Poland each have various amounts of missing data for the chosen year.

Figure 1.1: Birth rate and average size of newly-born enterprises, 2015



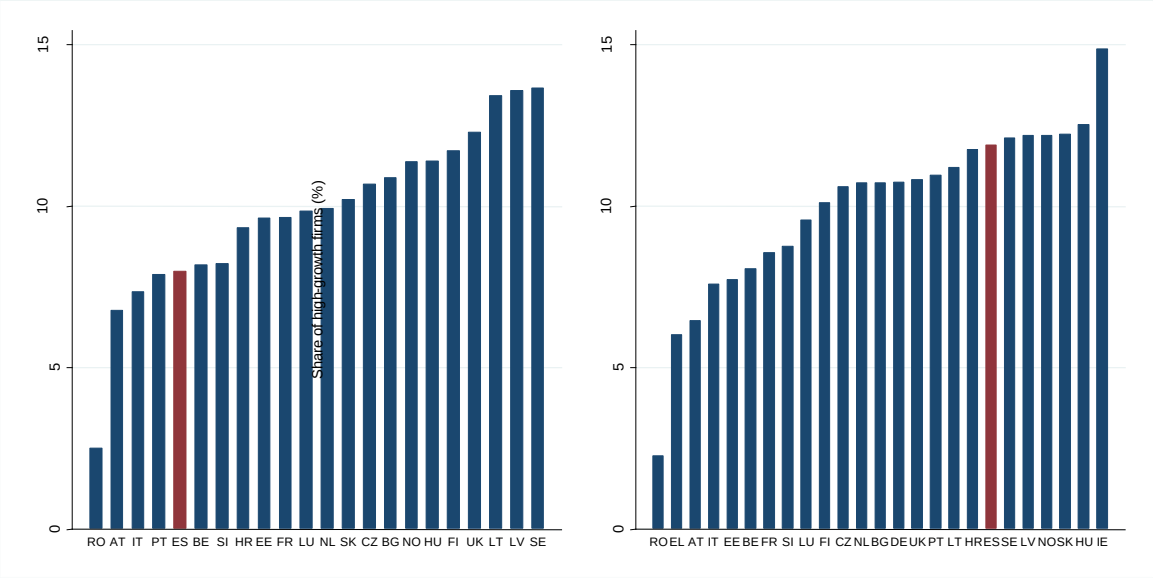
Notes: NACE Rev.2 Section B-N (exc. activities of holding companies)
Source: Eurostat Business Demography Statistics [bd_9ac_l_form_r2]

Figure 1.2: Death rate and churn rate, 2015



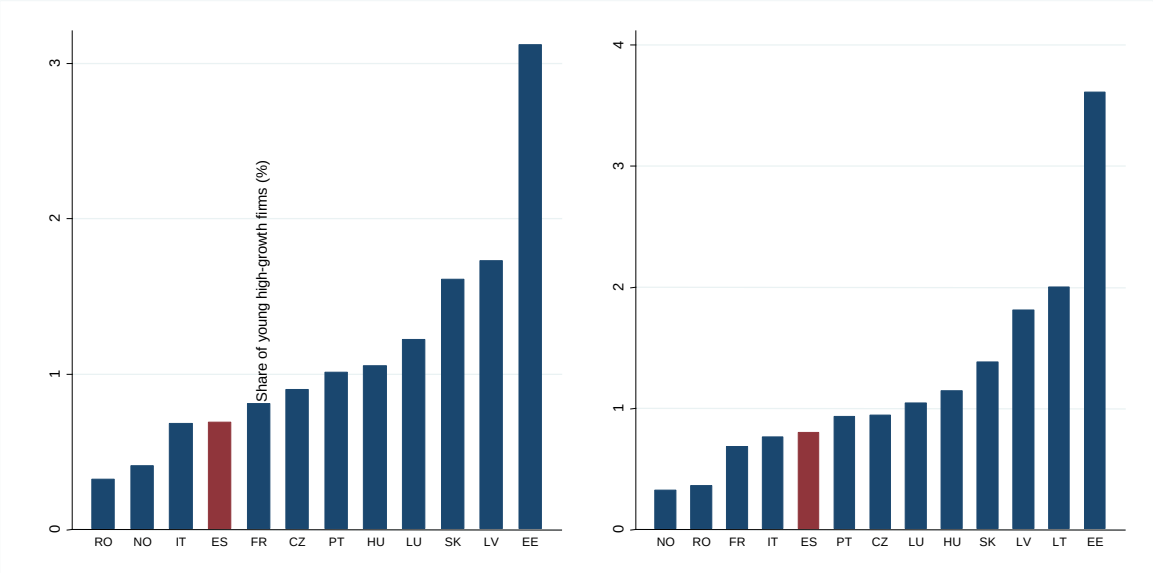
Notes: NACE Rev.2 Section B-N (exc. activities of holding companies)
Source: Eurostat Business Demography Statistics [bd_9ac_l_form_r2]

Figure 1.3: Share of high-growth enterprises, 2013 and 2015



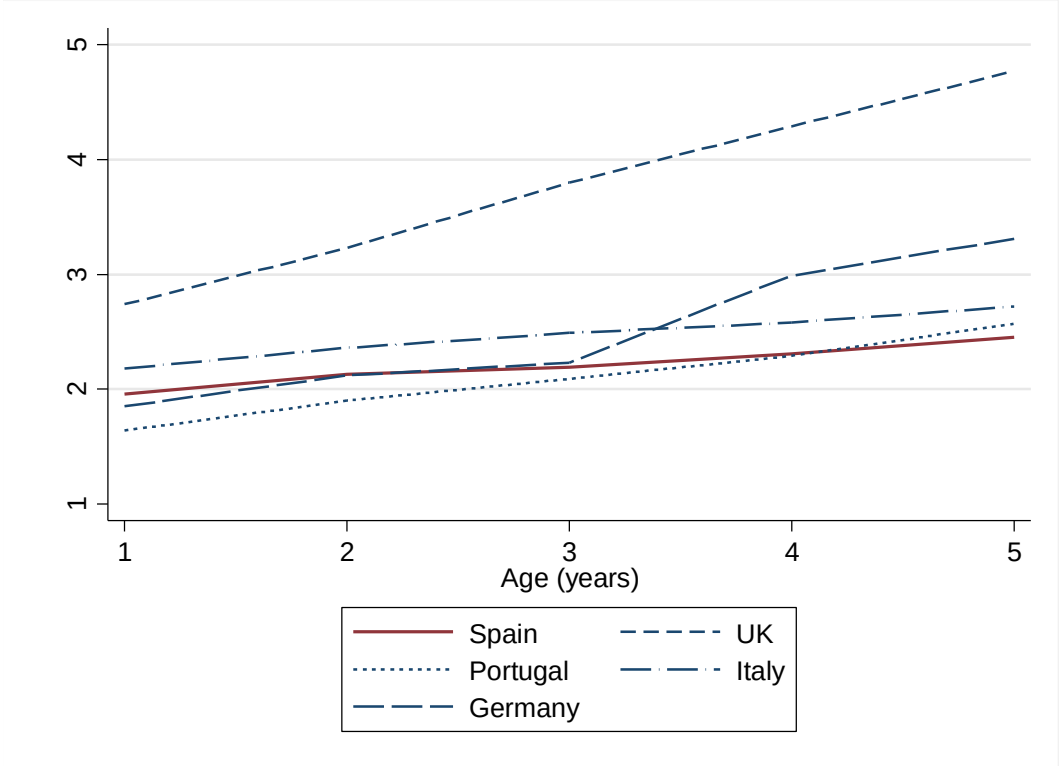
Notes: NACE Rev.2 Section B-N (exc. activities of holding companies). Number of high-growth enterprises measured in employment.
Source: Eurostat Business Demography Statistics [bd_9pm_r2]

Figure 1.4: Share of young high-growth firms (gazelles), 2013 and 2015



Notes: NACE Rev.2 Section B-N (exc. activities of holding companies). Number of young high-growth firms measured in employment.
Source: Eurostat Business Demography Statistics [bd_9pm_r2]

Figure 1.5: Average size of enterprises born in 2011, by age



Notes: NACE Rev.2 Section B-N (exc. activities of holding companies).
Source: Eurostat Business Demography Statistics [bd_9bd_sz_cl_r2]

Barriers to entrepreneurship

It has long been recognised that those wishing to start a new business in Spain have faced greater administrative burdens and a greater complexity of procedures than in many other advanced economies.

The OECD last charted these entry barriers as part of the 2013 update to its *Product Market Regulation Database* (Koske et al, 2013) (i.e. near the beginning of the recent reform process in Spain). The OECD methodology involved the compilation of a large number of numerical indicators across three main headings: the administrative barriers on start-ups; the complexity of regulatory procedures; and the regulatory protection of incumbents; the results are summarised in Table 1.1.[7] Spain ranked 32nd overall among 35 OECD countries in 2013, with its low overall ranking driven by its comparatively high level of administrative burdens and procedural complexity. Among the four countries specifically highlighted in Table 1.1 (Spain, the UK, France and Germany), Spain ranked lowest on the sub-index for 'Administrative burdens on start-ups' and also on the sub-index for 'Complexity of regulatory procedures', whilst Germany ranked lowest on 'Regulatory protection of incumbents'.

[7] The indices are compiled from closed questions that can either be answered with numerical values (e.g. the number of bodies that need to be contacted to start a business) or by selecting an answer from a pre-defined list. The coded information is normalised over a zero to six scale, where a lower value reflects a more competition-friendly regulatory stance.

Table 1.1: OECD Barriers to Entrepreneurship Index, 2013

	Index value (lower = more competition-friendly)				Rank (among 35 OECD countries)			
	Spain	**Min**	**Max**	**Median**	**Spain**	**UK**	**FR**	**DE**
Barriers to entrepreneurship (overall index)	**2.10**	**1.15**	**2.78**	**1.69**	**32**	**9**	**17**	**15**
Administrative burdens on start-ups (sub-index)	***2.34***	***0.92***	***3.08***	***1.97***	***26***	***9***	***24***	***14***
Administrative burdens for corporations	1.60	0.00	2.60	1.60	17	4	29	6
Administrative burdens for sole-proprietors	1.40	0.00	2.60	0.80	29	5	14	5
Barriers in service sectors	4.01	1.15	4.62	3.40	28	13	25	20
Complexity of regulatory procedures (sub-index)	***2.83***	***0.41***	***3.75***	***1.85***	***31***	***26***	***15***	***19***
Licences and permits system	4.67	0.00	6.00	2.67	27	27	5	13
Communication and simplification of rules and procedures	0.99	0.00	1.50	0.59	27	11	30	32
Regulatory protection of incumbents (sub-index)	***1.15***	***0.64***	***2.72***	***1.30***	***12***	***1***	***19***	***23***
Legal barriers	1.30	0.20	2.00	0.90	25	12	22	6
Anti-trust exemptions	0.00	0.00	2.95	0.00	1	25	1	32
Barriers in network sectors	2.14	0.97	3.95	2.69	4	1	21	9

Source: OECD Product Market Regulation Indicators (Koske et al, 2014)

Some have linked the lack of business dynamism in Spain to these comparatively high entry barriers (Gonzalez-Pandiella, 2014; Bank of Spain, 2015) and, in 2012, the Spanish Government began a program to reduce the administrative burdens for new firms, as part of the broader program of national reform to improve Spanish competitiveness and foster economic growth.

The Spanish Government created the Commission on the Reform of the Spanish Public Administration (CORA by its Spanish acronym) in October 2012, with one sub-commission charged with reducing administrative barriers to economic activity. The sub-commission put forward a range of proposals, and these have led to a number of significant initiatives to facilitate the establishment of new businesses (see Box 1.1).

Box 1.1: Initiatives to facilitate the establishment of new businesses in Spain

- Eliminating the requirement for a municipal licence to open commercial premises with an area of less than 300 square metres (Law 19/2012 of 25th May 2013; enacted December 2012). Later extended to cover permanent establishments with a retail area not exceeding 750 m² (Law 20/2013).
- Eliminating some other formalities previously required for business start-up, such as the verification of the record of Labour Inspectorate visits (an initiative adopted by the Council of Ministers in July 2013).
- Easing and speeding up the process of business registration process (Law 14/2013):
    - 'Entrepreneur Service Point' (PAE) created a 'one-stop shop' for business information and start-up, integrating the previous network of business service desks (VUE) and Consulting and Process Initiation Points (PAIT).
    - Single Electronic Document (DUE) can be completed and filed via the PAE or online.
    - DUE submitted via the Business Information and Creation Network (CIRCE) to the Tax Authorities, Social Security Authorities and local/regional government offices.
    - Time limits for the Commercial Registry to issue a certificate of registration.
- Law 14/2013 also:
    - introduced a new form of company, the Gradually Established Limited Liability Company (SLFS), which reduced the initial costs of incorporating a company by removed the minimum initial capital requirement (previously 3,000 Euros).
    - Creation of Entrepreneurial Limited Liability (E.L.L.), allowing individuals to avoid liability for business debts from affecting their primary residence
    - Support for the provision of residency visas for non-EU entrepreneurs
    - Reduction in income tax (of 20%) for investments made in new companies
    - Simplification of health and safety law for small enterprises
    - Simplified accounting requirements for small companies
- Development of model byelaws to expedite the incorporation procedure via CIRCE (Royal Decree 421/2015)

The process of reform proposed by the CORA has been monitored through the creation of (in June 2013) of the Office for the Implementation of Reform in Public Administration (OPERA), which documents the progress of the reform program through a series of quarterly and annual reports.[8]

These reforming initiatives have built on the progress that had already made prior to 2012 (for example, in making it easier for individual entrepreneurs to register a business electronically). Spain's overall progress can be observed through reference to the World Bank's *Doing Business* (DB) indicators, which measure the number of procedures required to register a business in Spain, along with the time and cost, for each year from 2005-2018. These data are based on the administrative environment facing a start-up firm in

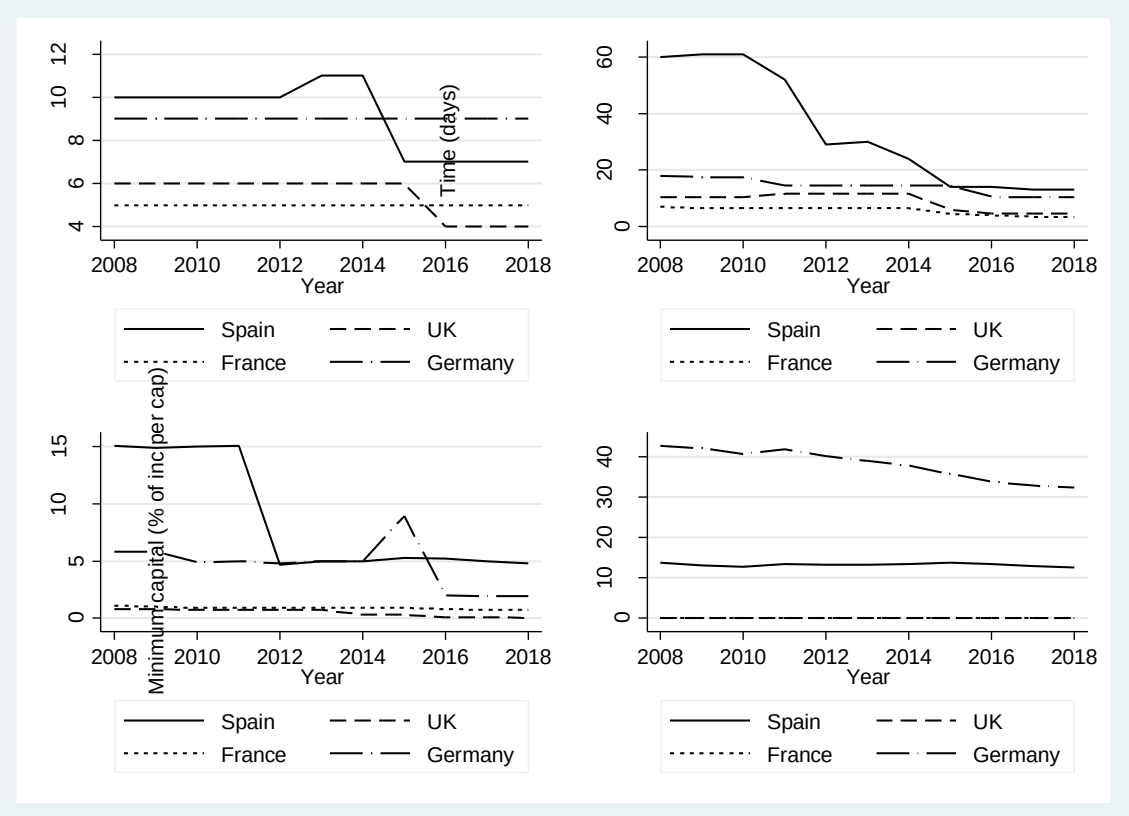
[8] See http://www.sefp.minhafp.gob.es/en/web/areas/reforma_aapp/actuaciones-informes.html

Madrid, the capital, and comparable data are available from the World Bank for many other countries (again based capital cities).[9] These metrics are less detailed than those collated by the OECD (see Table 1.1) but have the considerable advantage of being updated on an annual basis.

Figure 1.6 shows Spain's trajectory on these indicators over the period 2008-2018, compared with the major European economies of France, Germany and the UK. Spain has clearly improved its position over the past 5-6 years, and now sits above Germany in the World Bank's overall rankings for the ease of starting a business (86th out of 190 countries, compared with Germany's ranking of 113th). However, Spain is still some way below France (ranked 25th) and the UK (ranked 14th).

Within Europe, Spain sits roughly at the 75th percentile in terms of the number of procedural steps required to start a business, the time taken, the cost and the minimum amount of paid-up capital required. At present seven procedural steps are required to start a typical business in Madrid, taking 13 days and costing 4.8% of per capita income. The minimum capital requirement is typically 12.5% of per capita income. By comparison, in the UK, business start-up typically requires 4 procedural steps, taking 4.5 days with zero cost and requiring zero paid-up capital.

Figure 1.6: Entry regulations in Spain over time



Source: World Bank: Doing Business Annual Reports

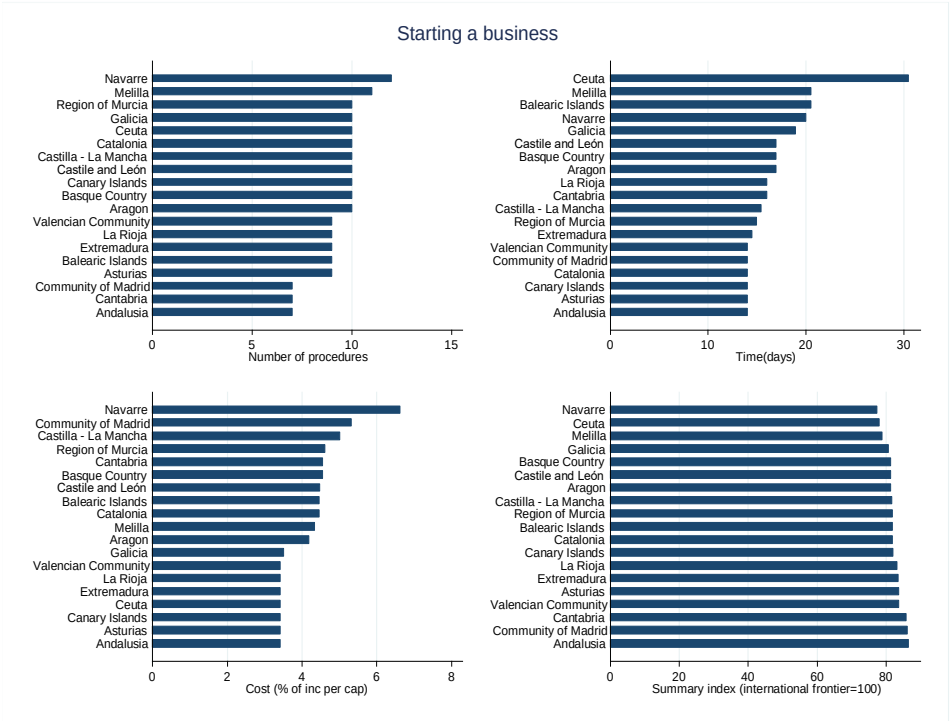
Regional heterogeneity within Spain

[9] See http://www.doingbusiness.org/

The regional devolution of competencies within Spain mean that the specific entry requirements also have a degree of spatial variation across Spain, as regions have used their devolved powers to set their own procedural requirements. This spatial variation can be mapped via a specific sub-national analysis that was conducted by the World Bank in 2015. Figure 1.7 shows the variation across the 19 Autonomous Cities and Communities of Spain in terms of the number of procedures required to start a business, the time taken and the cost as a percentage of per capita income.[10] Regions such as Navarre and Galicia tend to sit towards the top of these charts (having more extensive barriers), whereas regions such as Andalusia and Cantabria tend to sit towards the bottom. The community of Madrid also sits near the bottom, indicating that the World Bank's national rankings for Spain understate the regulatory burden faced by the average business in Spain.

In a departure from the methodology used for their national reports, the World Bank's sub-national report for Spain also measured the administrative requirements for setting up an industrial SME (using the stylised example of a manufacturer of steel products). The inter-regional variation is even greater here, particularly in respect of the time taken (Figure 1.8). It is also notable that the regions' scores are broadly uncorrelated across the two series (r=-0.02), with the Community of Madrid ranking only 9th among 19 regions for the ease of setting up an industrial SME. The two measures therefore need to be viewed in combination in order to provide a more comprehensive portrait of the degree of inter-regional diversity within Spain.

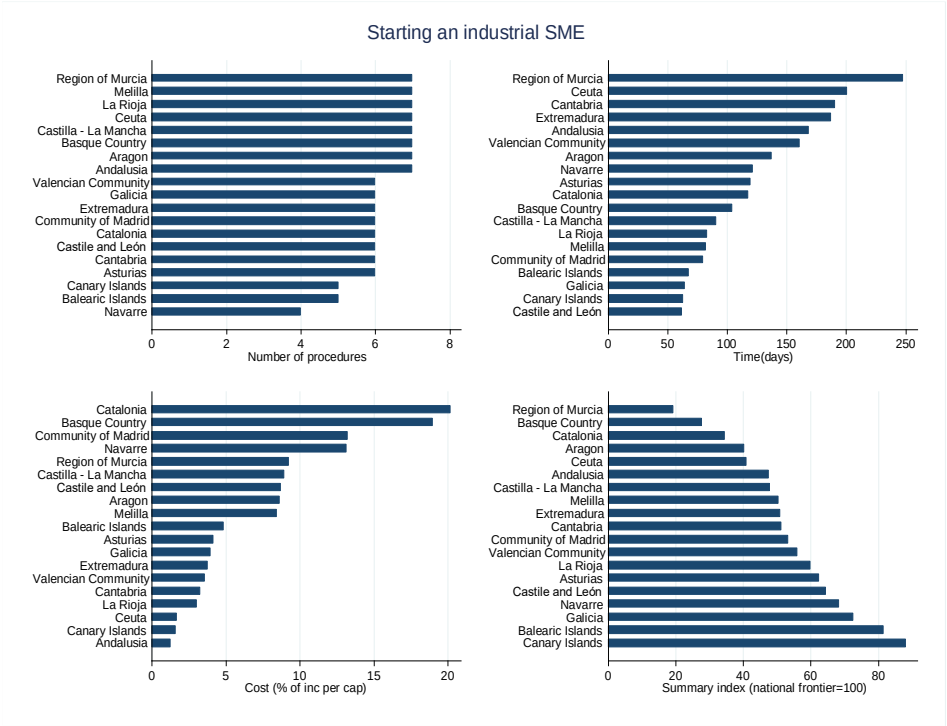
Figure 1.7: Regional variance across Spain in entry regulations for a standard business, 2015



Source: World Bank: Doing Business Subnational Report for Spain 2015

[10] These 19 Autonomous Cities and Communities correspond to NUTS2-level regions.

Figure 1.8: Regional variance across Spain in entry regulations for an industrial SME, 2015



Source: World Bank: Doing Business Subnational Report for Spain 2015

1.4. Methods and data

In the remainder of the report, we combine the World Bank's quantitative indicators of the entry barriers for new firms with the latest available data on business demography to investigate the relationship between entry barriers and business dynamics. We undertake analyses at the level of the nation state, comparing Spain with other major European economies, and also at the regional level, exploring the implications of inter-regional heterogeneity in entry requirements between Spain's Autonomous Cities and Communities.

We take a two-step approach: first, estimating the impact of entry barriers on firm birth rates and the average size of newly-born firms (what we have termed the 'first-order effects'); and second, estimating the potential implications of higher birth rates for other indicators of business dynamism, namely death rates and the share of high-growth firms (what we term the 'second-order effects').[11] In the following sub-sections, we outline our methods, which apply generally to both the country-level and region-level analyses, before going on to provide overviews of our various data sources.

[11] This is not to imply that the causal path runs only from entry to exit: exogenous shocks which raise exit rates may also create the space for new firms to enter. We limit ourselves to exploring correlations, rather than estimating the *causal* impact of higher entry on exit.

Methods

In seeking to estimate the impact of entry barriers on firm birth rates and the average size of newly-born firms, we follow the two broad methodologies that have been applied in the literature. The first of these (seen, for example, in the study by Desai et al, 2003) seeks to estimate regressions of birth rates (or average firm size) on measures of entry regulations using industry*country-level data. Industry fixed effects are used to control for industry characteristics that are common across all countries and which may be correlated with entry rates or entrant size (one example might be capital requirements). Other indicators of the business environment in each country (such as the availability of bank credit) are entered alongside the country-level measures of entry regulation in an attempt to reduce the chances of omitted variable bias at the country level. The specification is outlines in Equation 1 below.

$$B_{rj} = \beta_0 + \beta_1 Regulation_r + \beta_2 X_r + \beta_3 I_j + \beta_4 Z_{rj} + \varepsilon_{rj} \quad \text{(Eq. 1)}$$

where: *B* is a measure of the firm birth rate in country *r* and industry *j* (or alternatively, a measure of average firm size); *Regulation* is a measure of entry regulation in country *r; X* is a vector of additional country characteristics; I is a set of industry dummies; and *Z* is a vector of additional controls at the industry*country level. One expects the coefficient $\beta_1$to be negative if higher entry regulations are associated with lower entry rates.

Causal inference is difficult in this empirical framework, however, as omitted country characteristics may still be jointly driving the nature of entry barriers and economic outcomes. As noted earlier, some (e.g. Klapper et al, 2006) have addressed this problem through the use of a 'difference-in-differences' (DiD) approach which focuses on the difference in economic outcomes between more and less-affected industries within a given country or region. This approach allows the analyst to include fixed effects at both the industry and country-level, thus reducing fears about omitted variables. The empirical specification is as follows:

$$B_{rj} = \beta_0 + \beta_1 \left(Dynamism_j . Regulation_r\right) + \beta_2 C_r + \beta_3 I_j + \beta_4 Z_{rj} + \varepsilon_{rj} \quad \text{(Eq. 2)}$$

where: *B, I and Regulation* are defined as per Equation 1; C is a set of country dummies; *Dynamism* is a measure of the 'natural' level of business dynamism (in this case, birth rates) in industry *j*; and *Z* is again a vector of controls at the industry*country level. The critical coefficient is again β_1, which one expects to be negative if entry regulations are reducing the difference in entry rates between high and low-entry industries.

One limitation of this approach is that one is unable to obtain an estimate of the average effect of entry regulations on the economic outcome of interest; instead, one obtains an estimate of the relative effect on high-entry vs low-entry industries. However, the approach is likely to get closer to the causal effect of entry regulations on national economic outcomes than the alternative approach mentioned earlier.

To give a view of the potential 'second-order' effects of lowering entry barriers, we first repeat the methods outlined above, after replacing the dependent variable with the share of high-growth firms. To complete the analysis, we then also follow Brandt (2004) in looking more broadly at the correlation between entry rates and measures of business dynamics (specifically, death rates and the share of high-growth firms).[12] The specification for this final component of the analysis is as follows:

$$D_{rj\,t} = \beta_0 + \beta_1 B_{r\,j\,t-i} + \beta_4 C_r + \beta_5 I_j + \beta_6 T_t + \varepsilon_{rj\,t} \quad \text{(Eq. 3)}$$

[12] Such an analysis may also seek to focus on gazelles, but the measure provided in Eurostat's Business Demography Statistics (the share of all firms that are gazelles) represents the combination of the overall firm birth rate and the rate of growth among the newly-born. Ideally, we would like a measure of the share of newly-born enterprises that are high-growth, but this is not provided.

where: D is either the firm death rate or the share of high-growth firms in industry j in country r at time t; B is the birth rate in industry j in country r at time t; C, I and T are sets of country, industry and time dummies; and i takes the value 0, 1 or 2 to specify lagged terms which allow for delayed effects of up to two years. This informal specification seeks to assess whether there is a positive relationship within industry*country cells between the rate at which firms are entering the market and the rate at which firms are either growing or exiting. The specification is estimated on multiple years of data, with year fixed effects, in order to smooth any temporal volatility in the estimated relationships (such as may be caused by generalised economic shocks).

Data on business dynamics

To provide measures of business dynamics at the country level, we rely on data from Eurostat's series of Business Demography Statistics. Specifically, we utilise data on firm birth rates, the average size of newly-born enterprises, death rates and the share of high-growth firms (see Appendix 1.A for definitions and further details). We restrict our attention to NACE Rev. 2 Sectors B-N (after excluding Division 64.2 'Activities of holding companies') and extract data series at industry*country level for the year 2015 (the latest year of data available). After omitting countries with substantial amounts of missing data, we arrive at a sample of 44 industries across 25 countries. We use the data for the UK to estimate the 'natural' firm birth rate in the absence of entry barriers, since the UK has one of the lowest levels of entry regulation in Europe. The UK is thus excluded from all of our 'first-order' regressions, leaving us with a maximum sample size of 1,056 observations. We have two sets of estimates: one pertaining only to limited liability firms (since the World Bank *Doing Business* indicators for starting a business refer specifically to the process of incorporation) and another pertaining to all firms (so as to be able to observe any aggregate effects). Limited liability firms account for around 40% of all firms in NACE Rev 2. Sections B-N in Spain, but around 70% of all employment.[13]

For the inter-regional analysis within Spain, the Eurostat Regional Business Demography Statistics prove to have significant limitations, as they are available for only eight aggregated sectors, are not split by legal status and extend only to 2014. Consequently, we turn to other sources to obtain detailed industry-level data for each of Spain's Autonomous Cities and Communities (NUTS2 regions) in 2015. We obtain firm birth rates at industry*region level from the Spanish Statistical Office (INE) series on Harmonised Business Demography. This series offers data for each of 72 Divisions across Sections B-N of the NACE Rev. 2 classification, split by legal status. Data are not provided for the Basque Country, due to the unavailability of some primary sources, and we omit the Autonomous Cities of Ceuta and Melilla in North Africa, leaving a total of 16 regions. We thus have a maximum of 1,152 observations. We use the same source to provide data on firm death rates.

Unfortunately, INE provide no detailed industry*region estimates of the average size of newly-born enterprises, nor of the share of high-growth firms. We sought to obtain both from the SABI database, but the rate of firm birth observed in SABI was too low to be credible and so we have had to omit any analysis of the average size of births from our inter-regional analysis. The share of high-growth firms estimated by SABI did match reasonably well at the national level with that suggested by official statistics, however, and so SABI provides our estimates of the shares of high-growth firms at industry*region level (again for 72 industry Divisions in each of 16 regions).

One additional issue that arises in the measurement of business dynamics when operating at the inter-regional, rather than the inter-country level, is that the firm-level estimates

[13] Estimates calculated from the Eurostat Business Demography Statistics.

provided by INE and SABI are likely to suffer from a degree of 'headquarter bias'. Such a bias may arise if multi-establishment firms tend to locate their headquarters in particular regions (say that of the capital city). In this situation, the growth of the firm will be attributed to the region hosting the headquarters, even though this growth may actually have occurred across plants in other regions. Such biases are generally unavoidable in the absence of detailed plant-level statistics, but we are able to address the issue to some extent in the SABI data by restricting our attention to firms with fewer than 250 employees. We also note that the degree of headquarter bias is considered to be lower in Spain than in many other countries (OECD, 2017b: 86). Further details and sources of the sub-regional data are provided in Appendix 1.B.

Data on entry barriers

To provide measures of the entry barriers facing new firms at country-level or across the regions of Spain, we turn to the World Bank's *Doing Business* (DB) reports, as presented in Figures 2.5 to 2.7.

As noted earlier, the DB country-level reports provide measures of the number of procedures required to register a business, along with the time taken (in days), the cost of any fees levied, and the minimum capital requirement. They are distinct from the OECD measures of entry barriers, but feed into the indices of economic freedom compiled by the Fraser Institute and Heritage Foundation. The DB indicators are based on information about a stylised case (specifically, the administrative environment facing a limited liability firm providing general industrial or commercial activities in the capital city of each country), so as to harmonise measurement across time and space. Accordingly, the measures are not based on the 'lived experience' of any one firm, nor do they show the mean experience of all firms. They ought to indicate the experience of the median firm, however, and they have the advantage of being annual. We take the data for 2015 so as to match our data on business dynamics.[14]

Measures of the regional variation in entry barriers within Spain come from the DB 2015 sub-national report for Spain. This report provided measures of the number of procedures required to register a business in each NUTS2 region, along with the time taken (in days) and the cost of any fees levied.[15] Measures were collected for the standard case of a limited liability firm providing general industrial or commercial activities and for an industrial firm manufacturing steel products (see Figures 2.6 and 2.7); we use both series, taking the barriers facing an industrial firm as those pertaining in NACE Rev. 2 Sections B-E and taking the barriers facing a general firm as those pertaining in Sections F-N.

Again, Appendices A and B provide further detail on definitions and sources.

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[14] The DB approach has been criticised in some quarters because individual countries' ranking positions have been shown to vary considerably over time as a result of temporal changes to the methodology of computing each country's 'distance to the frontier' (*The Economist*, 2018). We use only a single year of DB data (thus avoiding inconsistencies in measurement over time). For our focal measures of entry barriers, we also follow the recommendations of an earlier independent review of the DB methodology (Manuel et al, 2003) by utilising specific indicators of procedural requirements and costs, in preference to the aggregated 'distance to the frontier' rankings. Further information on the DB methodology is presented at: http://www.doingbusiness.org/methodology

[15] The minimum capital requirement did not vary by region within Spain.

1.5. Results

National sample

In simple bivariate regressions using our industry*country-level sample (not shown), we find a negative association between the extent of the entry barriers and industry birth rates. Countries with higher entry costs and higher minimum capital requirements have lower birth rates, whilst the average size of newly-born enterprises is larger in countries with more extensive entry procedures. However, these associations could reflect a variety of omitted variables. The left-hand panel of Table 1.2 thus presents the results of analyses which control for a range of other features of the business environment, as measured in *Doing Business*, following the specification set out in Equation 1 in Section 6.4.[16] Here we see that, after controlling for these other features of the business environment and industry fixed-effects, the association with levels of paid-up capital remains statistically significant: firm birth rates are found to be lower in countries with a higher minimum capital requirement (model 4) and the result holds after entering all four measures of entry requirement alongside one another (model 5). This association is slightly stronger when focusing on entry rates for limited liability firms (upper panel) than when focusing on the entry rate for all firms (lower panel), but this is to be expected, given that the requirements for paid-up capital typically pertain only to limited liability firms.[17]

The coefficient of -0.427 for all firms implies that a one standard deviation increase in the minimum capital requirement in a country is associated with a 1.1 percentage point reduction (on average) in the birth rate within an industry*country cell. To put this in context, the mean birth rate across industry*country cells in our sample is 9.3 per cent, with a standard deviation of 5.3 percentage points. Thus, an increase in one standard deviation in the minimum capital requirement is associated with a reduction of one fifth of a standard deviation in the birth rate: a modest but still notable elasticity.

The right-hand panel of Table 1.2 then shows the association between the level of entry requirements and the average size of newly-born firms. Here, more extensive entry procedures and higher entry costs are each associated with a larger average size of entrants, both in respect of limited liability firms and all firms (model 10). The elasticities are similar to that noted above: increases of one standard deviation in the number of procedures and the extent of entry costs are each associated with increases of around one fifth of a standard deviation in the average size of newly-born enterprises.

Table 1.3 goes on to present the DiD models, following the specification set out in Equation 2. Here the model controls for a full set of country-level fixed effects and the coefficients now indicate whether the firm birth rate is lower in industries with a high 'natural' propensity for entry than it is in industries with a low 'natural' propensity when the country has higher entry barriers. The results suggest that some of the associations seen in Table 1.2 may have been caused by unobserved country-level characteristics. In the DiD models, lengthier and more costly entry requirements are found to be negatively associated with the birth rates for limited liability firms (models 2 and 3), whilst higher minimum capital requirements are found to be positively associated with the size of entrants (model 8). The coefficients are generally smaller when looking at the outcomes for all firms, but the

[16] These additional features are listed in the notes to the table.

[17] The coefficients on the other measures of the business environment are not shown, for reasons of brevity. However, 'better' scores on these measures typically attract positive coefficients, with measures of the ease of registering property and the ease of enforcing contracts being statistically significant. The measure of the ease of trading across borders is the only one to have a statistically significant negative association with firm birth rates.

negative association between the time needed to fulfil entry requirements and the firm birth rate remains statistically significant under this perspective.

To provide some interpretation of these DiD estimates, we can look at the difference in birth rates between an industry such as the manufacture of leather products (NACE Rev. 2 Division 15), which sits at the 25th percentile of UK sectoral birth rates (birth rate of 11% in 2015), and an industry such as computer programming and IT consultancy (NACE Rev. 2 Division 62), which sits at the 75th percentile of this distribution (birth rate of 16% in the UK in 2015). The coefficient of -0.094 in the lower panel of Table 1.3 suggests that moving from Spain (which sits at the 75th percentile of the distribution on entry time in 2015) to Portugal (which sits at the 25th percentile) would raise the difference in birth rates between these two sectors by around 0.5 percentage points.[18] The mean difference in birth rates between these two sectors across the countries in our sample is 4 percentage points, again suggesting a modest but notable effect of entry barrier on firm birth rates.

In summary, these results accord broadly with the extant literature, suggesting that market entry barriers do continue to depress firm birth rates and to raise the average size of entrants in European countries in 2015.

[18] For comparison, Klapper et al (2006) estimate that moving from the 25th percentile to the 75th percentile in the distribution of entry costs (their focus) also raises the difference in entry rates between the sectors at the 25th and 75th percentile of the distribution of entry rates by 0.5 percentage points.

Table 1.2: Fixed-effects estimates of the impact of entry barriers on birth rates and the size of newly-born enterprises, country sample, 2015

	Birth rate					Ln(Average size of newly-born enterprises)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Limited liability firms:										
Ln(Procedures)	-0.578				-0.622	0.721***				0.630***
	[-0.30]				[-0.44]	[3.77]				[3.31]
Ln(Time)		-0.218			0.228		0.014			-0.085
		[-0.28]			[0.43]		[0.10]			[-0.75]
Ln(Cost)			0.153		-0.063			0.150***		0.110***
			[0.33]		[-0.15]			[2.99]		[2.93]
Ln(Minimum capital)				-0.465***	-0.476***				0.002	0.005
				[-3.32]	[-3.39]				[0.11]	[0.24]
Observations	927	927	927	927	927	778	778	778	778	778
Goodness of fit	0.45	0.45	0.45	0.51	0.51	0.55	0.49	0.53	0.49	0.57
All firms:										
Ln(Procedures)	-1.379				-0.486	0.368**				0.263*
	[-0.51]				[-0.18]	[2.53]				[1.80]
Ln(Time)		-1.360*			-0.806		0.135**			0.065
		[-1.85]			[-1.30]		[2.11]			[1.26]
Ln(Cost)			-0.365		-0.447			0.084***		0.066**
			[-0.61]		[-0.76]			[3.14]		[2.52]
Ln(Minimum capital)				-0.419*	-0.427**				0.018	0.019
				[-1.84]	[-2.10]				[1.06]	[1.26]
Observations	954	954	954	954	954	915	915	915	915	915
Goodness of fit	0.44	0.45	0.44	0.47	0.48	0.50	0.49	0.50	0.48	0.52

Notes: The estimates in columns (1)-(5) are from Tobit regressions, with left-censoring at zero and goodness of fit measured via the McKelvey-Zavoina pseudo-R^2; those in columns (6)-(10) are from OLS regressions with goodness of fit measured via adjusted-R^2. All regressions include a constant, the industry share of value-added by country, a full set of industry dummies, and the country's *Doing Business* 'distance-to-the-frontier' scores for: getting electricity; registering property; getting credit; protecting minority investors; paying taxes; trading across borders; enforcing contracts; and resolving insolvency. Standard errors are clustered by country. Key to statistical significance: *** p<0.01; ** p<0.05; * p<0.10. See Appendix 1.A for variable definitions and sources.

Table 1.3: Difference-in-difference estimates of the impact of entry barriers on birth rates and the size of newly-born enterprises, country sample, 2015

	Birth rate				Ln(Average size of newly-born enterprises)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Limited liability firms:								
$Entry_{UK}$*Ln(Procedures)	-0.005				-0.017			
	[-0.09]				[-1.42]			
$Entry_{UK}$*Ln(Time)		-0.061*				0.007		
		[-1.92]				[0.83]		
$Entry_{UK}$*Ln(Cost)			-0.029*				-0.000	
			[-1.89]				[-0.03]	
$Entry_{UK}$*Ln(Minimum capital)				-0.003				0.003*
				[-0.32]				[1.86]
Observations	927	927	927	927	778	778	778	778
Goodness of fit	0.63	0.63	0.63	0.63	0.65	0.65	0.65	0.65
All firms:								
$Entry_{UK}$*Ln(Procedures)	-0.012				-0.003			
	[-0.20]				[-0.59]			
$Entry_{UK}$*Ln(Time)		-0.094**				0.003		
		[-2.29]				[0.70]		
$Entry_{UK}$*Ln(Cost)			-0.004				0.001	
			[-0.23]				[0.49]	
$Entry_{UK}$*Ln(Minimum capital)				-0.000				0.001
				[-0.02]				[1.23]
Observations	954	954	954	954	915	915	915	915
Goodness of fit	0.60	0.60	0.60	0.60	0.59	0.59	0.59	0.59

Notes: The estimates in columns (1)-(4) are from Tobit regressions, with left-censoring at zero and goodness of fit measured via the McKelvey-Zavoina pseudo-R^2; those in columns (5)-(8) are from OLS regressions with goodness of fit measured via adjusted-R^2. All regressions include a constant, the industry share of value-added by country, a full set of industry dummies and a full set of country dummies. Standard errors are clustered by country. Key to statistical significance: *** p<0.01; ** p<0.05; * p<0.10. See Appendix 1.A for variable definitions and sources.

The second phase of our industry*country-level analysis examines the potential implications of lower entry barriers for broader levels of business dynamism and growth.

First, we repeat the specifications presented in Tables 2.2 and 2.3 but take the share of high-growth enterprises as the dependent variable.[19] The results are shown in Table 1.4. Here we see a predominance of negative coefficients, but none of them are statistically significant from zero at the 10 per cent level, either under the fixed-effects or DiD specifications. This suggests that any impact that entry barriers may have on levels of firm growth are too weak to be robustly identified in our sample.

Table 1.4: Fixed-effects and difference-in-difference estimates of the impact of entry barriers on the share of high-growth enterprises, country sample, 2015

	Share of high-growth enterprises				
	(1)	(2)	(3)	(4)	(5)
Fixed-effect estimates:					
Ln(Procedures)	0.365				0.551
	[0.17]				[0.25]
Ln(Time)		-0.708			-0.699
		[-0.64]			[-0.69]
Ln(Cost)			0.200		0.159
			[0.37]		[0.27]
Ln(Minimum capital)				-0.207	-0.177
				[-0.99]	[-0.78]
Observations	921	921	921	921	921
Goodness of fit	0.36	0.36	0.36	0.37	0.37
Difference-in-difference estimates:					
Ln(Procedures)	-0.112				
	[-1.47]				
Ln(Time)		-0.072			
		[-1.34]			
Ln(Cost)			0.021		
			[1.34]		
Ln(Minimum capital)				-0.009	
				[-0.78]	
Observations	921	921	921	921	
Goodness of fit	0.55	0.55	0.55	0.55	

Notes: For fixed-effects estimates, see the notes to Table 1.2. For difference-in-differences estimates, see the notes to Table 1.3.

This is not to say that birth rates do not matter for levels of business dynamism and growth, however. Table 1.5 takes our industry*country dataset and pools over four years (2012-2015), controlling for country, industry and year fixed-effects (following equation 3

[19] We have no measure of employment growth within limited liability firms, so our analysis focuses on rates for all firms.

in Section 2.4). Birth rates are found to be strongly correlated with firm death rates and with the shares of high-growth firms under this analysis.

The size of the coefficients on the firm birth rate do not increase monotonically with the length of the lag, as is the case in Brandt's (2004) analysis. And in additional analyses (not shown) we find no statistically significant association between birth rates and rates of productivity growth.[20] However, the results in Table 1.5 do suggest that higher entry rates not only bring new firms into the market but also contribute to greater levels of market dynamism more generally.

Taken together, the full set of results indicates that the height of entry barriers does depress firm birth rates and raises the average size of newly-born enterprises. However, the lowering of entry barriers is not sufficient, on its own, to raise overall levels of business dynamism and growth.

Table 1.5: Conditional correlations between birth rates and death rates, and between birth rates and the share of high-growth firms, country sample, 2012-2015

	Death rate			Share of high-growth enterprises		
	(1)	(2)	(3)	(4)	(5)	(6)
Birth rate at lags:						
0	0.262***			0.059***		
	[21.45]			[3.18]		
1		0.225***			0.059***	
		[18.69]			[3.25]	
2			0.240***			0.035*
			[20.35]			[1.94]
Observations	4145	4024	3963	3968	3861	3807
Pseudo-R^2	0.49	0.49	0.49	0.43	0.43	0.43

Notes: The estimates are from Tobit regressions, with left-censoring at zero and goodness of fit measured via the McKelvey-Zavoina pseudo-R^2. All regressions include a constant and full sets of industry, country and time dummies. Key to statistical significance: *** p<0.01; ** p<0.05; * p<0.10. See Appendix 1.A for variable definitions and sources.

Regional sample

The analysis of our industry*region sample proceeds in the same vein as that discussed above for the national sample, with the exception that we have no data on the size of newly-born enterprises at industry*region level within Spain. Recall, also, that our measure of entry barriers is more nuanced, as it takes account of the different requirements applying to industrial and non-industrial activities.

In bivariate regressions (not shown), regions with more extensive entry procedures are found to have lower birth rates for limited liability firms, but there are no statistically significant associations with the time or cost of fulfilling entry requirements. The upper panel of Table 1.6 shows that the nature of these associations remains once we control for those other elements of the business environment that are measured in the DB report

[20] Brandt (2004: 21-22) showed a positive association, but only with total factor productivity growth. Our measure is of the growth in value-added per worker.

for Spain (the ease of obtaining construction permits, the ease of getting electricity and the ease of registering property). The coefficients are generally smaller when we use birth rates for all firms (the lower panel of Table 1.6) and the length of entry procedures, in particular, is no longer statistically significant in the regional sample under this perspective.

Table 1.6: Fixed-effects estimates of the impact of entry barriers on birth rates, regional sample, 2015

	Birth rate			
	(1)	(2)	(3)	(4)
Limited liability firms:				
Ln(Procedures)	-2.871*			-3.291*
	[-1.74]			[-1.69]
Ln(Time)		-0.062		0.162
		[-0.10]		[0.23]
Ln(Cost)			0.220	0.621
			[0.28]	[0.78]
Observations	1066	1066	1066	1066
Pseudo-R^2	0.35	0.35	0.35	0.35
All firms:				
Ln(Procedures)	-1.667			-1.528
	[-0.74]			[-0.61]
Ln(Time)		-0.321		-0.214
		[-0.34]		[-0.20]
Ln(Cost)			-0.307	-0.117
			[-0.36]	[-0.13]
Observations	1066	1066	1066	1066
Pseudo-R^2	0.56	0.56	0.56	0.56

Notes: All estimates are from Tobit regressions, with left-censoring at zero and goodness of fit measured via the McKelvey-Zavoina pseudo-R^2. All regressions include a constant, the industry share of enterprises by region, a full set of industry dummies, and the region's *Doing Business* 'distance-to-the-frontier' scores for: getting electricity; registering property; and dealing with construction permits. Standard errors are clustered by region. Key to statistical significance: *** p<0.01; ** p<0.05; * p<0.10. See Appendix 1.B for variable definitions and sources.

Table 1.7 presents the results of the DiD analysis on our industry*region sample. To interpret the coefficient on the length of entry procedures in this model, we can look again at the implied difference in birth rates between the leather industry and the computing/IT consultancy industry. The coefficient implies that moving from the region at the 75th percentile in the distribution of procedural steps (Castilla and Leon) to the region at the 25th percentile (Extremadura) – a shift of approximately one standard deviation in the distribution of procedural steps within Spain – reduces the difference in birth rates between these high and low birth-rate industries by 0.15 percentage points. The effect is therefore

around one third of the size of that estimated at the national level in respect of a shift in the time required to complete these procedural steps.

The results indicate that, just as at the national level, the height of entry barriers does affect firm birth rates. Specifically, within Spain, those Autonomous Cities and Communities which use their devolved powers to implement lengthier entry procedures for new firms do indeed have a lower rate of firm entry into their local market than those Autonomous Cities and Communities with shorter entry procedures. However, the differences in entry procedures between the regions of Spain appear less important, economically, than the differences in entry procedures between Spain and other countries in Europe.

Table 1.7: Difference-in-difference estimates of the impact of entry barriers on birth rates, regional sample, 2015

	Birth rate		
	(1)	(2)	(3)
Limited liability firms:			
$Entry_{UK}$*Ln(Procedures)	-0.237*		
	[-1.96]		
$Entry_{UK}$*Ln(Time)		-0.013	
		[-0.32]	
$Entry_{UK}$*Ln(Cost)			0.066
			[0.87]
Observations	1066	1066	1066
Pseudo-R^2	0.37	0.37	0.37
All firms:			
$Entry_{UK}$*Ln(Procedures)	-0.171		
	[-1.26]		
$Entry_{UK}$*Ln(Time)		-0.015	
		[-0.28]	
$Entry_{UK}$*Ln(Cost)			0.066
			[0.86]
Observations	1066	1066	1066
Pseudo-R^2	0.59	0.59	0.59

Notes: All estimates are from Tobit regressions, with left-censoring at zero and goodness of fit measured via the McKelvey-Zavoina pseudo-R^2. All regressions include a constant, the industry share of enterprises by region, a full set of industry dummies and a full set of region dummies. Standard errors are clustered by region. Key to statistical significance: *** p<0.01; ** p<0.05; * p<0.10. See Appendix 1.B for variable definitions and sources.

Table 1.8 then repeats the specifications presented in Tables 2.6 and 2.7 but takes the share of high-growth enterprises as the dependent variable. As in the country-level analysis, none of the coefficients are statistically significant from zero at the 10 per cent level, either under the fixed-effects or DiD specifications. Again, this suggests that any impact that entry barriers may have on levels of firm growth within Spain are too weak to be robustly identified in our sample.

Table 1.8: Fixed-effects and difference-in-difference estimates of the impact of entry barriers on the share of high-growth enterprises, regional sample, 2015

	Share of high-growth enterprises			
	(1)	(2)	(3)	(4)
Fixed-effect estimates:				
Ln(Procedures)	-3.958			-5.053
	[-0.68]			[-0.78]
Ln(Time)		1.610		1.986
		[0.48]		[0.56]
Ln(Cost)			0.102	0.734
			[0.04]	[0.35]
Observations	967	967	967	967
Goodness of fit	0.20	0.20	0.20	0.20
Difference-in-difference estimates:				
Ln(Procedures)	-0.824			
	[-0.80]			
Ln(Time)		0.253		
		[0.79]		
Ln(Cost)			0.481	
			[1.54]	
Observations	967	967	967	
Goodness of fit	0.22	0.22	0.22	

Notes: For fixed-effects estimates, see the notes to Table 1.6. For difference-in-differences estimates, see the notes to Table 1.7.

Table 1.9 then looks more directly as the association between entry rates and levels of business dynamism (cf Table 1.5). The left-hand panel shows the results of regressing the firm death rate in each industry*region on the firm birth rate, both contemporaneously and with lags. The results are similar to those found in the national sample, except that here the positive relationship between entry and exit is only found in the first and second lag.

The right-hand panel shows the results of regressing the share of high-growth enterprises in each industry*region on the firm birth rate. Here, we also find a positive association, but only on the second lag. The association between rates of entry and rates of within-firm employment growth thus seems weaker within Spain than it is across Europe as a whole (though we cannot discount the possibility that the differences may also be a function of our use of an alternative data source for the share of high-growth firms).[21]

[21] Replacing the birth rate for all firms with the birth rate for limited liability firms does not change the pattern of results.

Table 1.9: Conditional correlations between birth rates and death rates, and between birth rates and the share of high-growth firms, regional sample, 2015

	Death rate			Share of high-growth enterprises		
	(1)	(2)	(3)	(4)	(5)	(6)
Birth rate at lags:						
0	-0.052			-0.335		
	[-1.33]			[-1.43]		
1		0.261***			0.001	
		[7.70]			[0.01]	
2			0.208***			0.546**
			[5.67]			[2.44]
Observations	1072	1068	1067	968	967	967
Pseudo-R^2	0.46	0.50	0.50	0.22	0.23	0.23

Notes: The estimates are from Tobit regressions, with left-censoring at zero and goodness of fit measured via the McKelvey-Zavoina pseudo-R^2. All regressions include a constant and full sets of industry and region dummies. Key to statistical significance: *** p<0.01; ** p<0.05; * p<0.10. See Appendix 1.B for variable definitions and sources.

1.6. Conclusions and policy implications

Theory and empirical evidence supports the view that higher entry requirements can hamper the creation of new firms, thereby muting the dynamism of the market, with attendant consequences for business competitiveness and growth. In spite of a number of reforms that have been undertaken by the government of Spain over recent years, the barriers facing potential entrants remain higher than in many other major, advanced economies. They also vary to notable degrees across Spain's nineteen Autonomous Cities and Communities. The extent of such barriers is seen as an impediment to further progress in boosting the dynamism and competitiveness of Spain's economy (OECD, 2017a; European Commission, 2017).

In this chapter, we combined quantitative indicators of the barriers to entry for new firms with the latest available data on business demography in order to re-evaluate the relationship between entry barriers and business dynamics at the present time. We undertook analyses at the level of the nation state, comparing Spain with other major European economies, and also at the regional level, exploring the implications of inter-regional heterogeneity in entry requirements between Spain's Autonomous Cities and Communities.

In both samples, we found that the height of entry barriers depresses firm birth rates and raises the average size of newly-born enterprises. We also presented evidence of the positive correlation between firm birth rates and other aspects of business dynamism, namely exit rates and the share of high-growth firms. However, we found no statistically significant direct association between the height of entry barriers and rates of firm growth.

Our results imply that further reforms to the administrative environment governing business entry in Spain – both at the national and regional level – would yield economic benefits in terms of higher rates of business creation. When considering possible avenues for future reform, our results suggest that initiatives to reduce the number of procedural steps needed to register a business, to reduce the time taken to complete these steps, and to reduce the cost of registration could all bring benefits. Prior experience in other countries (and to some extent, within Spain itself) suggests a number of potential avenues

for continued reform. For instance, further promotion of the use of 'one-stop' shops and online registration procedures, which have seen greater use in Spain in recent years, and which have brought considerable benefits in countries such as Portugal and Mexico, will help to reduce procedural delays. Further promotion of the sets of model byelaws, as are now used in a large number of countries, and which were introduced in Spain in 2015, will also help to speed up processing times. Spain has already made progress in these areas in recent years, but our analysis suggests that further gains can yet be realised.

However, our analysis suggests that the lowering of entry barriers is not sufficient, on its own, to raise overall levels of business dynamism and growth. Although there is a positive relationship between birth rates and indicators of business churn and growth, we found no statistically significant direct association between such indicators and the height of entry regulations, reinforcing the view that other factors are important. Some of these potential factors will be explored in the chapters which follow.

Appendix 1.A: Variable definitions and sources for country-level sample

Variable	Definition and source
*Industry*country-level variables:*	
Birth rate	Number of enterprise births in year *t* divided by the number of enterprises active in year *t*. Source: Eurostat Business Demography (indicator V97020)
Average size of newly-born enterprises	Logarithm of the number of persons employed in year *t* among enterprises born in year *t* divided by the number of enterprises born in year *t*. Source: Eurostat Business Demography (indicator V97121)
Death rate	Number of enterprise deaths in year *t* divided by the number of enterprises active in year *t*. Source: Eurostat Business Demography (indicator V97030)
Share of high-growth enterprises	Number of high-growth enterprises in year *t* divided by the number of active enterprises with at least 10 employees in year *t*. A high-growth enterprise is an enterprise with >10% average annualised growth in the number of employees over a three-year period (t – 3 to t) and having at least 10 employees in the beginning of the period (t – 3). Source: Eurostat Business Demography (indicator V97460).
Industry share of value-added	Value-added in industry *i* and country *j* as a share of total value-added for country *j*. Source: Eurostat Structural Business Statistics.
Country-level variables:	
Entry procedures	Logarithm of the number of interactions with external parties that are required to start a limited liability company in the capital city of country *j*. Source: *Doing Business 2015*
Entry time	Logarithm of the time (in days) required to start a limited liability company in the capital city of country *j*. Source: *Doing Business 2015*
Entry cost	Logarithm of the cost (as a % of income per capita) of all fees required to start a limited liability company in the capital city of country *j*. Source: *Doing Business 2015*
Minimum capital requirement	Logarithm of the minimum paid-in capital (as a % of income per capita) required to start a limited liability company in the capital city of country *j*. Source: *Doing Business 2015*

Appendix 1.B: Variable definitions and sources for region-level sample

Variable	Definition and source
*Industry*region-level variables:*	
Birth rate	Number of enterprise births in year *t* divided by the number of enterprises active in year *t*. Source: INE Harmonised Business Demography (Tables 01004 and 01002)
Death rate	Number of enterprise deaths in year *t* divided by the number of enterprises active in year *t*. Source: INE Harmonised Business Demography (Tables 01010 and 01002)
Share of high-growth enterprises	Among enterprises with <250 employees: the number of high-growth enterprises in year *t* divided by the number of active enterprises with at least 10 employees in year *t*. See Appendix 1.A for the definition of 'high-growth'. Source: SABI Database.
Industry share of enterprises	Number of enterprises in industry *i* and region *j* as a share of the total number of enterprises in region *j*. Source: INE Harmonised Business Statistics (Table 01002).
Region-level variables:	
Entry procedures	Logarithm of the number of interactions with external parties that are required to start a limited liability company in the capital city of region *j* (for NACE Rev. 2 Sections B-E: a limited liability company engaged in industrial production). Source: *Doing Business in Spain 2015*
Entry time	Logarithm of the time (in days) required to start a limited liability company in the capital city of region *j* (for NACE Rev. 2 Sections B-E: a limited liability company engaged in industrial production). Source: *Doing Business in Spain 2015*
Entry cost	Logarithm of the cost (as % of income per capita) of fees required to start a limited liability company in the capital city of region *j* (for NACE Rev. 2 Sections B-E: a limited liability company engaged in industrial production). Source: *Doing Business in Spain 2015*

2.SPAIN'S INTERNAL MARKET

2.1 Introduction

The evaluation of the Single European Market requires better knowledge of the level of integration both between and within the EU countries. While some institutions are pushing towards greater integration between the EU countries themselves, some others may be introducing -on purpose or collaterally- additional barriers to economic interaction within a given EU country. To this regard, we join other economists in wondering what, in economic terms, a nation actually is, and how national and regional boundaries differ as impediments to economic integration.

The "Cecchini Report" (Cecchini et al, 1988) outlined the main costs of "non-Europe" which are of extreme relevance in nowadays context. Paradoxically, within Spain the level of market of fragmentation remains high and is bound to have a number of negative consequences, in terms of productivity, efficiency, investment, employment, and generally on business dynamics and economic growth. With the objective of deepening the integration of the internal market, Spain approved the Law 20/2013 on the Guarantee of Market Unity on 9 December 2013. The Law on Market Unity was conceived to reduce the fragmentation of the Spain's domestic market, which is plagued by a large number of different and overlapping national, regional and local regulations.The Law aims to create a more favourable environment that also might benefit consumers in terms of accessing better quality products and services.

The Law is conceived to have wide application to all economic activities, and to both movements of services and goods. It applies, for example, to a wide spectrum of activities including transport, electronic communication services, financial services, healthcare, pharmaceutical services, audiovisual services, social services in the areas of housing, childcare, private security services, work agencies and gambling, and tourism activities. The Law is based on two key principles: i) the unity of the market, that aims to guarantee the principle of free movement of goods and services across Spain; and ii) a move towards a progressive administrative deregulation that can impede administrations from hindering freedom of movement.

Despite critical efforts to implement these reforms since 2013, the level of internal fragmentation remains high. In order to correct for these distortions, it is vital to implement the Market Unity Guarantee Law effectively, by reducing and homogenising regulations in different sectors. The aim is to ensure that any product or service which complies with one region's legislation can be traded in other regions of Spain, based on the principle of single licence. Recent evidence shows that firms have progressively reduced their presence in regions other than that of the parent, despite that for many firms, especially in the service sector, direct investment is key to be able to reap the benefits of economies of scale (Bank of Spain, 2015).

A step-back in the implementation of the Law is the null declaration by the Spanish Constitutional Court, in June 2017, of some of its key provisions. The Spanish Constitutional Court declared that the articles 18.2 b), c) and e), 19, 20, and the 10th additional provision of the Law on the Guarantee of Market Unity, which are related to the principle of "single license", are unconstitutional. Under this principle, economic operators can provide their services and commercialise their products outside the territories of origin, provided that the territory of destiny would accept the full validity of the requirements, qualifications, prior inspections or guarantees of the territory of origin, even when these did not exist (article 19).

According to the Constitutional Court, even if the national legislator can establish a certain administrative intervention in order to guarantee market unity this recognition is only suitable when there is an "equivalence among applicable rules" between the origin and the destiny legislations. In this sense, the Constitutional Court believes that there will be no equivalence if (i) the origin regulation has no common denominator with the destiny legislation, or if (ii) "licenses" obtained in the origin without any requirements are considered as valid. Anything different would involve "forcing an autonomous community to accept, within its territory, a plurality of foreign policies" and would also imply a competence conflict. This set back could be especially harmful for SMEs, as they have a lower ability to overcome an excess in administrative hurdles.

The border-effect literature offers a valuable basis for discussion, since it allows us to quantify, after controlling for a set of factors, the level of intensity of trade within a certain spatial unit, in comparison with the intensity in other markets. The magnitude of the so-called border effect can shed light on the extent of economic integration in a country like Spain, as the border effects are indicative of some types of national barriers to trade. We study here whether regional borders influence the pattern of commercial transactions across Spain. However, we need to bear in mind when interpreting this evidence, that border effects may also arise endogenously as a consequence of the optimal location choices of producers. There is also evidence that consumers may also exhibit a bias towards domestic goods rather than to more formal barriers to trade (Head and Mayer, 2000). If border effects reflect the existence of national or regional barriers to trade, there could be increased market integration through the removal of these barriers. By contrast, if the border effect was mainly the result, for example, of the agglomeration of intermediate and final goods producers in a specific nation or region, the nature of the effect is considered mainly ''endogenous'', and the possibility to reduce the border through policy is less clear-cut.

2.2. Background: The state of the art

2.2.1 The border effect literature: international experiences

The existence of large border effects is one of the main puzzles of international macroeconomics (Obstfeld and Rogoff, 2000). The seminal paper by McCallum (1995) found that trade between any two Canadian provinces was (on average) 22 times greater than trade between any Canadian province and any US state. Since then, many authors have repeated the exercise with other countries and other spatial units, whether countries, regions, provinces or even zip codes (see Table 2.1 for a summary).

Table 2.1. Selected papers on external border effect for North America, OCDE, Europe and Spain, classified by data type and spatial unit.

Paper	Country	Sectoral analysis	Time period	External border effect
		Region-to-region		
1995. McCallum	Canada-United States	No	1988	22
1996. Helliwell	Canada-United States	No	1988–1990	22
1998. Hillbery	Canada-United States	No	1993	20
2001. Helliwell	Canada-United States	No	1991–1996	15–10
2002. Head & Mayer	United States (Wolf, 1997, 2000)	Yes	1997	11
		Country-to-country		
1996. Wei	OCDE	No	1982–1994	10-2.6
1997. Helliwell	OCDE	No	1996	13
2000. Nitsch$_a$	EU-10	No	1979–1990 1983–1990	7–10
2000. Head & Mayer	EU-9	Yes	1976–1995	30-11
	EU-12	Yes	1993–1995	13
2004. Chen	EU-7	Yes	1996	6
		Region-to-country		
1999. Anderson & Smith	Canada-United States	No		12
2005. Gil et al.	Spain (17 regions), Rest of Spain(*) and OECD-27	No	1995–1998	21
2003. Minondo	Basque Country, Rest of Spain(*), 201 countries	No	1993–1999	20–26
2007. Helble	France, EU-14	No	2002	8
	Germany, EU-14			3
2010. Requena &Llano	Spain (17 regions)	Yes	1995 & 2000	13
	OECD-28	Yes		
2010. Ghemawat et al.	Catalonia, Rest of Spain(*), OECD	Yes	1995–2006	55
2011. Llano-Verduras et al.	Spain (17 regions; 50 provinces, OECD)	No	2000 & 2005	40

(*) Rest of Spain considered as a country, with total exports computed from one Spanish region to the rest of Spain (ROS). The purpose of this aggregation is to measure external border effects when region-to-region data is not available.

Source: Own elaboration.

For the European Union (EU), certain papers have estimated the relevance of international borders by comparing a European country's domestic and international trade volumes (Head and Mayer, 2000; Minondo, 2007; Chen, 2004). Similar analyses have been produced at the sub-national level for a given country, computing what can by defined as the *external border effect*. These have taken a country's regions (or provinces) as their point of reference and counted how many more times they traded with the rest of the country (as a whole) than with other countries (Gil et al., 2005; Ghemawat et al., 2010).

Regarding the external border effect, a recent meta-analysis (Havranek and Irsova, 2017), has revised 1,271 estimates of the (external) border effect reported in 61 studies, codifying 32 aspects of each article that may influence the estimates. The paper concludes that the available empirical evidence is consistent with a mean reduction of a 33 percent in international trade due to borders, or inversely, an increase of 277 percent in intra-national trade due to borders. Papers based on Anderson and van Wincoop (2003) yield smaller estimates, finding that borders reduce trade among industrialized countries by 29 percent. Their meta-analysis suggests that the country-level differences in border effects can be partially explained by theory-motivated variables: 1) trade costs are positively associated with border effects, as larger border effects are reported for countries with larger tariff and non-tariff barriers to international trade; 2) pairs of countries with similar levels of GDP per capita tend to share smaller border effects, which might reflect the importance of consumers taste. Other important aspects conditioning the level of the border effect are: the level of aggregation, the measurement of internal and external distance, the control for multilateral resistance, and the treatment of zero trade flows.

In parallel, we also find estimates of the *home bias* within countries (*internal border effects*), that is, as how much more a region (o province) of a given country conducts more trade with itself than with any other region (province) of the same country. Wolf (1997, 2000), for example, while investigating market fragmentation in the United States (US), found intra-state trade unduly high in relation to inter-state trade. Later, Hillberry and Hummels (2008) analyzed the impact of geographical frictions on trade, using information from truck deliveries within the US at different spatial levels. They found that the internal border effects disappear in the US as the spatial units become very fine. Similarly, and taking into account the role played by social and business networks, Combes et al. (2005) and Garmendia et al. (2012), investigate the narrowing of *internal border effects* at the province level (Nuts 3) for France and Spain, respectively.

Studies such as the ones highlighted above all require data on interregional commodity flows. In most countries, these tend to be scarce and incomplete. In those papers that focus on internal trade (within a country), it is common to use interregional transport flows or deliveries as reported by the selling firms (Hillberry and Hummels, 2008), or by freight statistics, as reported by the transport operators (Garmendia et al, 2012; Llano et al., 2017; Gallego et al, 2015; Gallego and Llano, 2014).

Of special interest to us here are papers that compute a single country's home bias or own-region effect, defined as how much more a region (or province) trades with itself than with any other region (province) of the same country. These studies include Wolf (2000), Millimet and Osang (2007) and Yilmazkuday (2012) for the United States; Helliwell (1996) for Canada; Helble (2007) and Nitsch (2002) for Germany; Combes et al. (2005) for France; and Garmendia et al. (2012) for Spain). Another interesting reference is Kei-Mu Yi (2010), who develops a theoretical model that studies the home-bias in the US, considering the multi-stage production (fragmentation) within a country.

2.2.2 The border effect in Spain

Regarding the border effect in Spain, Gil et al. (2005) examined the magnitude of the *external border effect* using bilateral trade flows between each of the 17 Spanish regions (Nuts 2) and 27 OECD countries for the period 1995-1998. Using panel data regressions with random effects, they found that, on average, exports from a Spanish region to the rest of Spain (as a whole) exceed 19 times that of the international exports, while a factor of 54 was found for imports. All these results were robust to controlling for size, distance, contiguity, the fact that some regions/countries are islands, or members of the EU or EFTA.

Since then, several papers have re-examined the Spanish border effect. Requena and Llano (2010) estimated the internal and external border effect at the regional level (Nuts 2), using industry specific flows. Their dataset includes intraregional trade flows and interregional trade flows for each of the 17 Spanish regions, and the international trade flows of each of these regions with the OECD (28) countries. The authors found that, on average, the internal border effect reaches a value of 17, indicating that a Spanish region tends to trade 17 times more with itself than with the rest of the country. Their external border effect indicated that a Spanish region tends to trade 13 times more with the rest of the country (as a whole) than with any other country in the sample. With a similar dataset, Ghemawat et al. (2010) focused on Catalunya's external border effect, comparing the intensity of trade between Catalunya and the rest of Spain, as a whole, with the equivalent trade with other 22 OECD countries. The results suggest a fall of the border effect of Catalunya from 1995 to 2005, from a factor of 80 to 29. Moreover, when this analysis is repeated considering the international trade of Catalunya with the adjacent France (exports + imports) only, the magnitude of the external border effect decreases to 23 (in 2005).

Llano-Verduras et al. (2011) re-estimated the external border effect in Spain using flows data at two different spatial scales, namely, regions (Nuts 2) and provinces (Nuts 3). They found that the magnitude of the border depends on the size of the spatial unit used. One of the limitations of this paper is that although introduces controls for the spatial scale of Spanish units (from Nuts 2 regions to Nuts 3 provinces), the spatial scale of the foreign partner is always a country. Garmendia et al. (2012) re-estimated the internal border effect in Spain using province data (Nuts 3) and looks at social and business networks effects. Following Hillberry and Hummels (2008), Díaz-Lanchas et al. (2013), estimated the internal border effect for the Spanish economy considering three different spatial units at the sub-national level (regions-Nuts 2; provinces Nuts-3; municipalities Nuts-5), as well as a number of different variables that proxy for trade distance (Km, travel time, generalized transportation costs). They found, as in the reference paper, that the internal border effect vanishes when the smallest spatial unit is considered. Again this suggests that the within-country effect is largely driven by specification issues, and the result of endogenous agglomeration economies around large cities, rather than the presence of strong external barriers to trade imposed, for example, by regional rules.

Gallego and Llano (2014) also estimate the internal and external border effect for the Spanish case, with the innovation of considering region-to-region flows within Spain, as well as between Spain and the regions of the 8 main EU countries (at Nuts 2 level). This paper also found that the value of the internal border effect decreases when it is computed simultaneously with the external border effect. A more detailed treatment of the non-linear relationship between the distance and the flows is used (in line with what was observed by Diaz-Lanchas et al, 2013, as well as Hilberry and Hummels, 2008).

Then, Gallego et al, 2015, also analyzed the *internal border effect* for transport mode specific flows, controlling for the presence of wholesales and re-exportation schemes due to complex logistic practices. Finally, Llano et al. (2017) revisited the same dataset for

modelling the presence of transport-mode competition in the inter-provincial flows within Spain, also computing an internal border effect, although less comparable than in previous cases, due to the specification used. All these main references are cited in Table 2.2.

Table 2.2. Selected Papers on *Internal Border Effect / Home Bias* within a country.

Paper	Country	Sectoral analysis	Time period	Internal border effect / Home bias	Observations
Wolf, 2000	United States	No	1988	2	
Nitsch (2002)	Germany				
Hillberry and Hummels, 2003	United States	No	1988	22	
Hillberry and Hummels, 2008	United States	No	1988	Decreasing with spatial aggregation	PPML. States and zip code. Just road deliveries.
Djankov and Freund (2000)	USSR	No		11	
Poncet (2003)	China	No			
Daumal and Zignago (2008)	Brazil	No		20	
Combes et al. (2005)	France	No	2000	6	Prefectures. Nuts 3.
Requena and Llano (2010)	Spain	Yes	1995-2000	17 for aggregate flows. From 6 to 45 for sector specific flows	OLS, panel data and Tobit. Internal and external border. Regions Nuts-2.
Millimet and Osang (2007),	United States	No	1988	6	
Henderson and Millimet (2008),	United States	No	1988	-	
Kei-Mu (2010)	United States	No	1988	-	
Garmendia et al. (2012),	Spain	No	2004-2008	1-3.7	OLS and PPML. Provinces Nuts-3.
Gallego and Llano (2015)	Spain	No	2004-2011	1-5	OLS and PPML. Regions Nuts-2.
Gallego and Llano (2012)	Spain	No	2004-2007	1-4	OLS and PPML. Internal border computed together with external. Regions Nuts-2.

Llano et al, (2017)	Spain	Yes	2007	10-5	Several specifications. OLS and SAR. Provinces (Nuts 3). Just road deliveries.
Díaz-Lanchas et al, (2013)	Spain	No	1995-2007	Decreasing with spatial aggregation	PPML. Regions (Nuts2), Provinces (Nuts 3), Municipalities (Nuts 5). Just road deliveries.

Source: Own elaboration.

2.3 The empirical model

2.3.1. *A* gravity model for Spain's market of goods

The backbone of our investigation is the gravity equation, where the intensity of trade between any two locations (regions) is positively related to their economic size and inversely related to the trade costs (which proxy by geographical distance) between them. The gravity models have been commonly used to model international and interregional trade flows. As recently reviewed by Head and Mayer (2014), the gravity equation can be justified by a broad range of trade theories, such as those based on differences in factor-endowments (Deardorff 1998), monopolistic competition (Helpman and Krugman, 1985), home-preferences (Anderson, 1979; Anderson and van Wincoop, 2003) or increasing returns to scale (Helpman and Krugman 1985; Evenett and Keller, 2002).

The internal border effect

By internal border effect we denote the number of times a Spanish region trades more with itself than with any another region in Spain. We define our specifications by taking inspiration from some classic papers on the estimation of border effects with sub-national spatial units in Canada and the US (McCallum, 1995; Anderson and van Wincoop, 2003; Feenstra, 2002, 2004). For the sake of brevity, we here define two equations that contain all the models used in this report. They include variables that will be *switched on* or *off* depending on the model in use at a given time. As is standard in this literature we model import and export flows separately.

Model 1

Equation (2.1) formulates a general specification for estimating the internal border effect using the intra and inter-regional (or region-country) flows along with measures of GDP, distance and other standard control variables:

$$\left(T_{ijt} * \frac{Y_i}{Y_j}\right) = \beta_0 + \beta_1 D_{ij} + \beta_2 ADJREG_{ij} + \beta_3 ADJCOU_{ij} + \beta_4 OWNREG_{ij} + \beta_5 SPAIN_{ij} + X_i + X_j + \mu_{it} + \mu_{jt} + \varepsilon_{ijt}$$

(2.1)

where T_{ijt} is the Euro value of deliveries from region *i* to region *j* (or country *j)* in year *t*; the subscript refers to the exporting Spanish region, and *j* to the importing Spanish region or importing foreign country.

We normalize the dependent variable to take into account differences in absolute values of trade flows. In the case of exports, for example, the dependent variable is determined by the size of the origin and destination regions ("Exports/(GDPi*GDPj)". In the case of the imports model, our dependent variable is equally given by the expression Imports/(GDPi*GDPj.

In equation (2.1), the variable Y_{it} is the economic size of exporter *i* and the variable Y_{jt} is the economic size of the importer *j* (both measured by the region or country's GDP for every year); D measures the geographic distance between locations *i* and *j*. To capture the positive effect of adjacency, in addition we introduce two dummy variables. The first one is *ADJREG*, which is a dummy variable that equals one when two Spanish regions share a common border, and zero otherwise. The second is *ADJCOU,* a dummy variable that equals one when a Spanish region and a foreign country share a common border, and zero otherwise. The latter two variables conveniently control for higher inter-regional trade flows between contiguous Spanish regions, as well as for higher concentration of trade between regions of Spain and other neighboring countries.

We then include two additional variables that will yield the estimation of the internal border effect or home bias. The first one is *OWNREG,* a dummy variable that equals 1 when the trade is intra-regional and 0 otherwise; that is, *OWNREG* is equal 1 if *i=j.* This variable aims to control for the potentially different nature of flows within and between regions within Spain. The second one is *SPAIN*, a dummy variable that equals 1 for trade between two Spanish regions and 0 for international trade or intrarregional trade (that is SPAIN equals 1 if $i,j\ SPAIN$ and $i \neq j$*).* The internal border effect or home bias is given by the antilog of the difference of coefficients β_4 and β_5 $[\exp(\beta_4\text{-}\beta_5)]$. It measures how many times intraregional trade exceeds inter-regional trade. The external border effect is given by the coefficient β_5 and captures how many times interregional trade exceeds international trade.

We use several measures of geographical distance, as this is one of the key variables of the gravity equation more likely to affect the validity and reliability of the econometric results of the border effect. Our preferred one is the distance from Llano et al (2017), measured at the province level. It takes into account road deliveries within the Iberian Peninsula and shipments for trade with the islands. These distances are weighted up using the size of population of the provinces of origin and destination asscoiated wih the trade flows.

The specification (2.1) includes a wide range of variables that control for different factors that may affect transaction costs and the magnitude of the flows across regions. For example we include a dummy veriable indicating whether the regions are an island (Balearic or Canary Islands) or whether have a `special' tax system. Full details of the variables included in the model are provided in the Appendix.

We adopt a panel data approach to estimate the equation as heterogeneity issues can be modelled with the use of country-pair 'individual' effects. The terms μ_{it} and μ_{jt} correspond to multilateral-resistance fixed effects, for the origin-time and the destination-time region, respectively. Their inclusion follows Anderson and van Wincoop (2003) and Feenstra (2002, 2004) and are meant to control for competitive effects, exerted by non-observable prices of partner regions and other competitors. They are also meant to capture other particular characteristics of the regions considered. It is worth mentioning that, because of their cross-section data, the origin and destination fixed effects in Anderson and van Wincoop (2003) and Feenstra (2002) did not consider their interaction with time; ε_{ijt} denotes the classical disturbance term. In the estimation, we cluster the standard errors by origin-destination pair effects.

We estimate the model using the Poisson Pseudo-Maximum Likelihood technique (PPML)[22]. This is preferred to using Ordinary Least Square (OLS) estimators, are our trade data consists of many zeros[23].

Model 2

Building again on the paper Llano and Requena (2010) we estimate an alternative version of the model (2.1) by inlcuding trade flows by industry (see also Chen, 2004). In addition to the variables outlined above, we include now some variables with an in industry dimension, and also add a fixed-effect term for each sector (μ_k).

$$\left(T_{ijkt} * \frac{Y_{ikt}}{Y_{jt}}\right) = \beta_0 + \beta_1 lnD_{ij} + \beta_2 ADJREG_{ij} + \beta_3 ADJCOU_{ij} + \beta_4 OWNREG_{ij} + \beta_5 SPAIN_{ij} + X_i + X_j + \mu_{it} + \mu_{jt} + \mu_k + \varepsilon_{ijt}$$

(2.2)

where now *k* now denotes industry; the variable Y_{ikt} proxies for the size of the industry *k* in exporting region *i* (measured in terms of output) and Y_{jt} controls for the size of the region or country of the destination of exports (measured again using GDP).

2.3.2 Data sources: regional trade data in Spain

There is no official data on region-to-region trade flows for any country in the EU. In this paper, we use a unique dataset that captures region-to-region, intra-region and inter-national trade flows within Spain, for the period 1995-2015 (C-Intereg project, www.c-intereg.es) for the 17 Spain's regions (Nuts 2[24]). This novel dataset is similar (but not exactly the same) to the ones used in previous analyses (Garmendia et al., 2012; Llano-Verduras et al., 2011; Ghemawhat et al., 2010; Requena and Llano, 2010). Requena and Llano (2010) provides a detailed description of the methodology underlying the construction of the database. It relies mainly on a full set of freight datasets by transport mode and type of products, mixed with product-specific price vectors, and the corresponding constraints at the national and regional level, both in terms of output and international trade.

The construction of the trade dataset draws on a number origin-destination transport statistics from: roads (Permanent Survey on Road Transport of Goods by the Ministerio de Fomento), railways (Complete Wagon and Containers flows, RENFE), sea (Spanish Ports Statistics, Puertos del Estado), air (O/D Matrices of Domestic flows of goods by airport of Origin and Destination, AENA). These data are matched with additional information on output by region and sector (Industrial Enterprises Survey, INE) as the interregional transport flows are constrained to National and Regional Accounts (INE) totals. As there

[22] It was Santos Silva and Tenreyro (2006) who proposed using the PPML approach, which also sorts out Jensen's inequality (note that the endogenous variable is in levels) and produces unbiased estimates of the coefficients by solving the heteroskedasticity problem.

[23] The zero values considered in our dataset correspond to region dyads that had non-zero values in at least one year of the period 2004–2011. Zeros corresponding to regions that did not receive any exports from a Spanish region during that period are not considered in our sample.

[24] Ceuta y Melilla are excluded from our sample.

are no data on regional gross production by industry in Spain, the effective amount of production is computed as the value added resulting from the aggregation of intrarregional, interregional and international trade flows by region and productive sector. The international trade data comes from the Spanish Tax Agency (Dirección General de Aduanas). See table 2.3 below for a description of all goods-producing sectors included in the C-Intereg database and in our report.

Table 2.3 Sectors covered by the C –Interreg database.

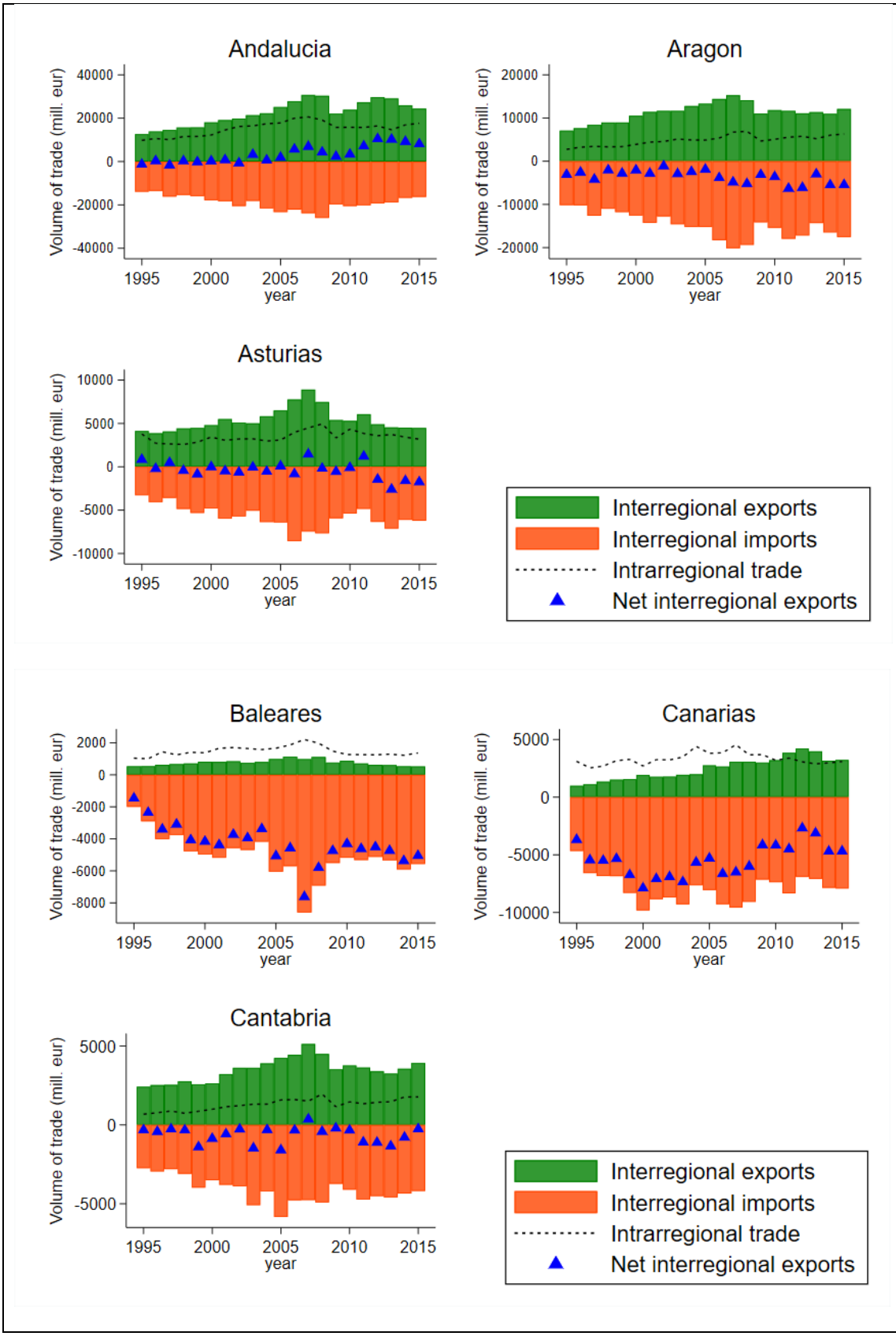
R30	Name of sector
1	Live animals
2	Cereals
3	Unprocessed food products
4	Woods
5	Processed food products
6	Oils
7	Tobacco
8	Drinks
9	Coals
10	Minerals (not ECSC)
11	Liquid fuels
12	Minerals (ECSC)
13	Steel products (ECSC)
14	Steel products (not ECSC)
15	Stones and ground, salt
16	Cements and limestone
17	Glass
18	Construction materials
19	Fertilizers
20	Chemical products
21	Plastics and rubber
22	Machinery, non-electric engines and motors, tractors, agricultural machinery and equipment
23	Machinery, apparatus and electric motors
24	Transport material
25	Textile and clothing
26	Leather and footwear
27	Paper
28	Wood and cork
29	Furniture and furnishings, new. Other manufactured articles.

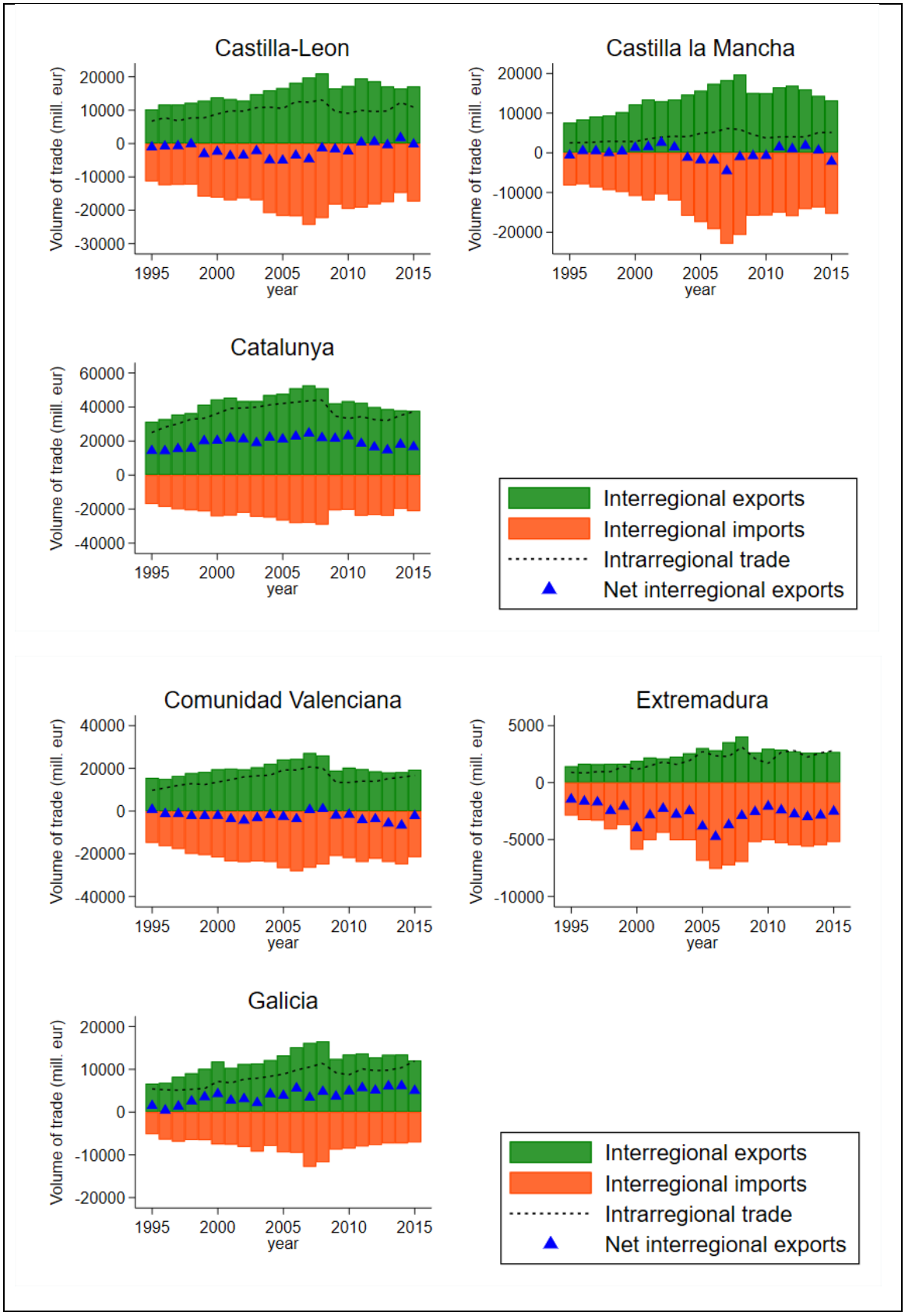
source: see www.c-intereg.es

Figure 2.1 illustrates the evolution of intra-regional and inter-regional trade in Spain during the period 1995 to 2015. We show, for each of the Comunidad Autonoma, the amount of trade within their own region, as well as with other regions, both in terms of exports (green bars) and imports (orange bars). A few interesting observations emerge from these graphs. The region with the most favourable trade balance in terms of net exports to other regions (or exports minus imports) is Catalunya. The regions with the a worst net trade position include Madrid, Extremadura, and the islands, Canarias and Baleares. In addition, we can compare trends in inter-regional trade with those in intra-regional trade (dotted line in the graphs). The volume of trade with other regions (exports minus imports) is usually below that in the same region, but the magnitude of this difference is not constant across regions or over time. It is also apparent that both types of flows decreased after the financial crisis but have recovered since. There are some regions that have seen an improvement in their net trade position over time (Galicia), and others have deteriorated (Pais Vasco).

We investigate also the extent to which intra-regional trade is above inter-regional trade in certain sectors. This is not necessarily linked to the degree of market fragmentation, but can instead be explained by patterns of industry specialisation. In figures 2.2a-2.2b we illustrate interregional and intraregional trade flows for some selected sectors. Each of the dots refers to a different Comunidad Autonoma, and their size represents volume of trade. Figure 2.2a shows that the "live animals" sector is the largest in Catalunya, Aragon and Castilla-Leon, compared to the rest of Spain. However, in Catalunya, the intra-regional trade accounts for a much higher share than the inter-regional trade, compared to Castilla-Leon and Aragon. The imports sector is also sizeable in these regions; the intra-regional imports in Catalunya are larger than the inter-regional imports, but the difference is less marked than in the case of the exports. In Figure 2.1b we see that Catalunya has the largest chemical sector, in volume of exports and imports. The share of this sector in total intra-regional imports is much higher than the share of total inter-regional imports. The Appendix includes the full set of figures for the sectors covered in the database.

Figure 2.1. Evolution of interregional and intraregional trade


Andalucia
Aragon
Asturias
Baleares
Canarias
Cantabria
Volume of trade (mill. eur)
year
1995
2000
2005
2010
2015
Interregional exports
Interregional imports
Intrarregional trade
Net interregional exports


Castilla-Leon
Castilla la Mancha
Catalunya
Comunidad Valenciana
Extremadura
Galicia
Volume of trade (mill. eur)
year
1995
2000
2005
2010
2015
Interregional exports
Interregional imports
Intrarregional trade
Net interregional exports

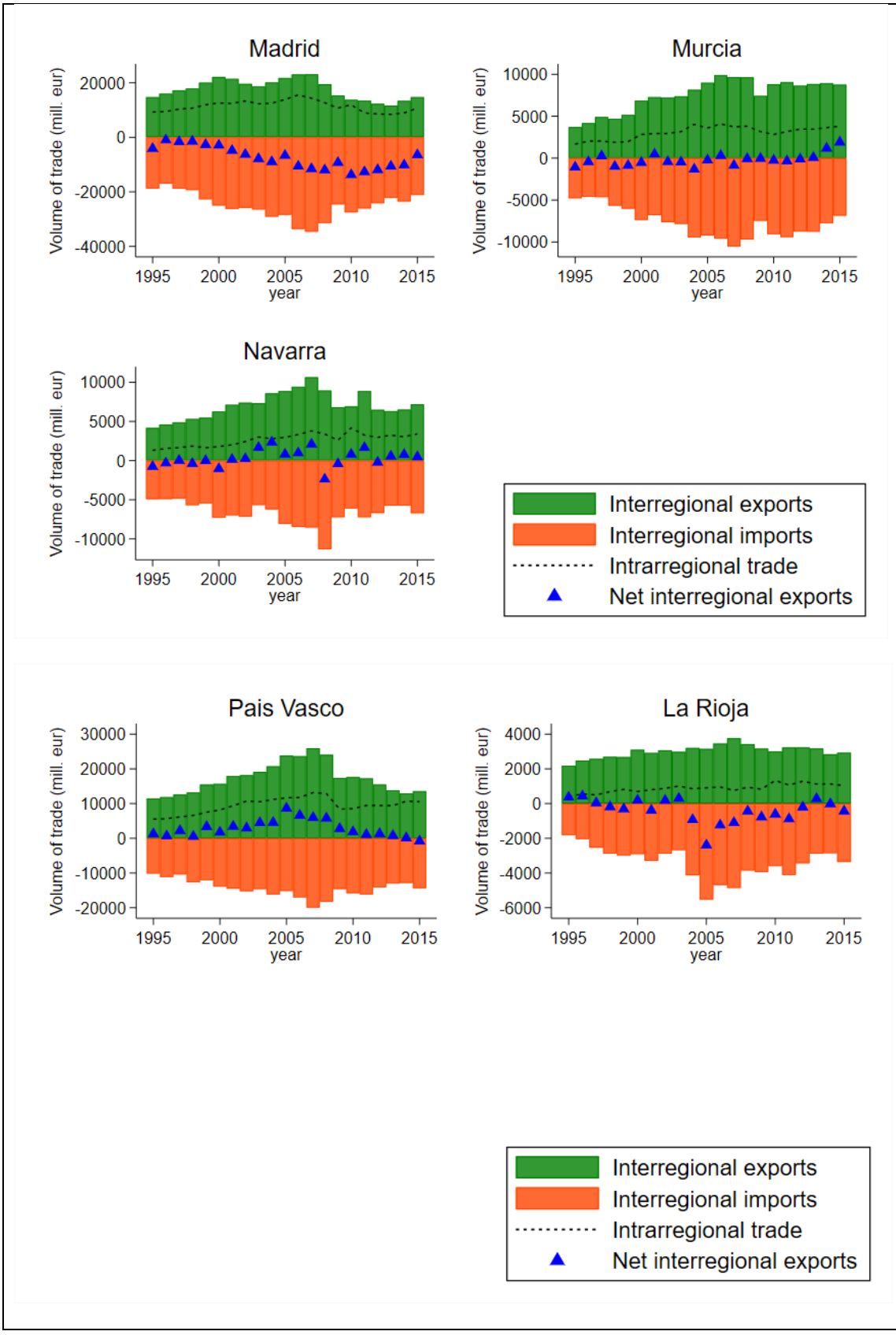

Madrid
Volume of trade (mill. eur)
20000
0
-20000
-40000
1995
2000
2005
2010
2015
year
Murcia
Volume of trade (mill. eur)
10000
5000
0
-5000
-10000
1995
2000
2005
2010
2015
year
Navarra
Volume of trade (mill. eur)
10000
5000
0
-5000
-10000
1995
2000
2005
2010
2015
year
Interregional exports
Interregional imports
Intrarregional trade
Net interregional exports
Pais Vasco
Volume of trade (mill. eur)
30000
20000
10000
0
-10000
-20000
1995
2000
2005
2010
2015
year
La Rioja
Volume of trade (mill. eur)
4000
2000
0
-2000
-4000
-6000
1995
2000
2005
2010
2015
year
Interregional exports
Interregional imports
Intrarregional trade
Net interregional exports

Figure 2.2a Industry – Live animals

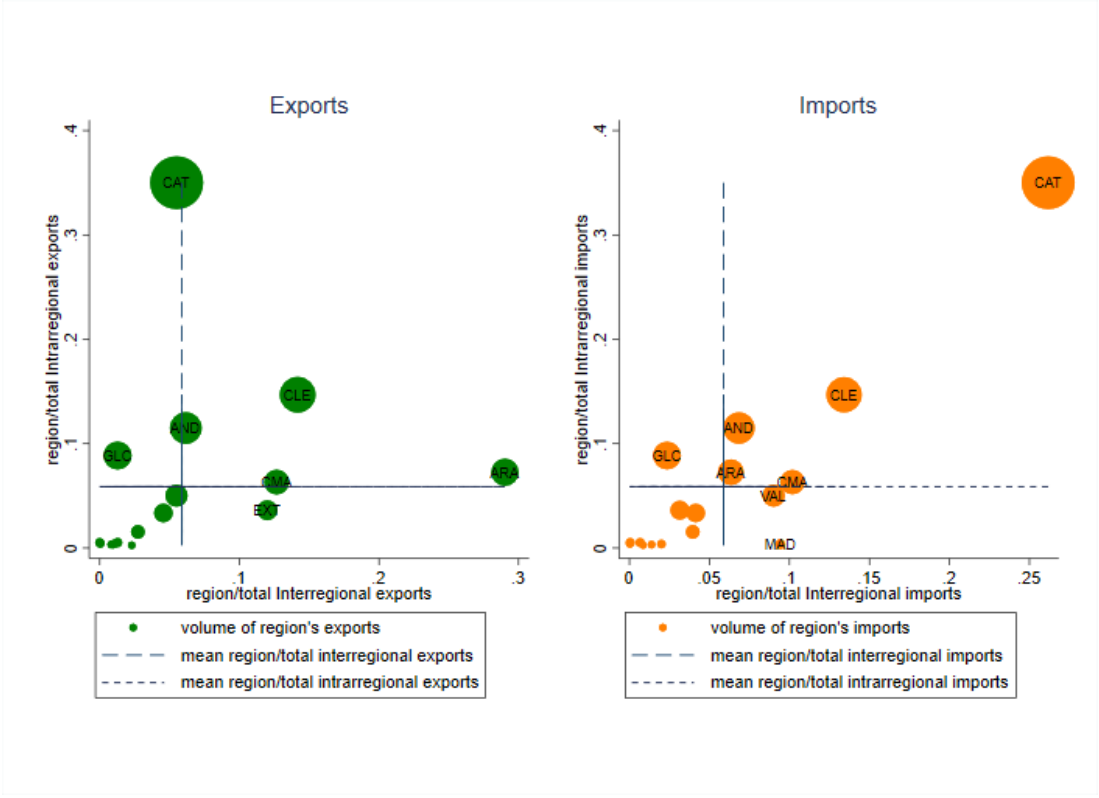
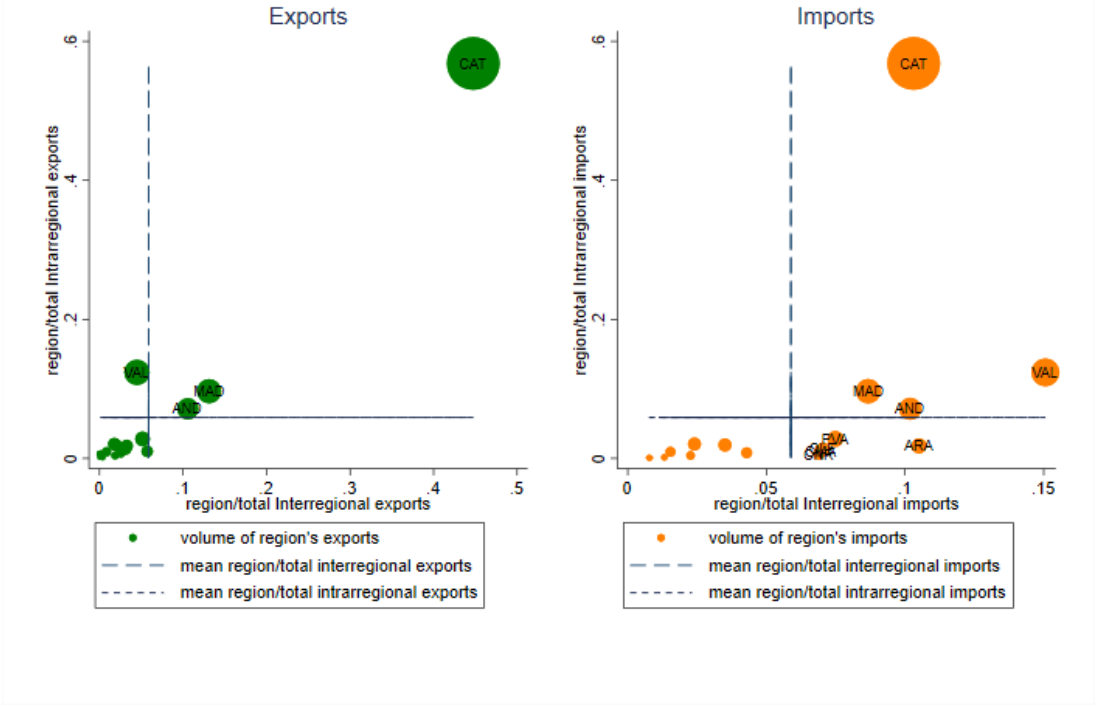


Figure 2.2b Industry – Chemical products



2.4 Econometric results of the gravity model

In this section we report and discuss the results of estimating the gravity models outlined in equations (2.1) and (2.2), based on our preferred estimation method (PPML). We highlight how our results differ from previous benchmark results available for Spain (See for example Gil et al 2005, and Llano and Requena, 2010). In table 2.4 we report the gravity model results when considering total regional flows, that is aggregated for all industries (estimation of equation 2.1). Column 1 represents exports and column 3 represents imports.

In columns 2 and 4 we report the results of estimating equation 2.2 when we distinguish industry flows (and the corresponding industry-level explanatory variables), again both for the case of the exports and the imports. In all cases we estimate the equations with year fixed effects. As in previous papers, we also control for the influence of international trade flows, that is, the import and export flows from Spanish regions with other countries (Llano and Requena, Gil-Pareja et al. 2005). In tables A.2.1 to A.2.3 we present descriptive statistics based on our sample.

We find, as expected, that the sign of the *Ownreg* variable is positive and significant (at 1 per cent level); the size of the coefficient is largely stable across the four specifications, ranging between 4 and 4.2. The coefficient of the *Spain* variable (denoting interregional trade) is estimated to be between 2.5 and 2.9. Considering column 3 (that is, total regional import flows) the precise estimate of the home bias is around 4, as the estimated coefficient for the *Ownreg* variable is 4.298 and the estimated coefficient for the the *Spain* variable is 2.898. The home bias is then equal to exp(4.298-2.898-4). Similar calculations can be replicated based on the coefficients for the four specifications. For the specifications with industry flows, the size of the homas bias is slightly larger, that is, 4.8 in the case of imports in column 4. The home bias is computed as exp(4.236-2.679).

According to the esitmates shown in table 2.4 Spanish regions are between 4 and 5 times (depending on the exact specification) more likely to trade with themselves than with other regions. This border estimate is on the lower bound what other studies have estimated previously (Llano and Requena, 2010 ; Gil-Pareja et al. 2005). The estimate of the home bias is slightly larger when using an OLS estimation technique (results are available upon request) compared to the PPML estimator, but the latter remains our preferred choice to estimate these models.

As for the coefficients of the rest of the variables from the gravity models, we find, in line with expectations, a negative and statistically significant relationship for the "geographical distance" measure. The coefficient is estimated to be around -0.9 (significant at the 1 per cent). This coefficient is consistent with those shown in of the closest to our study, Llano and Requena (2010).

The coefficient of the "contiguity" variable is also, as expected, positive and significant, as regions tend to trade more with adjacent regions than they do with otherwise similar regions. The effect of the external contiguity variable, however, is not statistically significant. The sign of the remaining coefficients in the gravity models are also consistent with what we would have anticipated. This is the case of the variable capturing the size of the exporting sector, which is positively correlated with the magnitude of the total export flows. The results of the models do not yield qualitatively different results whether we consider exports or imports. All models include year fixed effects in the estimation, and we include an additional dummy for the crisis years (2007-2009).

We then estimate a separate equation for each of the years, so that we are able to draw conclusions regarding the changing home bias. In figure 2.3 we see that home bias appears to have been rising since the mid-90s, although it has declined in the last couple years, that is from 2013 to 2015. The 2013 point coincides with the passing of the Ley de Garantia de Unidad de Mercado. This is apparent in the case of both the exports and imports. Having more more recent data will be useful to understand whether the 2013 decrease is temporary or may mark a reverse in the trend.

In Figures 2.4 we illustrate the extent to which the home bias differs across the regions in Spain (which result of estimating region-specific gravity equations). Again we estimate for both exports and imports, and always include also the international trade flows. Generally, we would expect to find different border effects by region, reflecting differences in industrial structure, as well as geography.

The coefficient of the "home bias" (computed as the antilog of the difference in coefficients β_5 and β_6) is positive and significant in all regional models, but it can vary substatially across regions. In figure 2.4 we illustrate the differences in the magnitude of the bias. Focusing on the imports, we find that the largest home bias is found for Extremadura, as we find that this region is 10 times more likely to trade with itself than with others. Other regions with a large bias include Aragon (home bias of 8), Baleares (home bias of 6) as well as Castilla-La Mancha and Castilla-Leon (home bias of 5). On the other hand, the region with the lowest home bias are Madrid and Canarias. Other regions with a low home bias (less than 2) include Catalunya, Andalucia, and Comunidad Valenciana. As for the exports, figure 2.5 shows qualitatively similar results.

We then go on to report industry-specific border coefficients for each of the 29 manufacturing sectors (see figure 2.6). Those sectors for which we find a larger home bias include minerals (not ECSC) woods, cement and limestone, construction materials, as well as some food industries, such as live animals, fertilisers, cereals, unprocessed foods and drinks. Industries for which estimate a lower value of the home bias include textiles and clothing, leather footwear, textile and clothing, glass, paper, machinery (electric), chemical products, and transport equipment.

Table 2.4: Regional gravity models, 1995-2015.

	(1)	(2)	(3)	(4)
Dep. variable	Export(GDPi*GDPj)		Import(GDPi*GDPj)	
Log Distance	-0.932***	-0.955***	-0.901***	-0.942***
	(0.0934)	(0.0750)	(0.0902)	(0.0734)
Contiguity	0.585***	0.652***	0.616***	0.664***
	(0.103)	(0.0903)	(0.102)	(0.0911)
External Contiguity	-0.0333	-0.0596	0.271	0.224
	(0.208)	(0.157)	(0.336)	(0.173)
Ownreg	3.962***	3.958***	4.298***	4.236***
	(0.276)	(0.222)	(0.270)	(0.225)
Spain	2.615***	2.420***	2.898***	2.679***
	(0.137)	(0.107)	(0.137)	(0.121)
Island Exporter	-1.106***	-1.050***	-1.040***	-0.990***
	(0.188)	(0.172)	(0.184)	(0.174)
Island Importer	0.0209	0.0794	-0.0302	0.0283

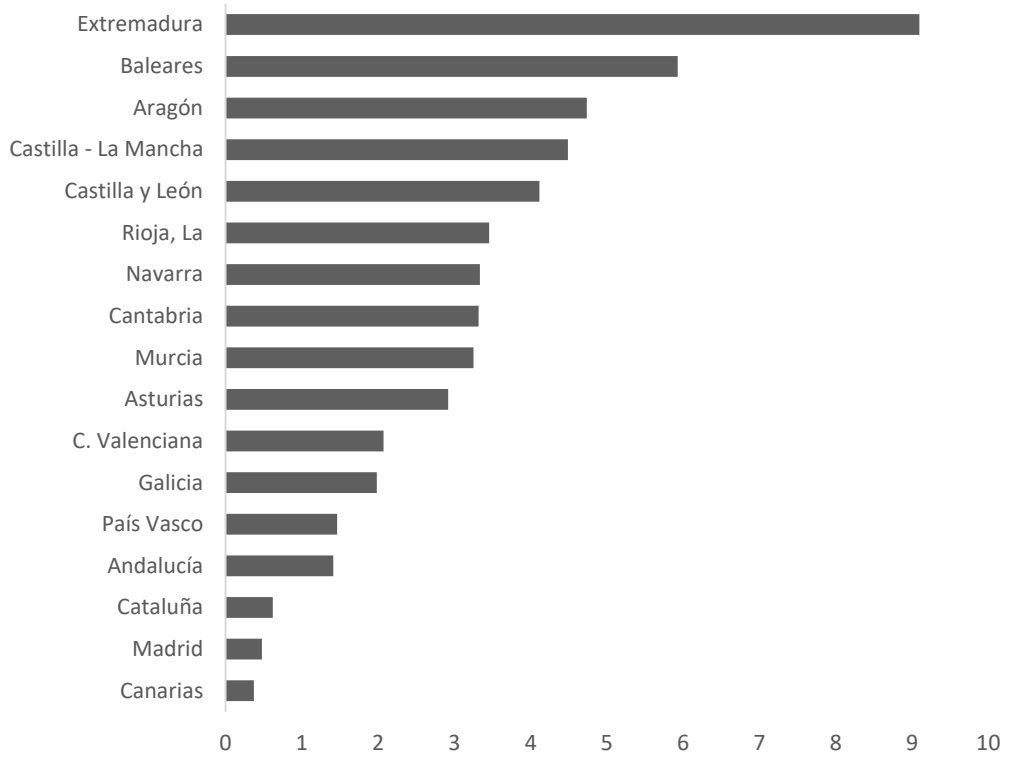
	(0.155)	(0.118)	(0.149)	(0.115)
Special Tax System Exporter	0.189	0.198*	0.0273	0.0249
	(0.191)	(0.109)	(0.191)	(0.111)
Special Tax System Importer	0.0498	-0.00143	0.214	0.171
	(0.198)	(0.109)	(0.194)	(0.106)
Crisis	-1.446***	-1.429***	-1.467***	-1.440***
	(0.270)	(0.169)	(0.269)	(0.170)
Constant	2.820***	-0.547	2.344***	-0.880
	(0.701)	(0.568)	(0.675)	(0.558)
Type of flow	Total flows	Industry flows	Total flows	Industry flows
Observations	15,708	461,601	15,708	461,601
R-squared	0.932	0.509	0.933	0.510
Robust standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

Note : Time FE are included in all specificaitonss. i denotes origin and j denotes destination region.

Figure 2.3 Evolution of the home bias across all Spanish regions, 1995-2015.

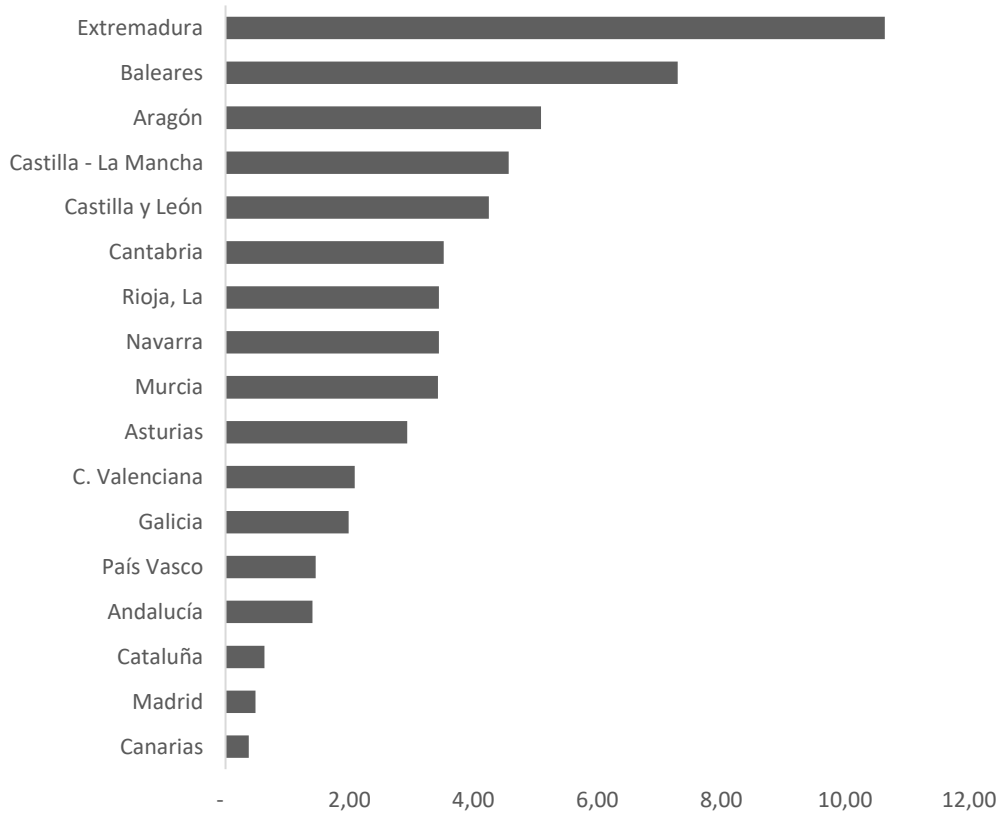
Source: Own elaboration, C-Interreg database.

Figure 2.4. Ranking home bias by Comunidad Autonoma, Imports, 1995-2015.



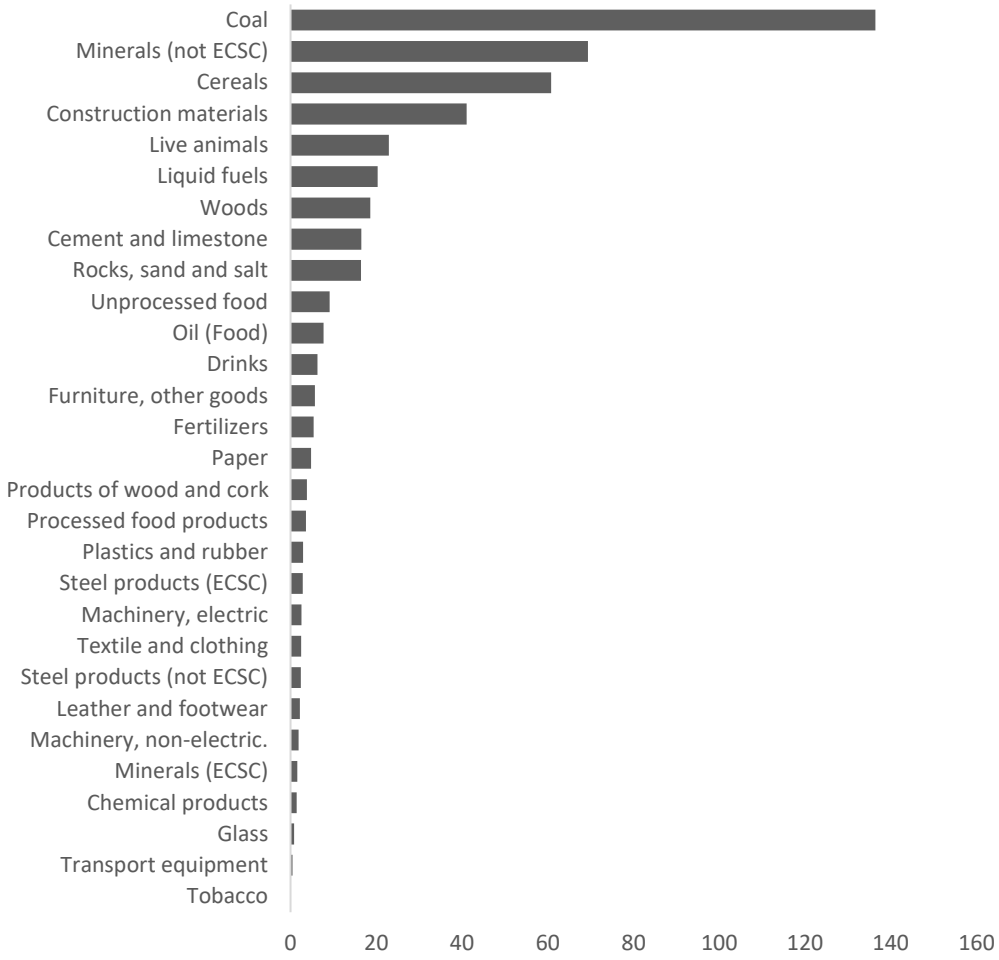
Source: Own elaboration based on C-Interreg database.

Figure 2.5. Ranking home bias by Comunidad Autonoma, Exports, 1995-2015.



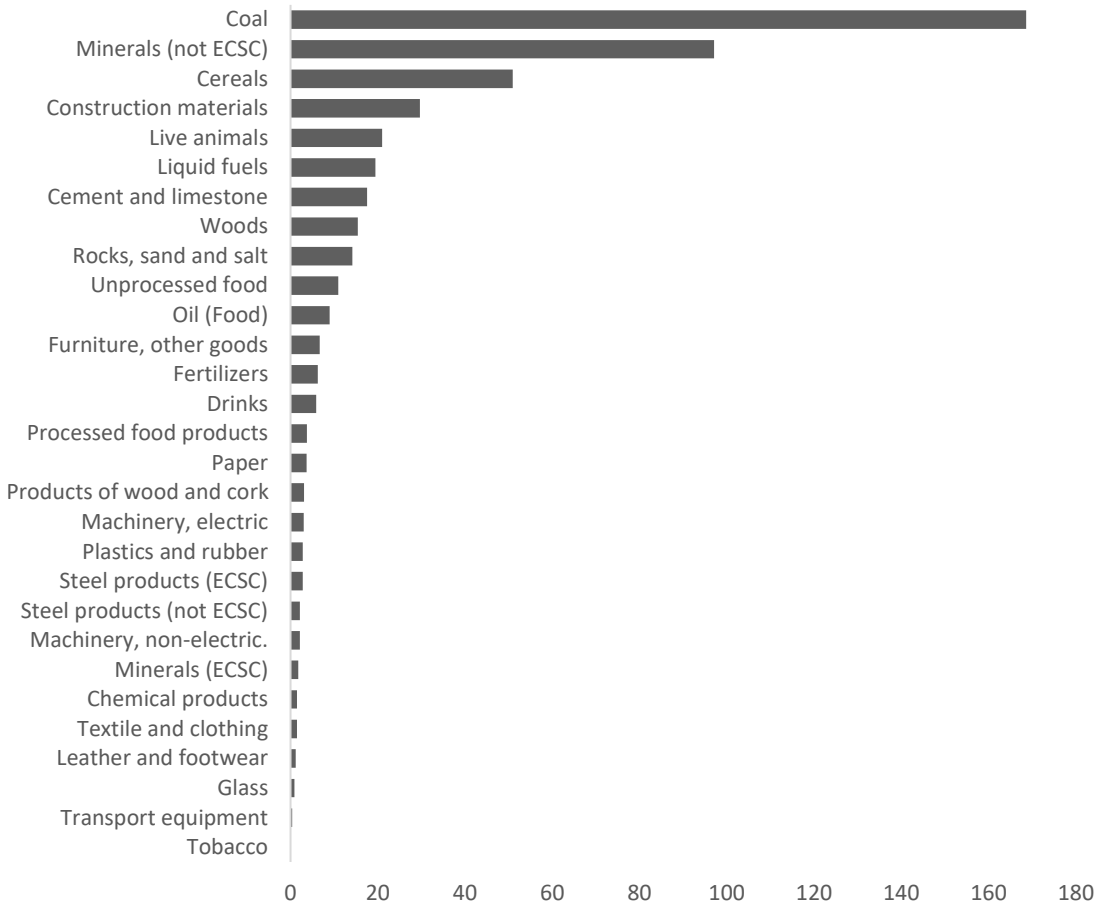
Source: Own elaboration, C-Interreg database.

Figure 2.6. Ranking home bias by industiral sector, Imports, 1995-2015.



Source: Own elaboration based on C-Interreg database.

Figure 2.7 Ranking home bias by industrial sector, Exports, 1995-2015.



Source: Own elaboration based on C-Interreg database.

2.5. Measuring market fragmentation

In this section we provide a summary of data sources that we have collected to illustrate the degree of product market fragmentation in Spain. The first source that we report in this section is the inventory by the CEOE (the national employers' association) on "Market Unity Distortions", dated from 2012. This is a very useful account of prevailing distortions, as it provides detailed examples of barriers to market unity for different sectors. The inventory dates back from 2012 (the year before the Ley the Garantia de Unidad de Mercado was approved), and therefore does not enable us to assess whether market fragmentation has improved in recent years. The lack of time variation in these data limits our ability to undertake any robust quantitative analysis of causality between the level of market fragmentation and business dynamics and performance outcomes.

Acknowledging this drawback, we rely on a second type of indicators, that help us capture the changing level of devolution of the Spanish regions over the last 40 years. These indicators are extracted from the paper by Marcos et al. (2010). Marcos et al. (2010) develop a number of indicators for regulatory intensity, for example, the number of pages published in the regional official journals. These are taken as an indication of the proneness of the regions to introduce new regulations and enforce them, and this can potentially be correlated with the regulatory burden imposed on business. While official journals are not a source of law themselves, they may act as a necessary publicity instrument to diffuse knowledge of laws.

A second measure of regional regulatory intensity is proposed by Marcos et al., which is the quantity of legislation and regulatory activity. This can also be used as a proxy for a region's degree of interventionism in the economic and business environment. Admittedly, the Marcos et al set of indicators present significant limitations, as they are not sector specific, and are not necessarily linked to the level of market fragmentation. They could however be interpreted broadly as proxies for the level of devolution acquired by Spanish regions.

Third, we are able to document the number of cases breaching the Ley de Garantia de Unidad de Mercado (LGUM) in 2013. The Ministerio of Economia files information on the number of complaints filed in each of the NACE sectors, although it refers mainly to the service sector. Each complaint contains a detailed description of the nature of the breach and the municipality affected, so we can get a picture of the regional concentration of these.

2.5.1 CEOE indicators

The CEOE (CEOE, 2012) includes a detailed inventory of the main market unity distortions existing in Spain. These can be defined as «obligations, restrictions, requirements or demands that pose unjustified barriers to economic activity ». A number of reasons are behind the emergence of market unity distortions. They can be related to the large number overlapping national and regional of legislations, with areas of competence no always clearly defined, the lack of regulatory quality, with economic criteria playing no role, as well as the lack of commitment from the national public administration to respect and fulfil the principles of market unity.

In their report, the CEOE defines 122 different cases of market distortions, and classifies them in three broad groups: industry, services, and those that relate to taxes. Some distortions are industry-specific, and some have an horizontal dimension, and relate to areas such as the environment, marketing (e.g. the labelling of products), industrial health and safety, licences or public procurement. There is also a further category of distortions, that results from regional laws contradicting national laws, or from different interpretations of a common national or European Law. A divergent tax regulation has contributed to deepen the product market segmentation in Spain. Identical activities may

be subject to disparate taxes, depending on the region of operation of businesses, that have no other economic justification beyond the own region's tax revenue targets. In tables 2.7-2.10 we provide a summary of these distortions, in production and services, as well as in taxes. Within the goods markets, a large number of distortions are concentrated in the manufacturing of food and drinks, as well as in chemicals and pharmaceuticals.

Based on this inventory, we build indicators of the number of distortions present in each region. The indicators signal the amount of distortion, but caution is needed in interpreting them. They are built from qualitative information that is not fully comprehensive. Figure 2.7 illustrates the number of market unity distortions that we have identified by Comunidad Autonoma. For some of the distortions, we are not able to identify in what precise regions this is likely to be a larger problem.

It can be seen that Catalunya, Andalucia and Extremadura present the highest number of distortions in production industries, followed by Madrid. Those regions with the lowest number of distortions are Asturias, Cantabria, La Rioja, Canary Islands and Balearic Islands. Regarding taxes, Catalunya and Andalucia also present a high number of distortions. Compared to market unity distortions, Extremadura has less tax distortions. Sectors with less tax distortions include La Rioja, Aragon, Baelaric and Canary Islands, and Cantabria.

Table 2.5. Details of market unity distortions in the food and drinks sector in Spain.

File	Description of distortion
1	Differences in the interpretation of requirements to the health register of companies in food and drink sector
2	Differences in the interpretation of requirements in the registering of "precintos fiscales" in companies producing and distributing alcohol. As a result, firms need to incur in admin costs as there are many different requirements and criteria.
3	Different regulations and codes of conduct across CCAA.
4	Differences in the nutritional requirements applied to food and drink in school cantines
5	Problems to obtain health register for products to export when product has been fabricated in a different region to where is being registered (these health certificates are required in certain countries)
6	Diversity of interpretations in inspections (for example some utilise a different language than the one spoken in the company)
7	Differences in taxes charged for the health inspection. Some regions charge unjustified taxes.
8	Differences across regions in (arbitrary) criteria on health and safety apply to products in ports (to enter and exit the country). This is an extra cost for firms.
9	Differences across regions in health requirements on selling meat products in retail. This creates an additional management cost
10	Differences across regions in requirements for risk assessment. This implies an additional time and cost and has negative effect on profitability.
11	Differences across regions in food chain law application.
12	Differences in labelling of products. Example: Galicia and Catalunya. This implied an additional cost for companies.
13	Differences in the labelling of water's sector products in Extremadura.
14	Differences across regions in the labelling of products (compulsory specification of contents of salt, sugar, fat). Companies need to adapt labels to each region in Spain.
15	Drinks (spirits). European law is not interpreted uniformly across regions.
16	Lack of coordination across Spanish regions on environmental permits and different requirements for obtaining those permits.

17	Different criteria in the control of SO2 emissions. This requires investing in different types of machinery, which affects costs.
18	It is compulsory to return the drinks containers, in the region of Andalucia, independent of the region where is bottled. This creates a barrier in those regions outside Andalucia.
19	Different requirements across regions for veterinaries in slaughter houses.
20	Different requirements in audits for meat producers.
21	Alcoholic drinks. Different regulations across regions in the distribution, and sales of alcoholic drinks (types of premises where they can be sold, times slots and appearances on TV and its content).
22	Charing of fee to exporting firms in Catalunya.
23	Differences in business support admin producers in food and drink industry.
24	Honey. A company in Leon producing organic honey has to obtain certification in the same region and not in another region.
25	Exporting of frozen fish. Differences in requirements between regions and central administration.
26	Meat industry. Veterinary and food chain fees are different by region for certain products.
27	Meat industry/rabbits. Differences in requirements for veterinary control in slaughter houses.
28	Meat industry/rabbits. Differences in requirements to sales of rabbit kidneys.
29	Regional differences in the packaging requirements of bread.

Source: CEOE(2012)

Table 2.6. Details of market unity distortions in other goods sectors.

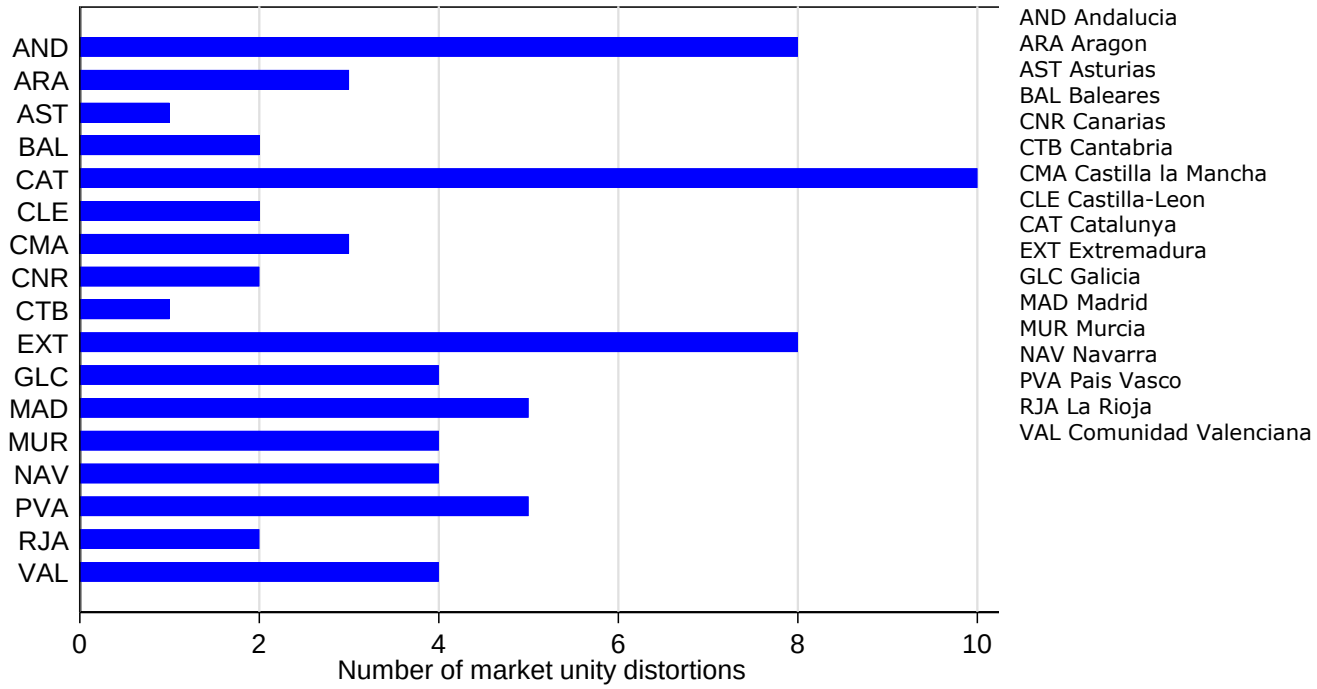
File	Description of distortion	Sector
30	Requirements of translation to Catalan of all the documentation of vehicles.	Vehicles
31	Logistics. Different timing of traffic restrictions across regions. This affects transport flows of goods, by road. This makes service more expensive.	Vehicles
32	Differences across Spanish regions of requirements to Spanish manufacturers of cars of environmental permits.	Vehicles
33	Differences in regulations regarding the control of emissions.	Cement
34	Different taxes and monitorization of emissions costs depending on the regional permit.	Cement
35	Barriers for firms to access public contracts- in some regions.	Construction
36	Different regulations in the building of public housing.	Construction
37	Differences in electronic prescriptions. 4 regions	Pharmaceuticals
38	Health card. Differences across regions.	Pharmaceuticals
39	Waste and packaging. Differences across regions.	Pharmaceuticals
40	Safety of pharmaceutical studies (admin procedures). Regional differences.	Pharmaceuticals
41	Differences in regional models/contracts for clinical tests. Some regions follow a centralised model.	Pharmaceuticals
42	Recruitment in the public sector (pharmaceutical sector). Differences in registering at national level and across regions.	Pharmaceuticals
43	Problems when prescribing treatments due to regional requirements (e.g. also related to IT barriers).	Pharmaceuticals
44	Energy. Rates are unique for all the country. However, some regional regulations are introducing distortions .	Electricity
45	Electricity. Regional administrative hurdles for obtaining authorisations for the construction, modification and use of installations.	Electricity
46	Different requirements to set up electricity networks (19 different regional requirements).	Electricity
47	Chemical sector. Differences in requirements for the packaging of products. 19 different systems.	Chemicals
48	Requirements for the commercialisation of specific chemical products in Andalusia, that do not exist in other c.a.	Chemicals
49	Different requirements across regions for the treatment of water for consumption.	Chemicals
50	Different requirement in Andalusia when opening a business- Obtaining a permit on impact on public health.	Inter-sectoral
51	Regional differences to file taxes.	Inter-sectoral
52	Different procedures and criteria for the acquisition of health technology in each region.	Health

Source: CEOE(2012)

Table 2.7 Examples of tax distortions.

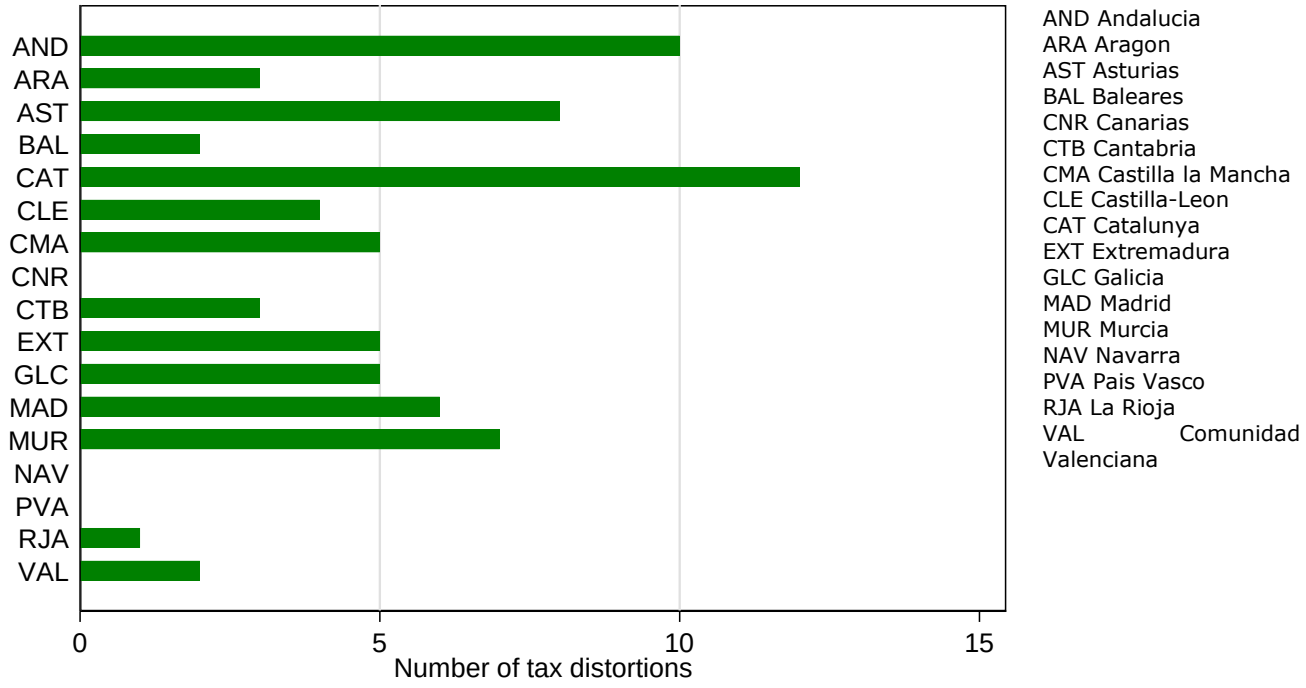
File	Type of tax distortion
91	Tax on residual waste in the coast
92	Tax on under-exploited land (Agriculture)
93	Tax on dangerous waste.
94	Tax on emissions
95	Tax on financial deposits
96	Tax on plastic bags
97	Tax paid by larger retail shops (environmental impact)
98	Tax on cable cars (environmental damage).
99	Differences in taxes for the use of water
100	4 different taxes (environment)
101	Gambling (special taxes in 4 regions)
102	Tax on deposits on waste
103	Taxes on turbines
104	Tax on "proteccion civil"
105	Tax on disposal of waste fron construction sector
106	Tax on environmental damage
107	Tax on slot machines
108	Tax on slaughtered animals
109	Different taxes in some ports
110	Special tax on petrol
111	Tax differences inheritance 1
112	Tax differences inheritance 2
113	Higher tax on gambling in some regions (slots machines, casinos).
114	Tax on donations/inheritance.
115	Tax on transport (vehicles) registration; regional differences.
116	Tax on gambling
117	Differences in taxes on assets
118	Differences in tax IBI
119	Differences in tax on economic activity
120	Differences in taxes in motor vehicles
121	Tax on construction projects
122	Tax on increments of value of urban land

Figure 2.8. Market distortions in production industries by CCAA.



Source: own ellaboration, based on CEOE(2012)

Figure 2.9. Number of tax distortions by CCAA, total number of industries.



Source: own ellaboration, based on CEOE(2012)

We next turn to the analysis of the regulatory intensity measures from the paper by Marcos et al (2010). As highlighted in the introduction to this section, these are aimed to capture regulatory intensity (not regulatory quality), and the extent to which Spanish Self Governing Communities (SGCs) or Comunidades Autonomas have exercised their legislative and regulatory powers since the late 1970s.

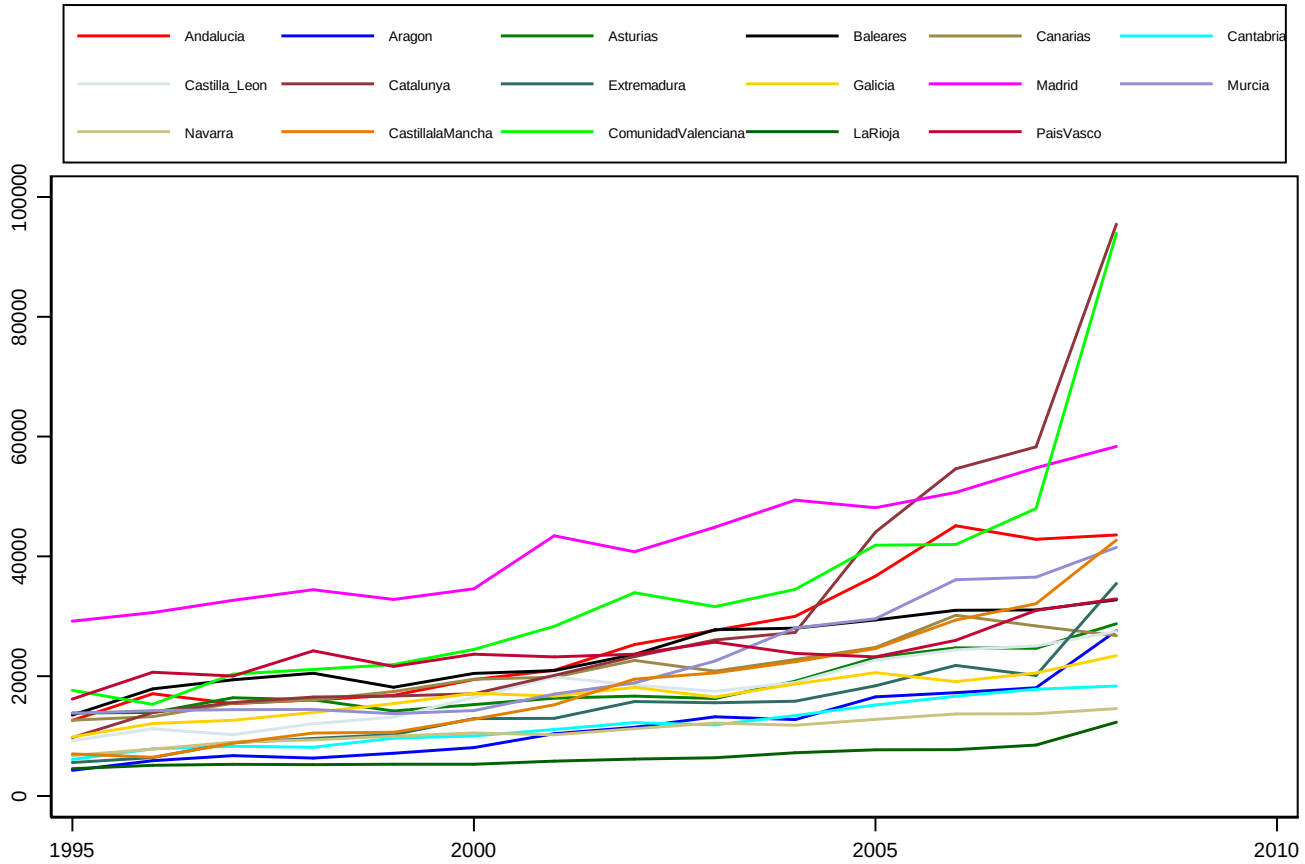
While it is difficult to establish an objective and accurate measure of regulatory intensity, the Spanish decentralized State provides a unique ground for shaping an indicator that captures the variations in their exercise of legislative and regulatory powers and that enables objective comparisons. The decentralization process in Spain was accompanied with a process of transfer of powers from the State to smaller entities of regional base. However, each region have reached different levels of self-government and this is likely to have been influenced by a number of historical and political factors.

It can be argued that the burden that compliance costs imposed on firms is bound to be correlated with the quantity of legislation (e.g. number of pages and/or rules). Figure 2.10 shows the variation in the number of pages in regional journals for the 17 Spanish regions for the period 1995-2009. In general we observe that these have followed an upward trend, but with regional variations. Catalunya, Comunidad Valenciana, Madrid and Andalucia have seen a fast increase, although in the case of Madrid and Andalucia this has slowed down towards the end of the period. Extremadura, Castilla la Mancha and Castilla-Leon are regions where the regulatory intensity has experienced a marked increase, despite the lower initial levels. La Rioja, Navarra and Cantabria are among the regions with lowest levels of regulatory intensity throughout the period. A limitation of these measures is that they do not necessarily relate to the regulatory burden over business activities, as other matters are usually published in the official journals (e.g. procurements, announcements).

In this regard, as well as in the amount of pages, it is interesting to focus also on the volume of rigonal official publications. More rules imply higher regulatory intensity, although again some laws or regulations will not be related to business or economic activities but rather concern administrative and organisational issues. The number of general dispositions adopted by each region is used as a proxy of how each region uses its rules as an instrument to exert power. Figure 2.11 shows the evolution of the norms and dispositions in each of the 17 Spanish autonomous regions during the period 1995-2008. Again, as in the number of pages meadure, we observe a high degree of variation across the regions. The correlation between the two measures is approximately 0.5 (p-value of 0.000).

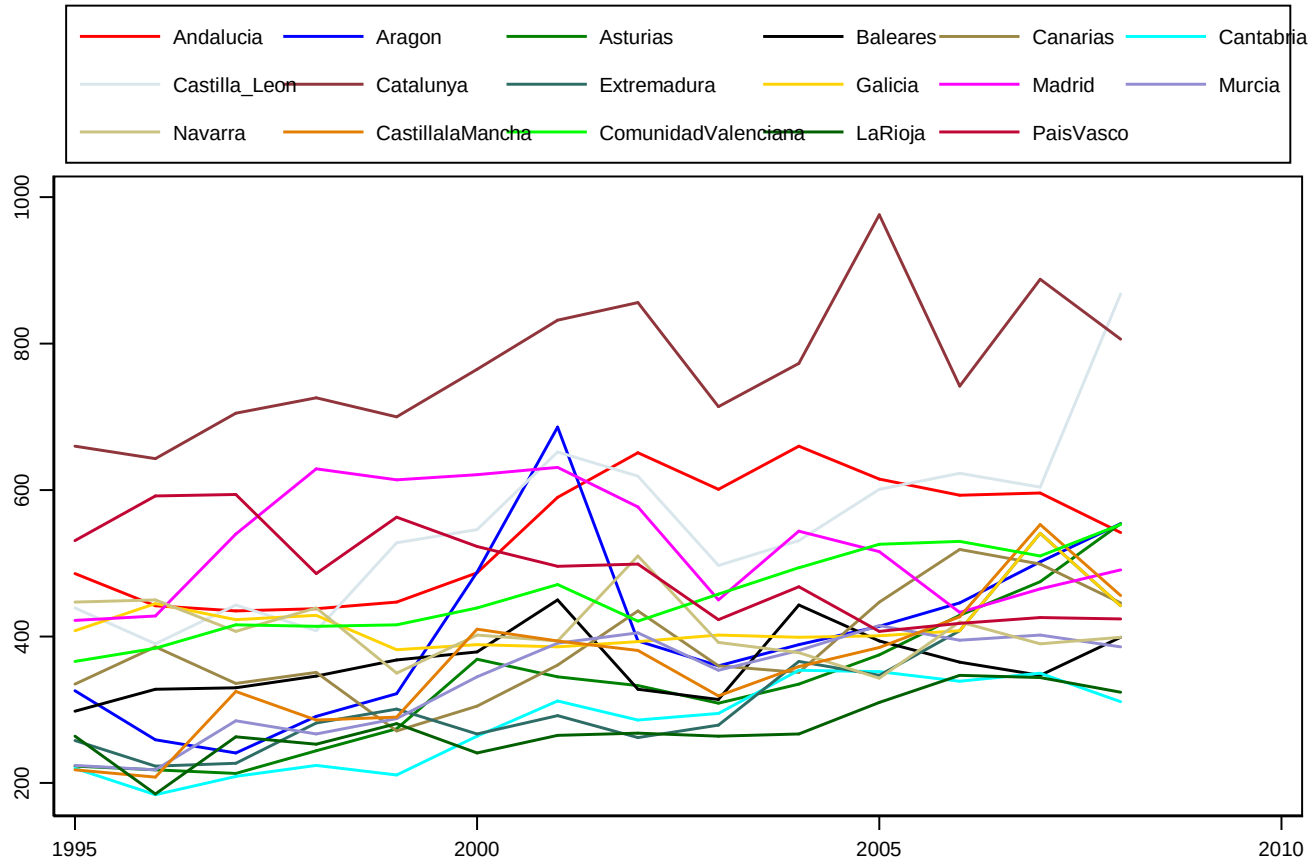
Catalunya has the highest number of regional dispositions and/or rules compared to the rest of regions, followed by Andalucia and Castilla-Leon. In the case of Andalucia, this measure has decreased over time, and in the case of Castilla-Leon has instead increased rapidly. Among the regions with the lowest level of regulatory intensity, according to this measure, are Cantabria, La Rioja, Navarra and Balearic islands.

Figure 2.10. Number of pages in regional journals, 1995-2008



Source: Own elaboration, based on Marcos et al. 2010

Figure 2.11. Number of norms and rules in regional journals, 1995-2008.



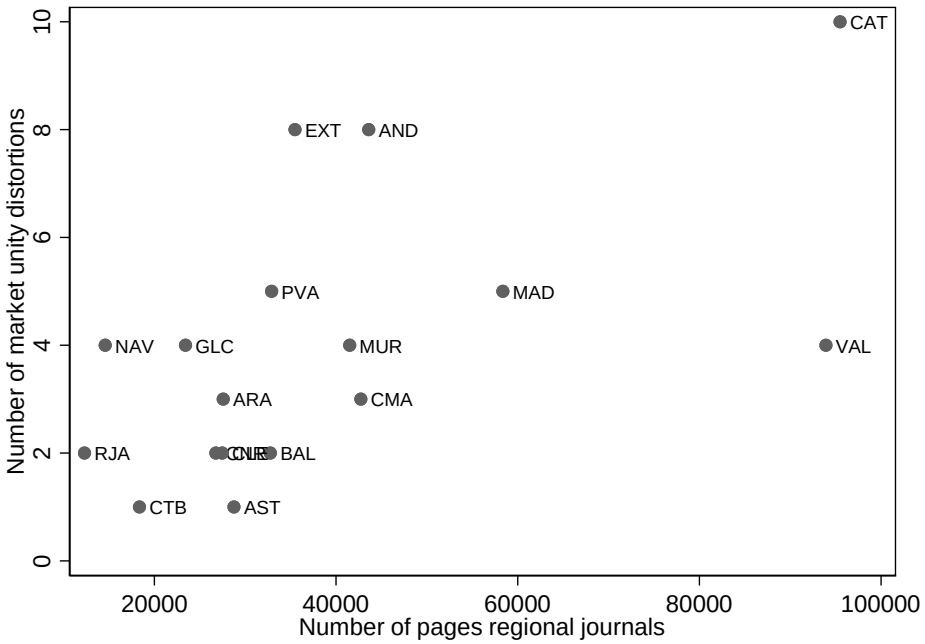
Source: Own elaboration, based on Marcos et al. 2010

Figures 2.12-2.15 show the pairwise correlations between the measures of regulatory intensity (pages or rules) and the number of distortions that we have identified from the the CEOE material. The regulatory measures by Marcos et al (2010) are available on an annual basis (we rely on the most recent year, that is, 2009), and the CEOE measures are only available for one point in time (2012).

From figures 2.12 and 2.13 we see that there is a positive correlation between the number of market unity distortions (constructed from the CEOE files) and the number of pages in regional journals. We do not observe such strong correlation between the number of rules and the level of market distortions.

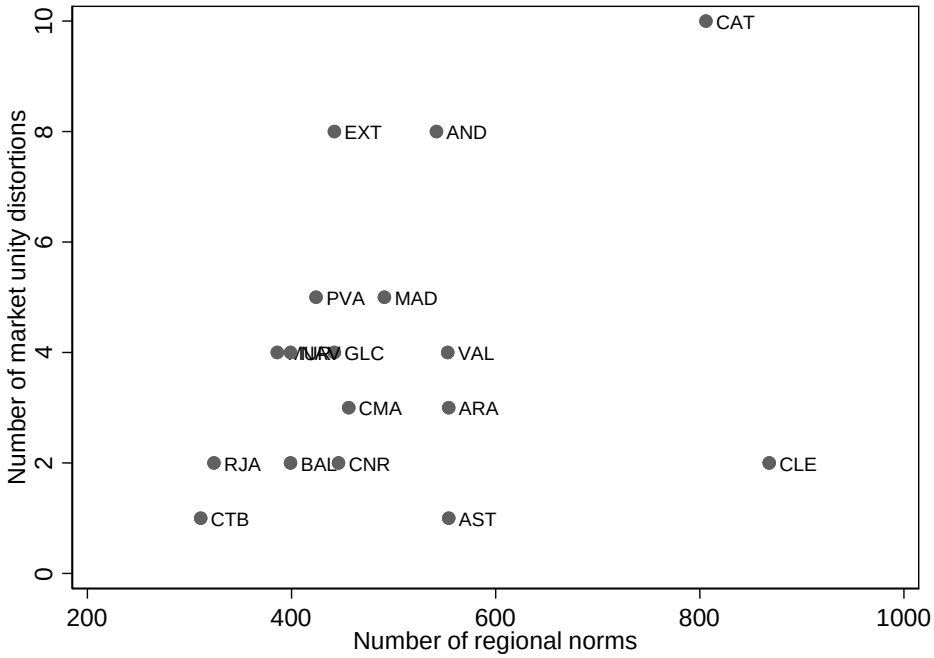
From figures 2.14 and 2.15 we see that there is also a positive and statistically significant correlation between the number of pages in regional journals and the number of tax distortions. Comunidad Valenciana appears to be an outliers, as it ranks high in the level of pages but low in the number of regional taxes. Catalunya has the largest number of tax distortions and the largest number of pages and regional rules and norms. Castilla-Leon combines a low number of tax distortions with large number of regional norms. We can see that the regions with both a small number of tax distortions and rules and pages are La Rioja, Navarra, Cantabria. Madrid appears to be in the middle in both of these measures. Extremadura has relatively lower number of tax distortions compared to product market distortions.

Figure 2.12. Correlation between number pages in regional journals and the number of market unity distortions, 2008.



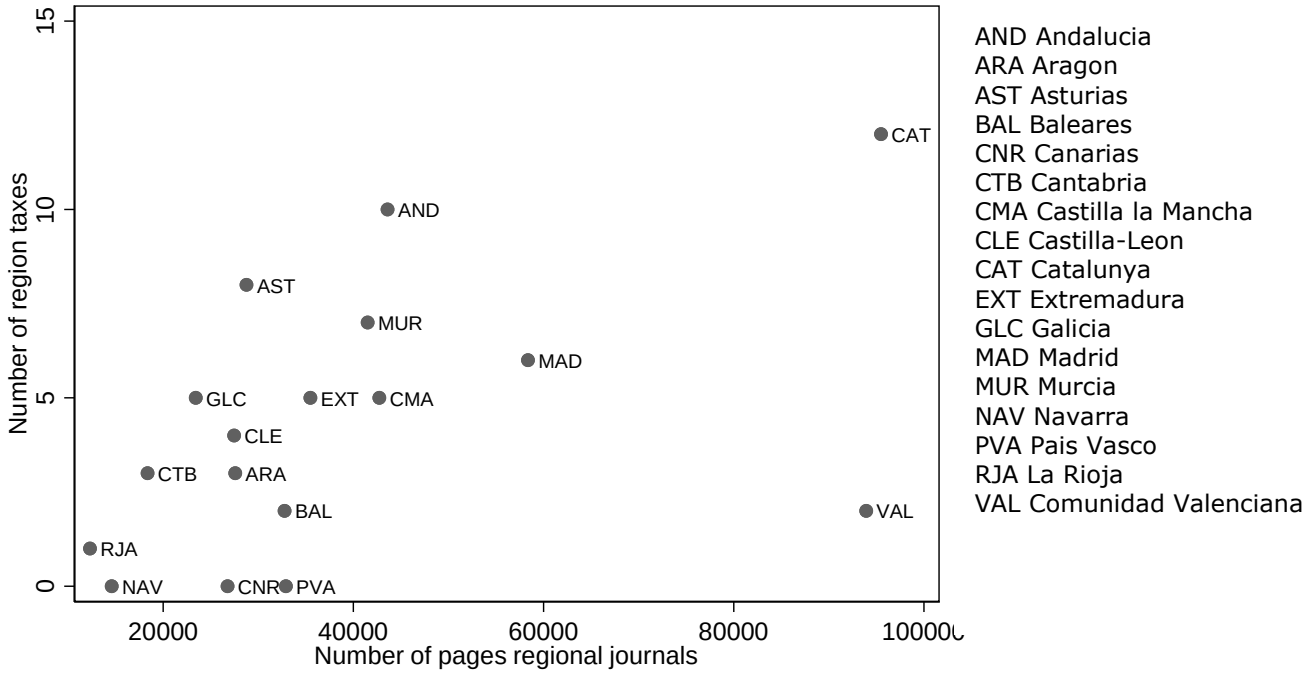
NOTES: Pairwise correlation (p-value in brackets) is 0.67 (0.01); Source: own elaboration based on CEOE(2012) and Marcos et al (2010). Number of pages in latest year available (2008).

Figure 2.13. Correlation between number pages in regional journals and the number of market unity distortions, 2008.



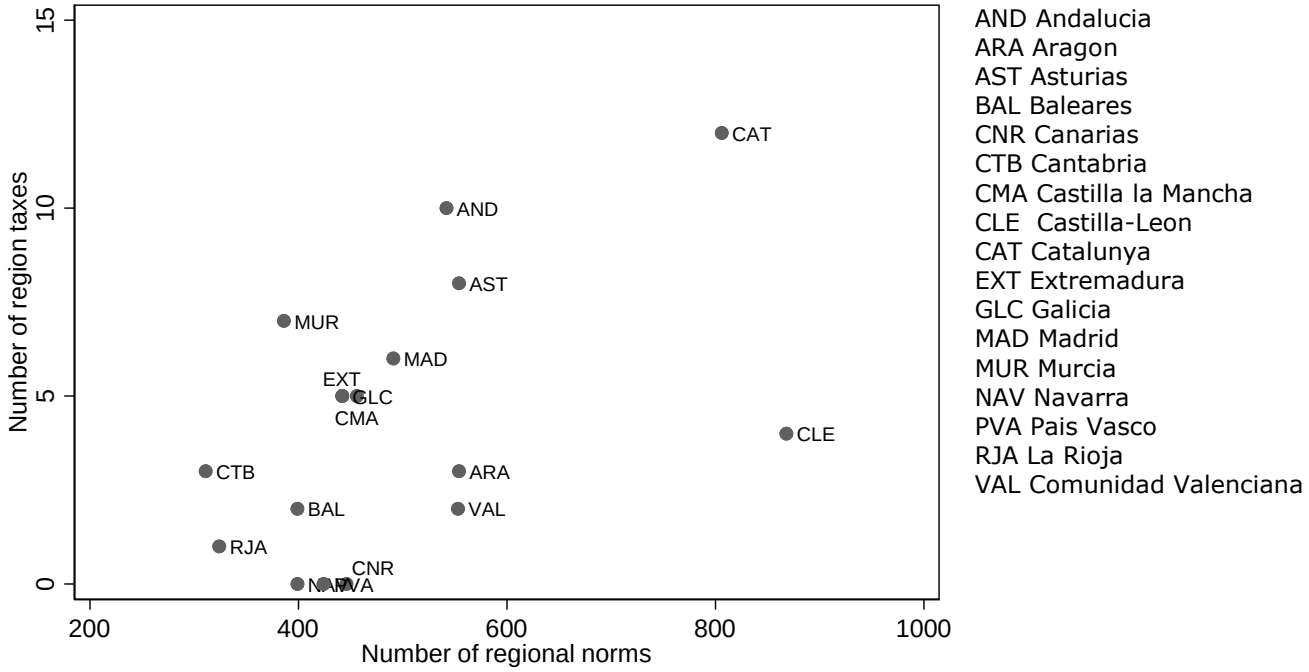
NOTES: Pairwise correlation (p-value in brackets) is 0.3279 (0.01); Source: own elaboration based on CEOE(2012) and Marcos et al (2010). Number of pages measured in latest year available (2008).

Figure 2.14. Correlation between number pages in regional journals and the number of tax distortions, 2008.



NOTES: Pairwise correlation (p-value in brackets) is 0.49 (0.04); Source: own elaboration based on CEOE(2012) and Marcos et al (2010). Number of pages in latest year available (2008).

Figure 2.15. Correlation between number of regional dispositions and the number of tax distortions, 2008.



NOTES: Pairwise correlation (p-value in brackets) is 0.49 (0.04). Source: own elaboration based on CEOE (2012) and the Marcos et al (2010). Number of rules in the latest year available in the data (2008).

Market fragmentation in services

We have estimated the gravity models specified in equations (2.1) and (2.2) for production industries only. Although we are aware that the bulk of market distortions are found in the services sectors, we do not have equivalent trade data for the services sector. Table 2.8 below contains some examples of distortions in the services sector, as reported by the CEOE report. While hese are not considered in empirical models, we acknowledge them here as they are illustrative of the type of distortions prevalent across the Spanish economy. The distortions are mainly concentrated to the following sectors: architecture and consultancy, commerce/retail, food distribution, gambling and the finance sector. Companies face barriers to operate freely across regions, with detrimental effects on the levels of competition and choice and quality of products available to consumers.

Table 2.8. Details of market unity distortions in service industries.

File	Description of distortion	Sector
53	No common professional association valid for all the country.	Architecture
54	Different formalities required to open delegations in Cataluña, Navarra and País Vasco.	Consultancy
55	Different regulation in each region preventing free trade.	Consultancy
56	Notarial monopoly of telematic management in public documents. Access barriers for the citizens.	Consultancy
57	Telematic access barriers to real estate information.	Consultancy
58	Textile commerce: Different winter and summer sales calendar in C. Madrid.	Commerce
59	Different regional rules for the elaboration of polls and statistical information.	Commerce
60	Different regional rules in building/reforms permits and opening licenses.	Commerce
61	Regional differences in the collection of health inspection's fees.	Food distribution
62	Different rules in smoking ban posters for public places.	Food distribution
63	Different interpretation in each region in sacrificial sale's rules.	Food distribution
64	Different interpretation and application by the regions in the food chain's rules.	Food distribution
65	Differences across regions in health requirements on selling meat products.	Food distribution
66	Different criteria across regions for concession of business licenses. Barriers to free movement of firms.	Food distribution
67	Different rules in regions with more than one official language. Obligation of offering all contracts and documents in both languages.	Finance
68	Normative duplications in transparency rules and consumer's information.	Finance
69	Consumer's protection rules different in Cataluña and in collision with national rules.	Finance
70	Different rules across regions on retail and consumer's protection.	Finance
71	Sanctioning is competence of regions. If a firm is sanctioned, it must answer 17 times for trading the same product with the same contract in the 17 regions.	Finance
72	Legal uncertainty due to the massive existence of national, regional and local rules about mandatory insurances.	Finance
73	5 different statements corresponding to the insurance premium tax in different self-assessment models.	Finance
74	Lack of coordination in 16 regions in consumer's protection administrative and componential rules.	Finance
75	The regions have assumed legislative and development power of private insurance and obliges intermediaries operating in one region to respond also each of the others.	Finance

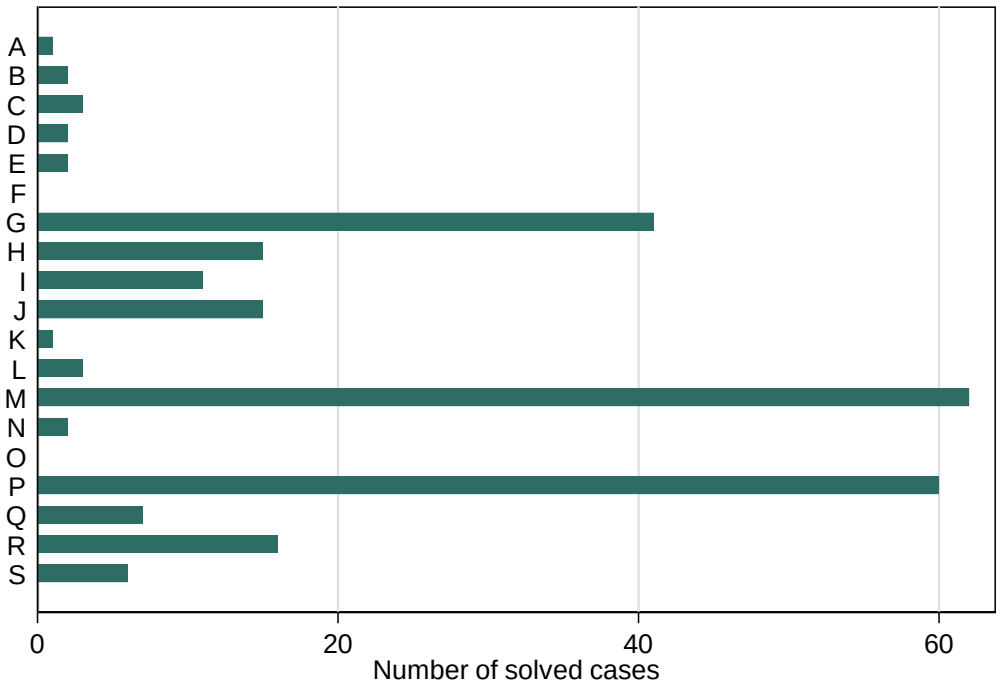
76	Different interpretation of a national law by regions in consumer's credit rules.	Finance
77	Different regional rules for the installation of industrial cold machines.	Installation of machine
78	Application of 19 different regulations for the same machine model.	Gambling
79	Some regions introduce social binding social clauses in the public procurement procedures.	Public procurement
80	The advertising carried by some companies in Catalunya must be entirely developed in Catalan. This oblige the firms to hire translators. Increase the costs of the companies.	Advertising
81	Heterogeneity in taxes and canons of water spills.	Recycling
82	Wrong application of spill canon's law. Some regions enforce pay the canon when no spill is generated.	Recycling
83	Different technical requirements, information models and difficulties to move spills when a company has production plants in different regions.	Recycling
84	Heterogeneity in rules when hiring renting of vehicles across regions.	Renting of vehicles
85	Differences in the types of contracts with public administrations and different contract documents, for the same service (Dialysis units).	Health sector
86	Application of different criteria across regions in worker health surveillance.	Health sector
87	Different quality models in haemodialysis treatment across regions.	Health sector
88	Divergent criteria for accreditations and management in dependence services the across regions.	Services for dependence
89	Application of 3 regulations (Cataluña, País Vasco and rest of Spain) for the definition of itineraries to be used by vehicles that transport dangerous merchandise.	Transports
90	Different rules for the installation and use of telecommunication infrastructures across regions.	Telecommunications

Source: CEOE(2012)

Figure 2.16 illustrates the number of complaints (which are cases wherer the LGUM may be breached) filed to the Ministerio of Economy, during the period 2013-2017. We see that these appear to be largely concentrated in the professional services industry (NACE Rev.2 section M) and also in the Education sector (P). In addition, a sizeable number of cases are reported in activities such as wholesale and retail (G), arts and recreation (R), accommodation and food services (I) and the information and communications sector (J). Interestingly, few cases are reported in the Finance and insurance sector (K). Figure 2.17 illustrates the distribution of these cases by region. The region with the largest number of reported cases is Madrid, followed by Comunidad Valenciana, Catalunya and Andalucia. Relatively fewer cases are reported in Asturias, Cantabria, Navarra, Murcia and none in La Rioja. Figure 2.18 we illustrate the number of cases across both region and sector. We see that the largest number of cases in the Madrid region belong to the Education sector (P). In Catalunya the majority of cases are reported in the agriculture, forestry and fishing sector (A), professional services (M) and the information and communications sector (I). In Comunidad Valenciana, the majority of files are reported in the professional, scientific and technical sector (M), as well as in wholesale and retail (G). In Andalucia, the distribution of cases across industries is more even, but are found mostly in professional services (M) and wholesale and retail (G).

Resolved cases by: Ministerio de Economia (MINECO)

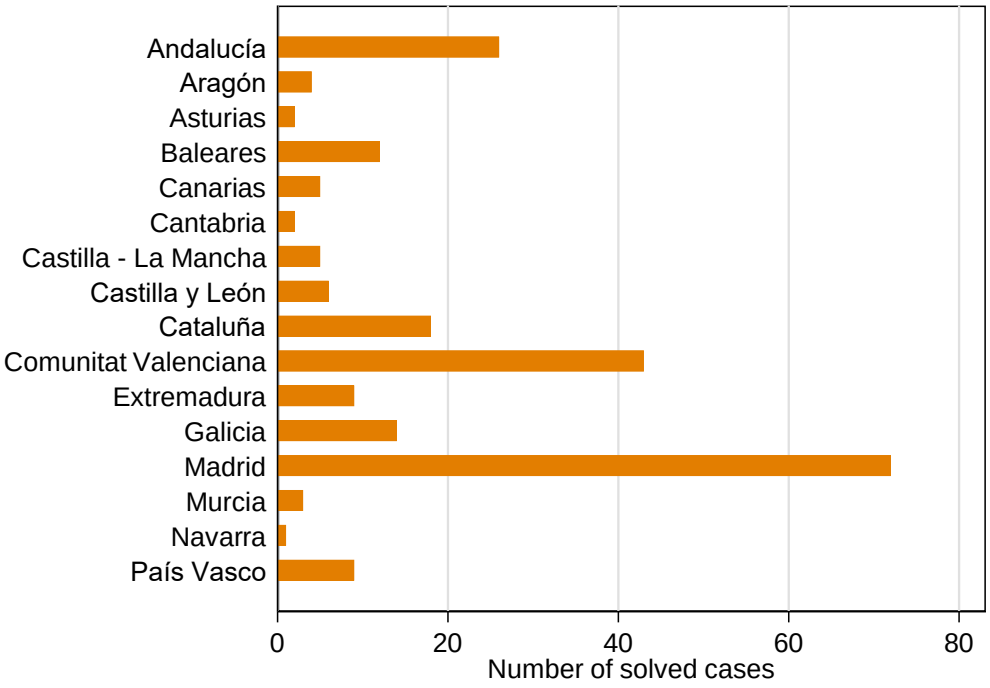
Figure 2.16 Number of cases by industry, 2013-2017.



Source: own elaboracion, MINECO

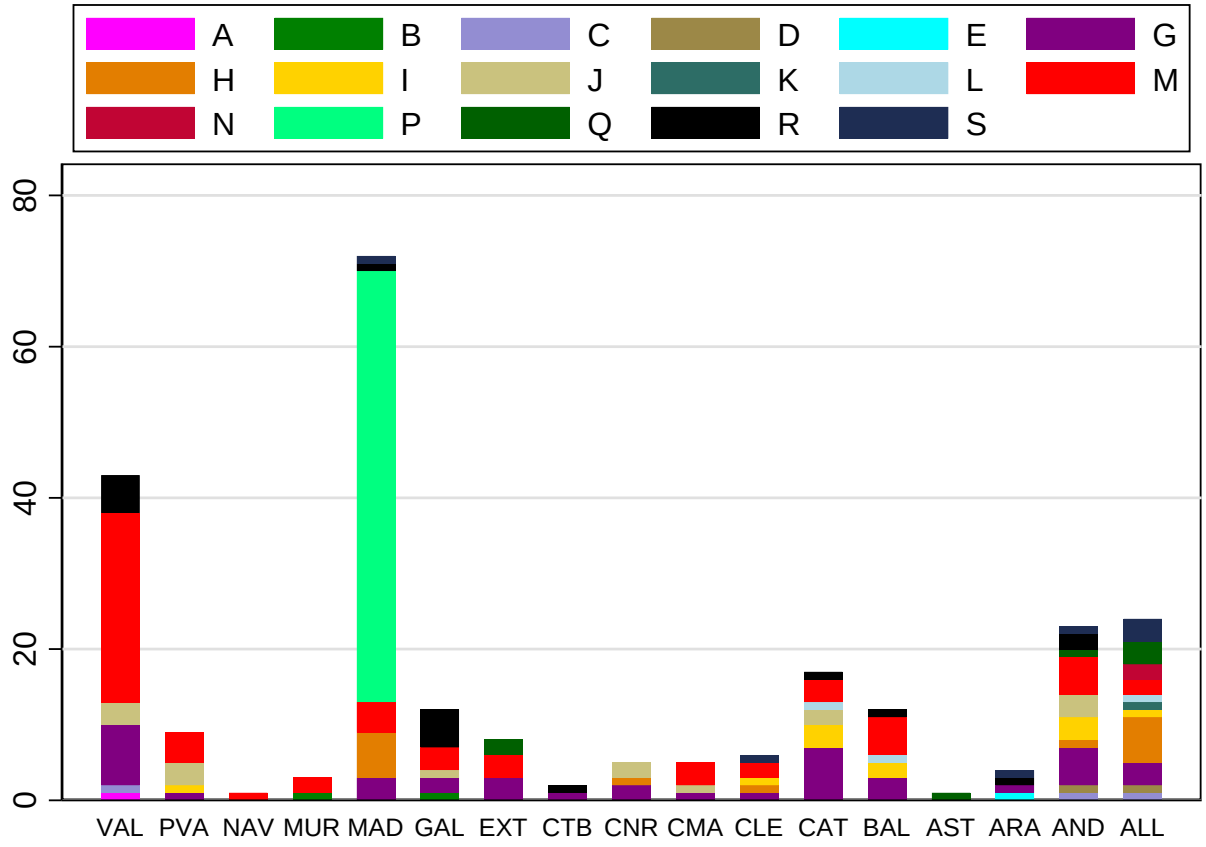
A Agriculture, forestry and fishing; B Mining and quarrying; C Manufacturing; D Electricity, gas, and air conditioning; E Water supply, sewerage, waste management; F Construction; G Wholesale and retail trade; H Transportation and storage; I Accommodation and food services; J Information and communication; K Financial and insurance; L Real estate; M Professional, scientific and technical; N Administrative and support activities; O Public administration and defence; P Education; Q Human health and social work; R Arts, entertainment and recreation; S Other service activities.

Figure 2.17 Number of cases by region, 2013-2017.



Source: own elaboracion, MINECO

Figure 2.18. Number of cases by region and industry, 2013-2017.



A Agriculture, forestry and fishing; B Mining and quarrying; C Manufacturing; D Electricity, gas, and air conditioning; E Water supply, sewerage, waste management; F Construction; G Wholesale and retail trade; H Transportation and storage; I Accommodation and good services; J Information and communication; K Financial and insurance; L Real estate; M Professional, scientific and technical; N Administrative and support activities; O Public administration and defence; P Education; Q Human health and social work; R Arts, entertainment and recreation; S Other service activities.

2.6 Gravity models and market fragmentation.

Table 2.9 shows the results of estimating the gravity equation (2.1), which is then augmented with indicators of regional regulatory intensity. We first report here the results of a model based on total trade flows by region (equation 2.1). The regulation indicators on total number of rules and pages, available on an annual basis, are derived from Marcos et al (2010). These estimations are restricted to the period 1995-2008, as the data on regional regulatory intensit are not available for more recent years. We are not able to include de CEOE indicators in these regressions as we only have these for one point in time.

In this version of the gravity equation, as well as including the baseline determinants of bilaterial trade flows between two Spanish regions, we control for the amount of regulations in both the regions of orgin and destination. This is done in columns 1 and 3. In this specification we obtain an estimate of the home bias based on trade between

Spanish regions only and does not include international trade. We always report the estimations that include time effects.

Turning to the exports model from column 1 (where we do not consider international trade), we find that the variable "Rules importer" has a negative and statistically significant coefficient (at 1 per cent level). The sign of the coefficient on "Pages importer" is also negative and statistically significant. These results suggest that the exports are reduced when the region of destination of the exports presents high levels of regulatory intervention. The indicators of regulatory intensity do not necessarily refer to economic issues, but can be seen as a proxies for the level of interventionism in a particular region. Similar conclusions emerge from the analysis of imports (column 3). We see that the "Rules importer" and "Pages importer " variables have a negative and statistically significant coefficient (at 1 per cent level).

Results from column 3 suggest that the restrictions of the exporting region also matter, although to a smaller extent. This is indicated by the negative sign on the "Pages of exporters", although in this case the coefficient on the "Rules exporters" variable is not statistically significant. These findings suggest that regulations in the markets of origin also matter, as regions may impose requirements or frictions difficult to absorbe for firms wanting to sell to other regions.

We then estimate a specification that includes international trade flows and show it in columns 2 and 4. In these models we are not able to control for regulation present in other countries, due to lack of data. We are only able to consider the level of regulation of exporting regions (in the exports models) and of importing regions (in the imports models). We estimate the home bias to be around 4.5. (exp(4.248-2.77) in the case of imports. This estimate is sligtly lower than the estimate from table 2.4 (see estimate of the home bias 4.8 from column 4). Bearing in mind the limitations of these proxy indicators, this evidence indicates that regulatory differences appear to explain away a small part of the overall "home bias". Reassuringly, the results for other key variables from the gravity models remain qualitatively unchanged. The geographic distance shows a negative and significant coefficient, and the contiguity dummy also presents a positive and significant coefifcient, all as expected.

Table 2.9. Gravity models augmented with indicators of market fragmentation, 1995-2015.

	(1)	(2)	(3)	(4)
Dep. variable	Exports (GDPi*GDPj)		Imports (GDPi*GDPj)	
Log Distance	-0.954***	-0.974***	-0.938***	-0.943***
	(0.0741)	(0.0735)	(0.0711)	(0.0701)
Contiguity	0.613***	0.599***	0.641***	0.636***
	(0.0914)	(0.0904)	(0.0908)	(0.0898)
External Contiguity		-0.0508		0.266
		(0.166)		(0.169)
Ownreg	1.438***	3.919***	1.475***	4.248***
	(0.151)	(0.218)	(0.146)	(0.218)
Interregional Trade		2.507***		2.777***
		(0.101)		(0.116)
Island Exporter	-0.985***	-1.012***	-0.931***	-0.932***
	(0.185)	(0.184)	(0.185)	(0.178)
Island Importer	0.0821	0.100	0.0362	0.0222
	(0.127)	(0.117)	(0.128)	(0.129)
Special Tax System Exporter	0.271**	0.442***	0.0791	-0.0658
	(0.105)	(0.108)	(0.105)	(0.0993)
Special Tax System Importer	0.260**	-0.0811	0.455***	0.528***
	(0.106)	(0.0994)	(0.104)	(0.104)
Crisis	1.068***	0.199	1.060***	0.525*
	(0.318)	(0.258)	(0.316)	(0.270)
Rules Exporter	-0.0486	-0.0969**	-0.0486	
	(0.0330)	(0.0387)	(0.0328)	
Rules Importer	-0.146***		-0.148***	-0.159***
	(0.0341)		(0.0339)	(0.0394)
Pages Exporter	-0.266***	-0.426***	-0.247***	
	(0.0591)	(0.0755)	(0.0587)	
Pages Importer	-0.356***		-0.375***	-0.487***
	(0.0699)		(0.0697)	(0.0819)
Constant	3.271***	0.371	3.166***	0.145
	(0.492)	(0.552)	(0.472)	(0.528)
Type of flow	Total flows	Industry flows	Total flows	Industry flows
Observations	121,380	307,734	121,380	307,734
R-squared	0.511	0.517	0.513	0.521
Robust standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

2.8 Results and policy conclusions

Building from the state-of- the-art literature on gravity models, in this chapter we provide an up-to-date estimation of internal border effects (or home bias) in Spain. We use twenty years of data spanning from 1995 to 2015, to evaluate this issue with more recent data than any related study has done so far.

We measure the internal border effect by estimating how many times a region trades more with itself than with another (non-adjacent) region of Spain, controlling for a wide range of factors likely to influence the magnitude of interregional trade. As well as looking at trade flows within Spain we also control for trade between Spanish regions and foreign countries. We find that the internal border effects in Spain is sizeable (between 4 and 5 in most cases) and in line with previous estimates for Spain and other countries.

In this chapter we also estimate how border effects vary substantially across industries and regions, and how these have evolved over time. At the aggregate level, we find that the size of the home bias in Spain may have increased in the last twenty years, but less so since 2013. Unsurprisingly, we also find wide variation in the size of the border effect across industries and regions. The largest home bias is found for Extremadura, a region with large number of market distortions, but also located in the economic and geographic perifery of Spain. There are some regions for which we estimate a lower home bias, and present low level of market unity distortions. This is the case of regions such as Navarra, and Murcia. On the other hand, we have the case of Catalunya, where the home bias is relatively low, but where market fragmentation issues are likely to represent a bigger problem. This is also the situation of Andalucia, where the level of regional interventionism appears lighter compared to the case of Catalunya. Our analysis shows that, while we can establish meaningful correlations between the level of market distortions and that of trade integration, formulating more sound conclusions requires a more detailed anaysis of the level of economic integration and industry specialisation of the different regions on Spain.

Another finding emerging from this study (admitedly with important methodological and data limitations) is that a region's level of interventionism is likely to affect competition and choice for consumers in their domestic market, but also may affect likelihood of its firms selling to other regional markets. This is an important consideration from the policy point of view, as creating unnecessary hurdles affects business dynamism in the broadest sense. From a policy point of view, removing barriers to commercial transactions across regions should be beneficial for growth and competitiveness of firms. Undoubtedly, a limitation of relying on gravity models is that a highly fragmented market does not necessarily mean there is less trade. Future avenues of research should consider a more careful analysis of economic performance, if possible using micro-data, on how the lack of market unity can affect costs structures, prices, profitability and productivity of Spanish firms.

DATA APPENDIX 2

Table A.2.1. Defininition of variables in regressions

Variable	Description
Trade Flow ij	Export/Import trade flow from region i to region j over GDPi*GDPj
Trade Flow ijk	Export/Import trade flow of sector k from region i to region j over GDPi*GDPj
Distance ij	Distance between regions i and j definition of distance (kms)
External Contiguity	Dummy variable that takes 1 value if the region if regions i and country j have a common border
Contiguity	Dummy variable that takes 1 value if the region i and j have a common border
Ownreg	Dummy variable that takes 1 value when trade flow is intrarregional (i = j)
Interregional trade	Dummy variable that takes 1 value when trade flow is intrerregional
Island	Dummy variable that takes 1 value if the region is an island
Crisis	Dummy variable that takes 1 value in the period 2008-2013
Special funding system	Dummy variable that takes 1 value if the region has a special tax system

i=origin; j=destination; k=industry

Table A.2.2. Summary statistics, Total regional flows.

Variable	Obs	Mean	Std. Dev.	Min	Max
Trade Flow ij	15,708	0.3623254	1.55068	0	40.26014
Ownreg - Trade Flow ij	357	7.167613	6.751567	0.2232959	40.26014
Interreg - Trade Flow ij	5,712	0.5301957	0.7993876	0	11.22077
International - Trade Flow ij	9,639	0.0107991	0.0260813	0	0.3813962
Distance	15,708	2738.837	3720.872	36	19682.99
Log (Distance)	15,708	7.263368	1.140616	3.583519	9.88751
Distance -Ownreg	357	109.2955	52.9336	36	204.2952
Log (Distance) - Ownreg	357	4.569155	0.5120135	3.583519	5.319566
Distance -Interreg	5,712	732.8135	531.8959	125.1913	2424.073
Log(distance) - Interreg	5,712	6.384016	0.641423	4.829843	7.793204
Distance -International	9,639	4024.983	4254.389	284.0001	19682.99
Log(distance) - International	9,639	7.884252	0.8683812	5.648974	9.88751

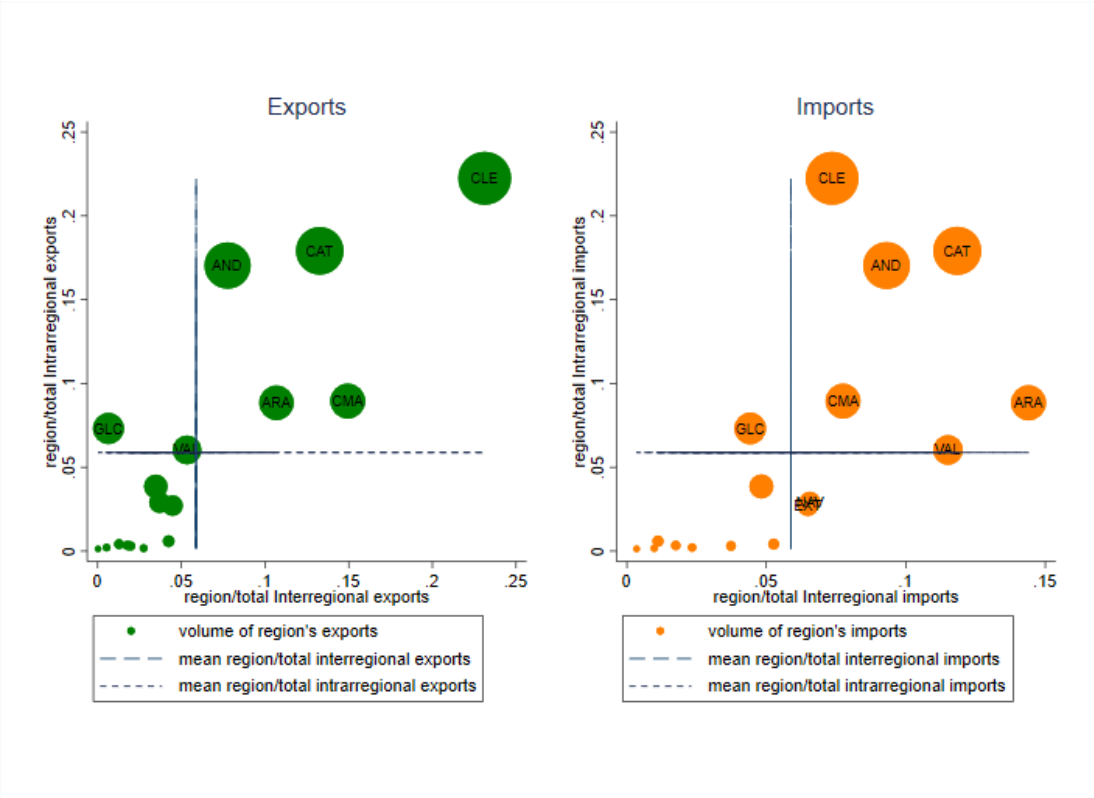
i=origin; j=destination

Table A.2.3 Summary statistics, Industry-region flows.

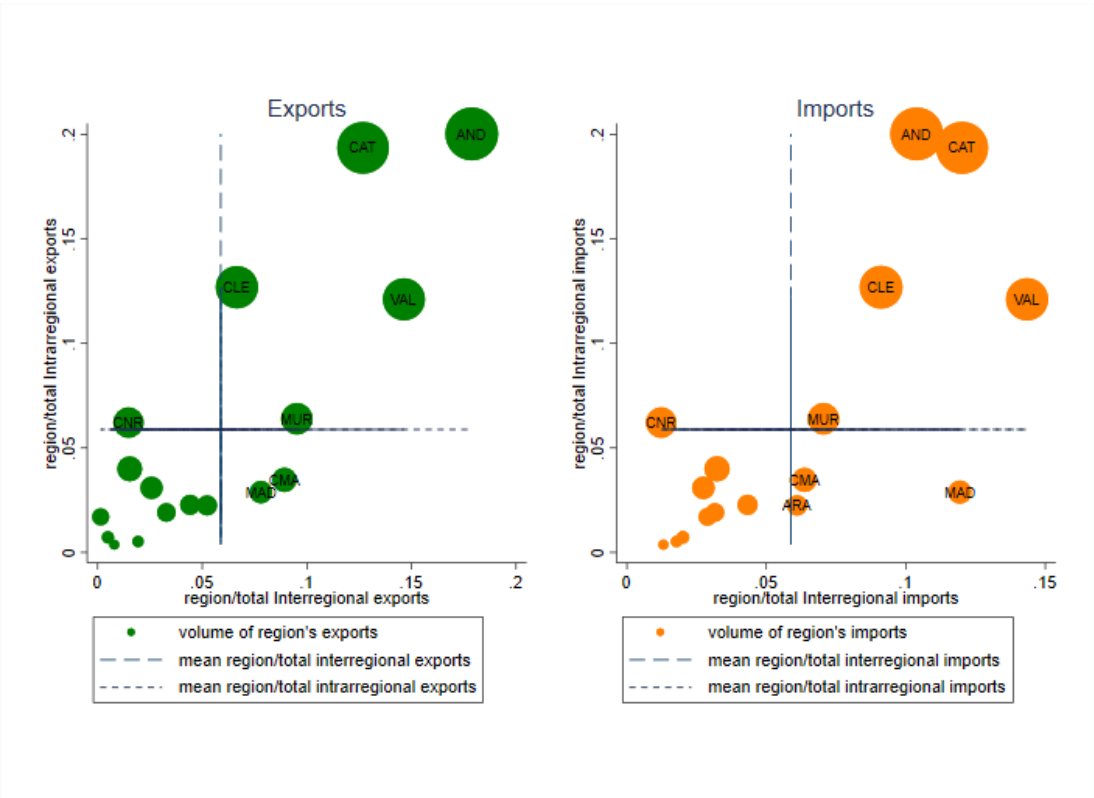
Variable	Obs	Mean	Std. Dev.	Min	Max
Trade Flow ijk	461,601	0.0143525	0.1346162	0	18.32676
Ownreg - Trade Flow ijk	461601	0.0143525	0.1346162	0	18.32676
Interreg - Trade Flow ijk	461,601	0.0143525	0.1346162	0	18.32676
International - Trade Flow ijk	279,531	0.0003724	0.0025801	0	0.3749432
Distance	461,601	2711.98	3704.044	36	19682.99
Log (Distance)	461,601	7.250403	1.141984	3.583519	9.88751
Distance -Ownreg	461601	2711.98	3704.044	36	19682.99
Log (Distance) - Ownreg	461601	7.250403	1.141984	3.583519	9.88751
Distance -Interreg	461,601	2711.98	3704.044	36	19682.99
Log(distance) - Interreg	461,601	7.250403	1.141984	3.583519	9.88751
Distance -International	279,531	4024.983	4254.175	284.0001	19682.99
Log(distance) - International	279,531	7.884252	0.8683377	5.648974	9.88751

i=origin; j=destination; k=industry

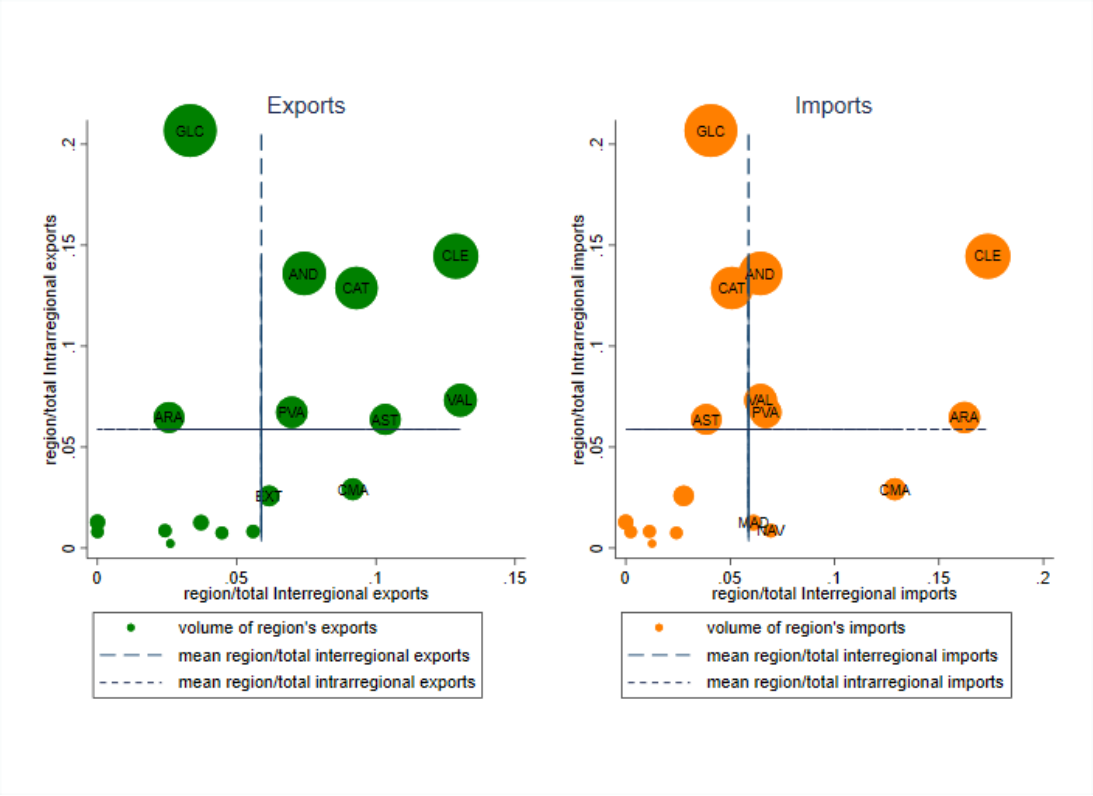
Figures A.2.1
Sector 2 – Cereals



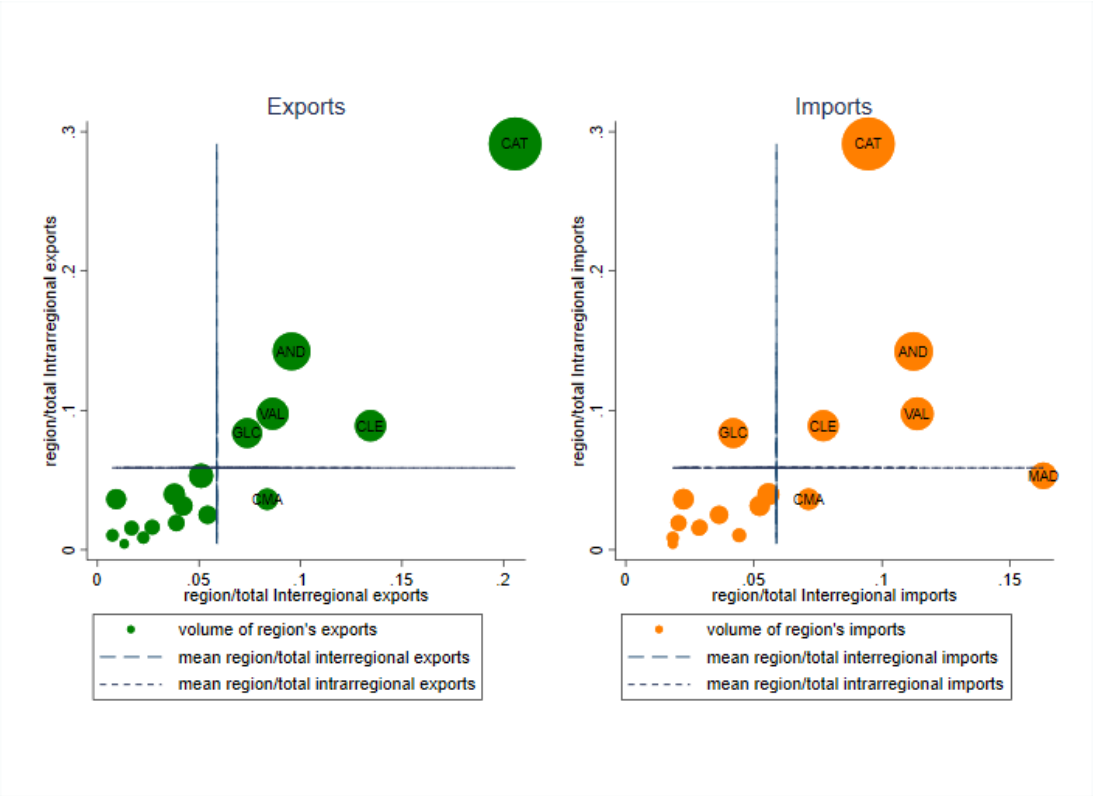
Sector 3 – Unprocessed food products



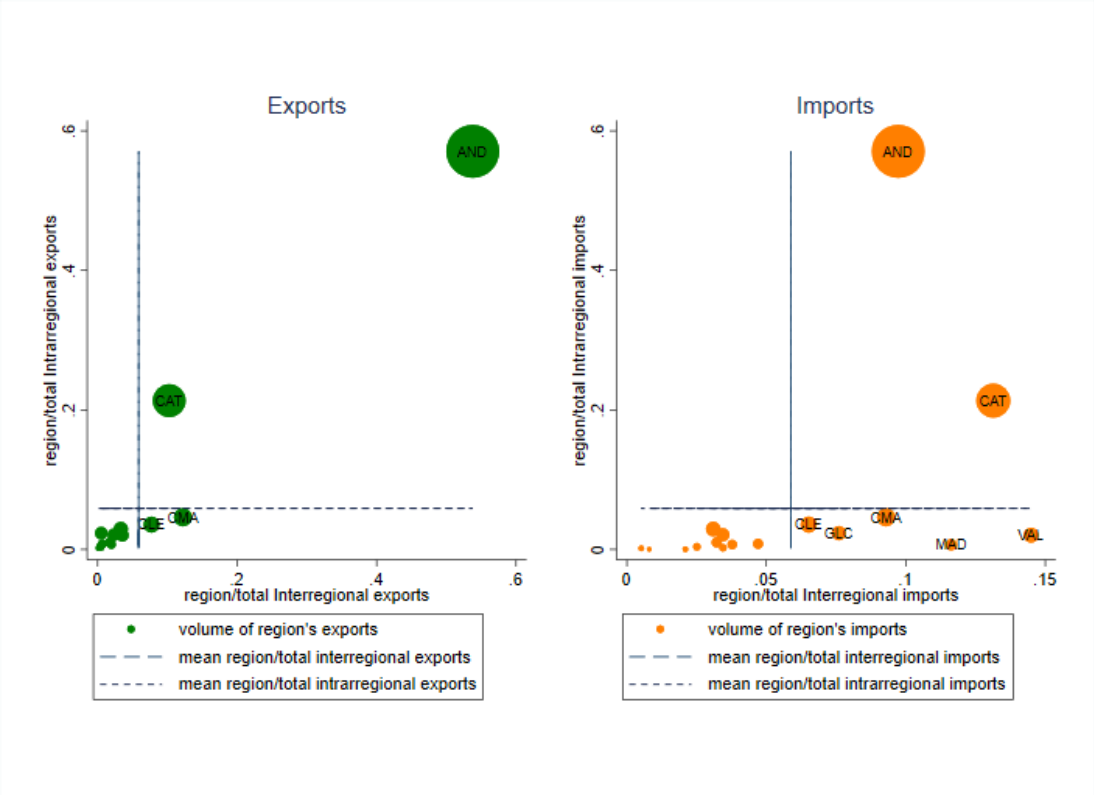
Sector 4 – Woods



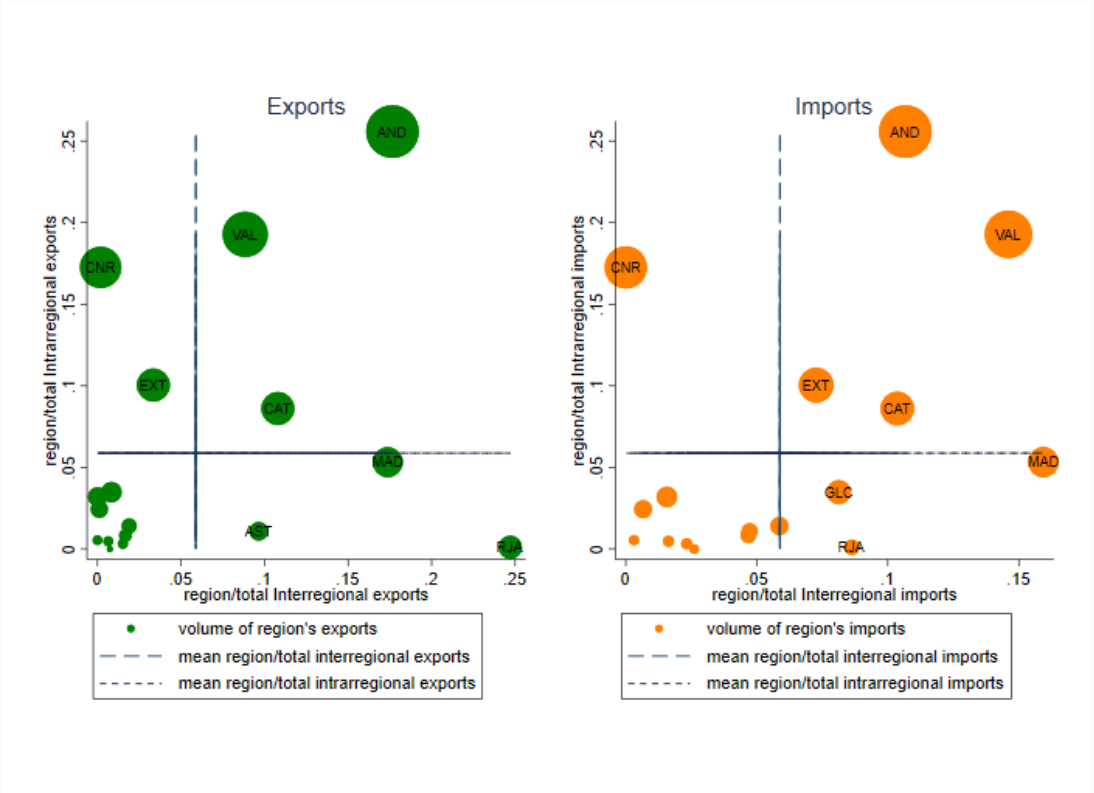
Sector 5 – Processed food products



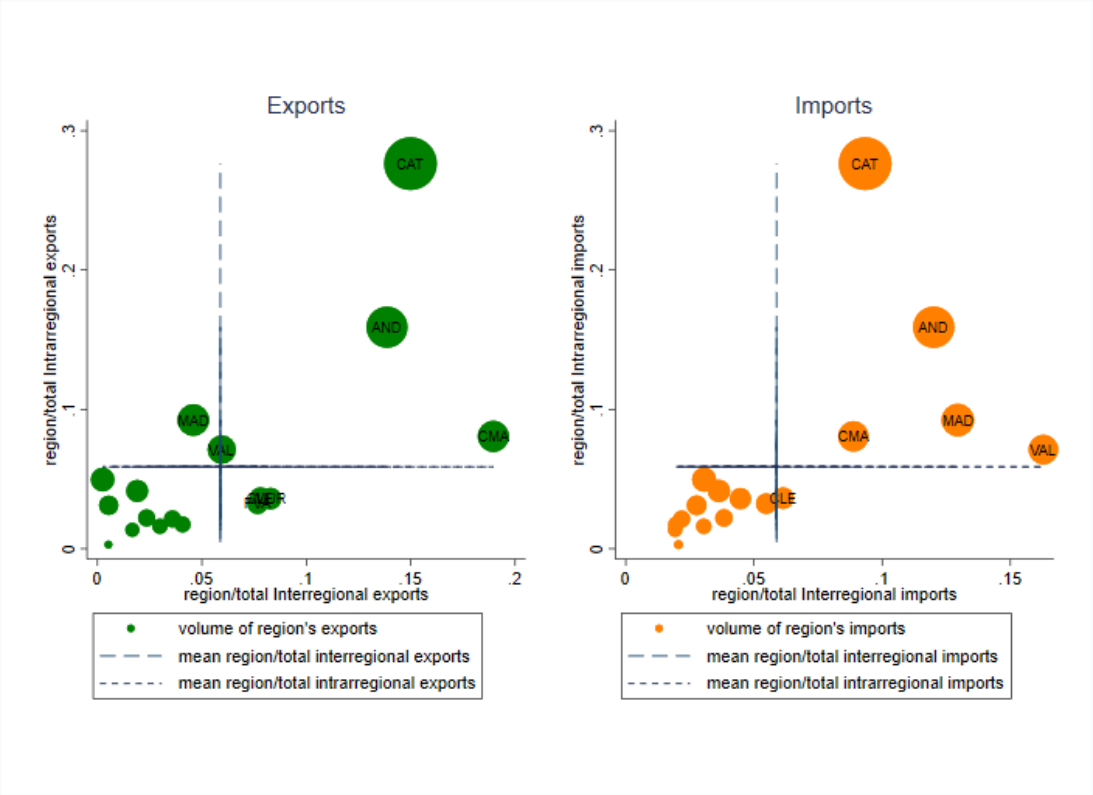
Sector 6 – Oils



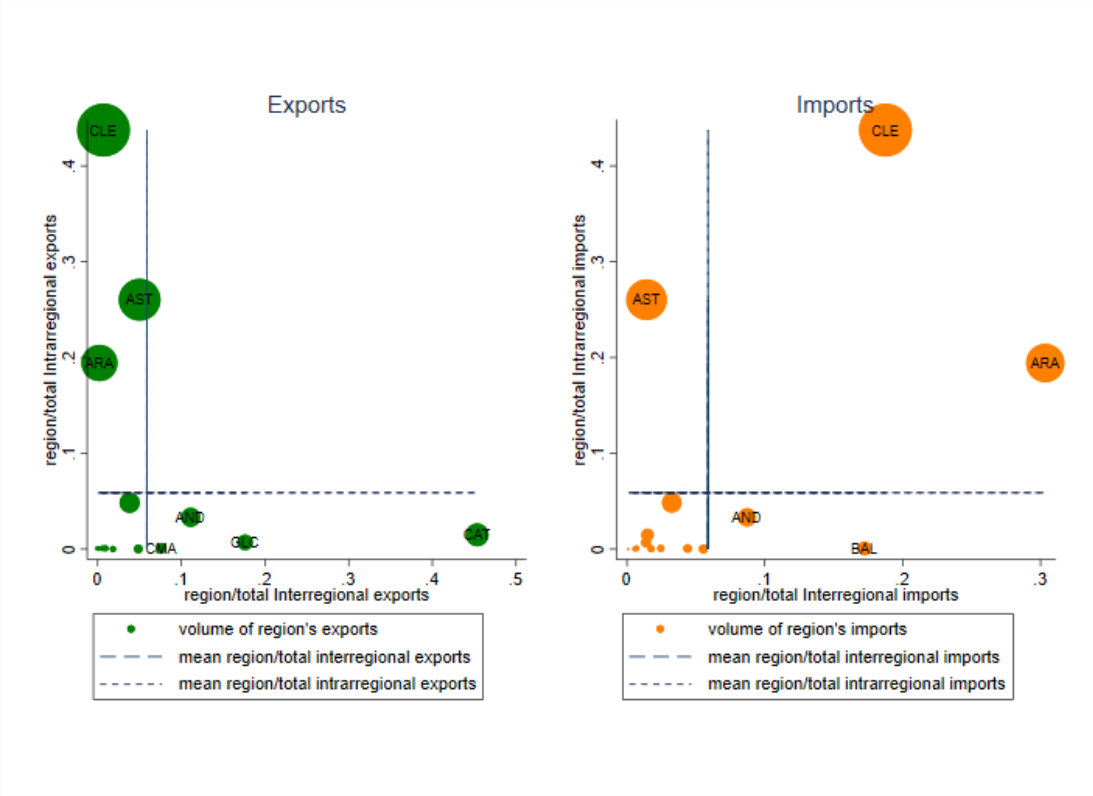
Sector 7 – Tobacco



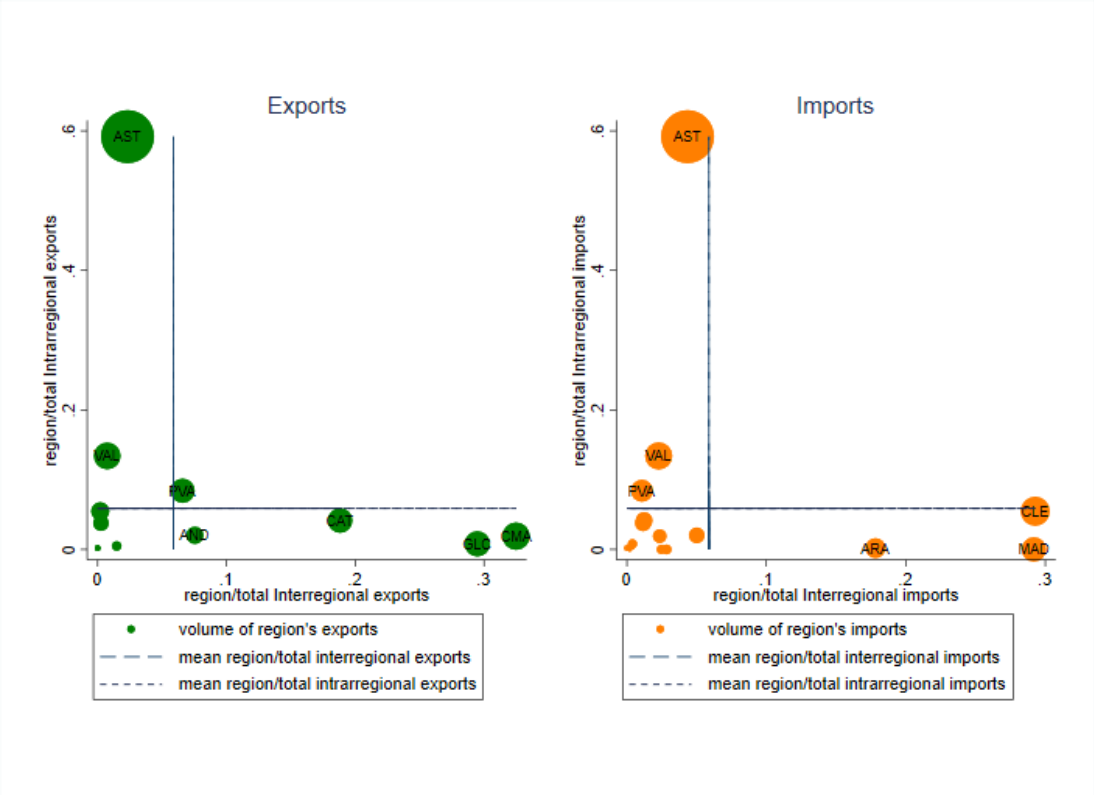
Sector 8 – Drinks



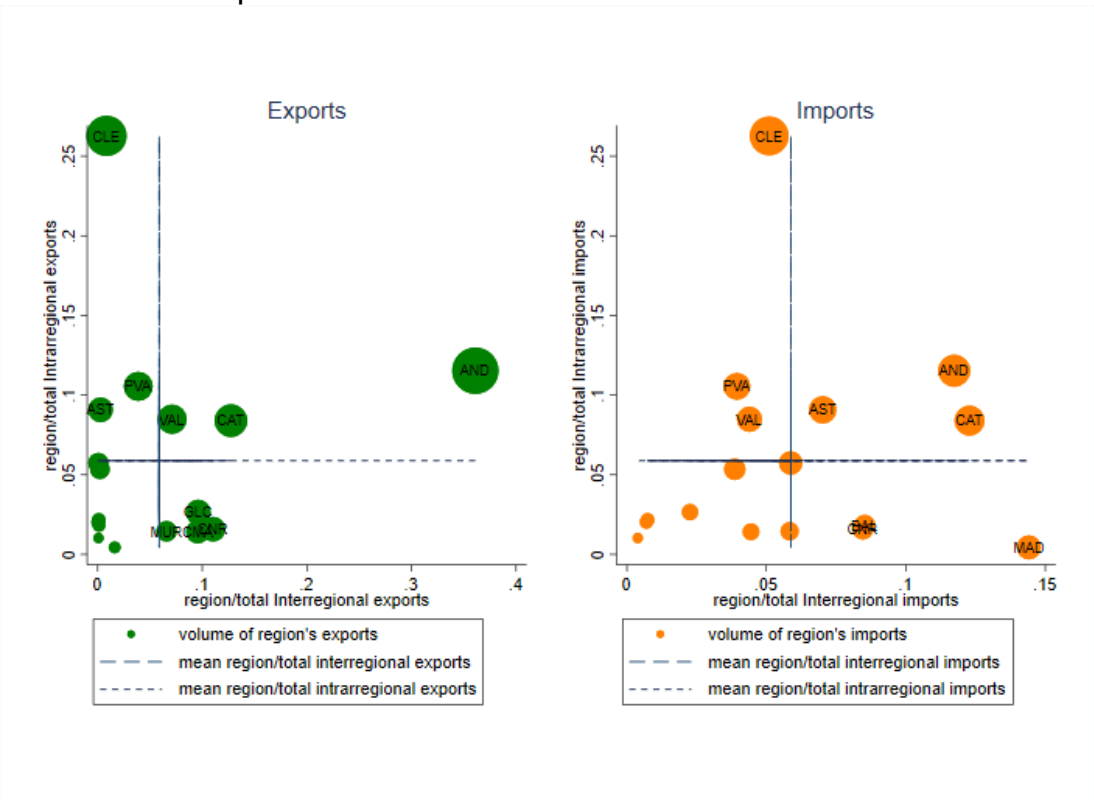
Sector 9 – Coals



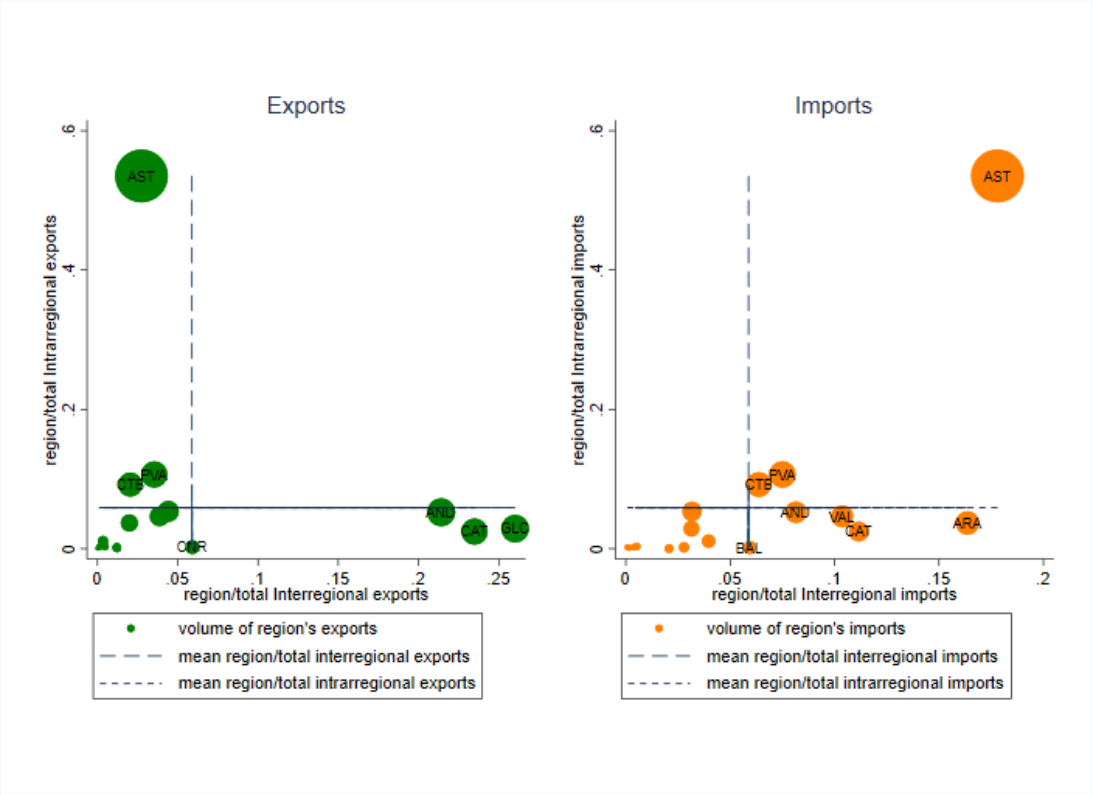
Sector 10 – Minerals (not ECSC)



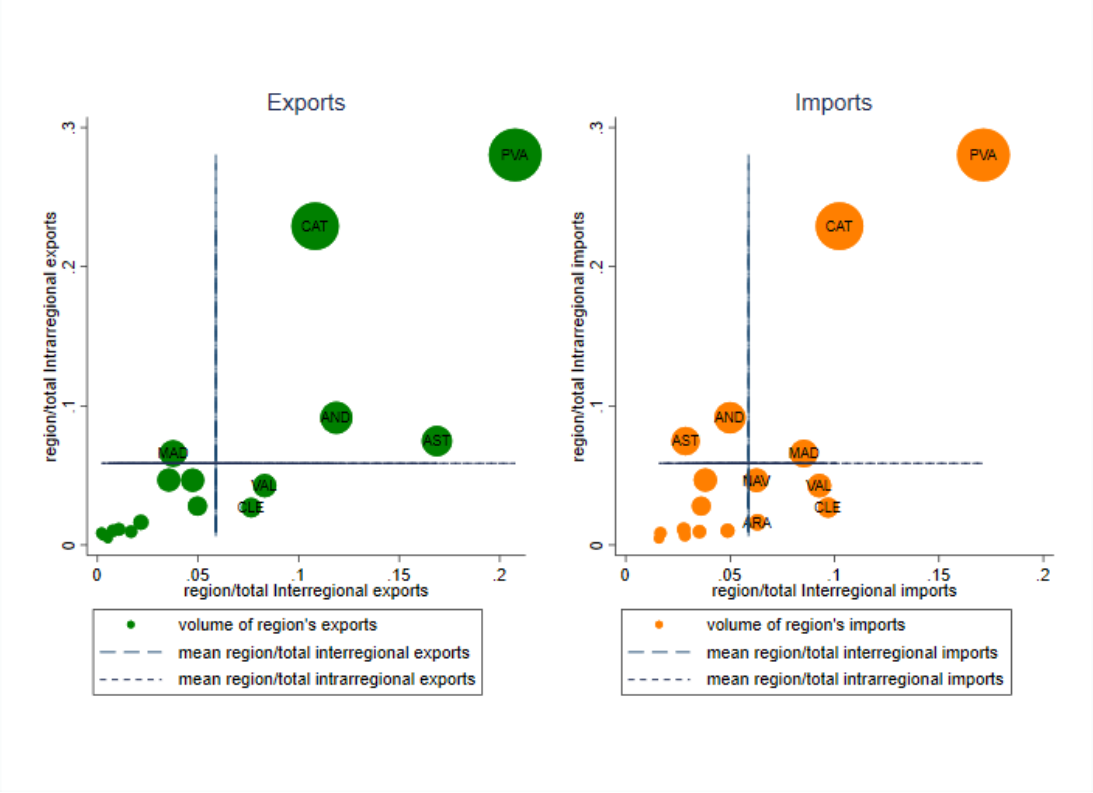
Sector 11 – Liquid fuels



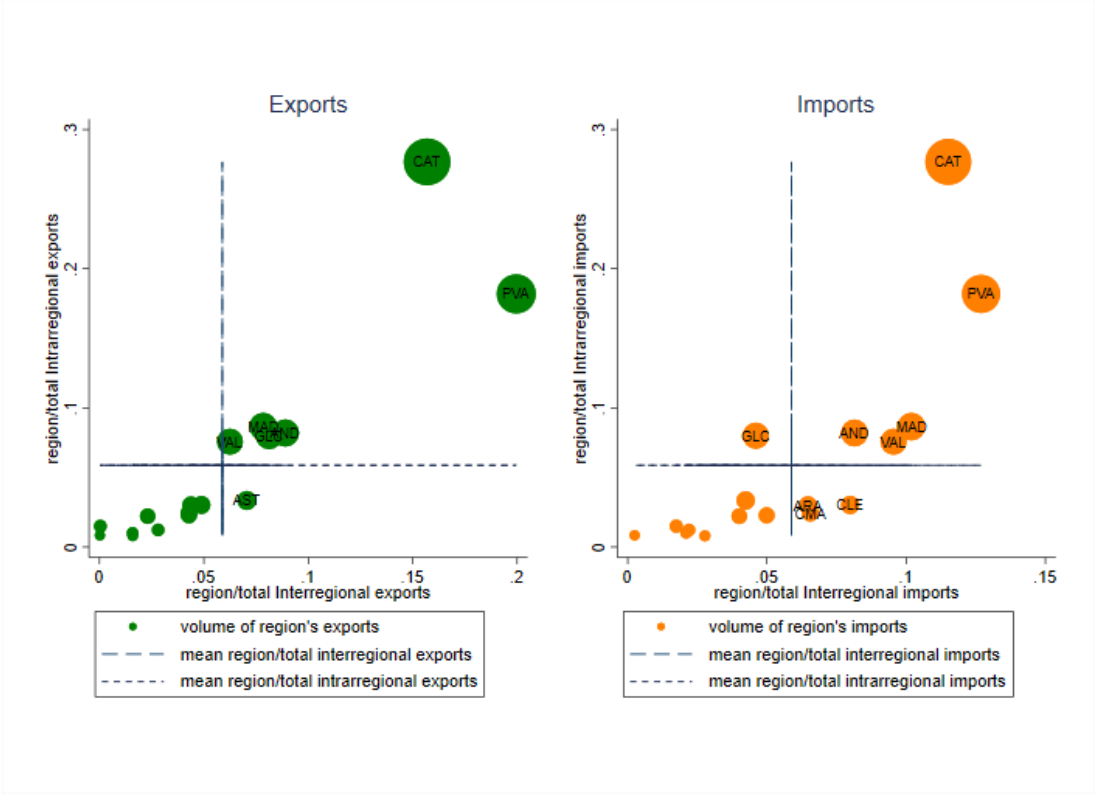
Sector 12 – Minerals (ECSC)



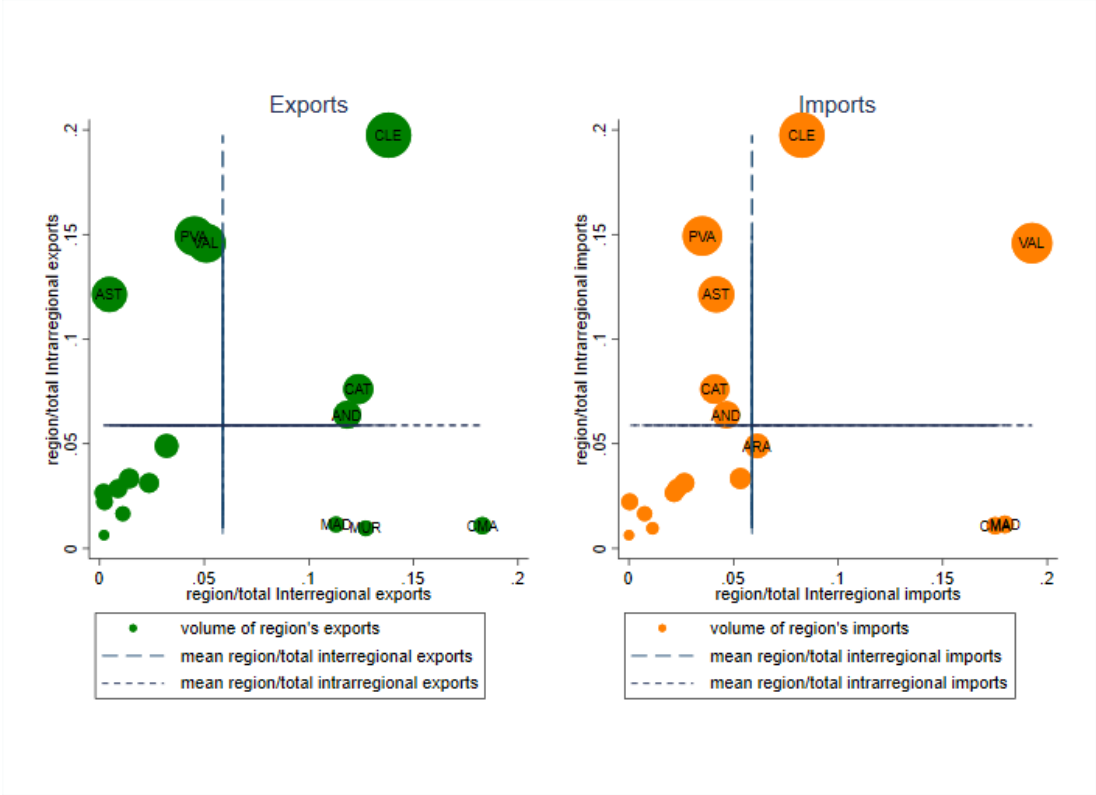
Sector 13 – Steel products (ECSC)



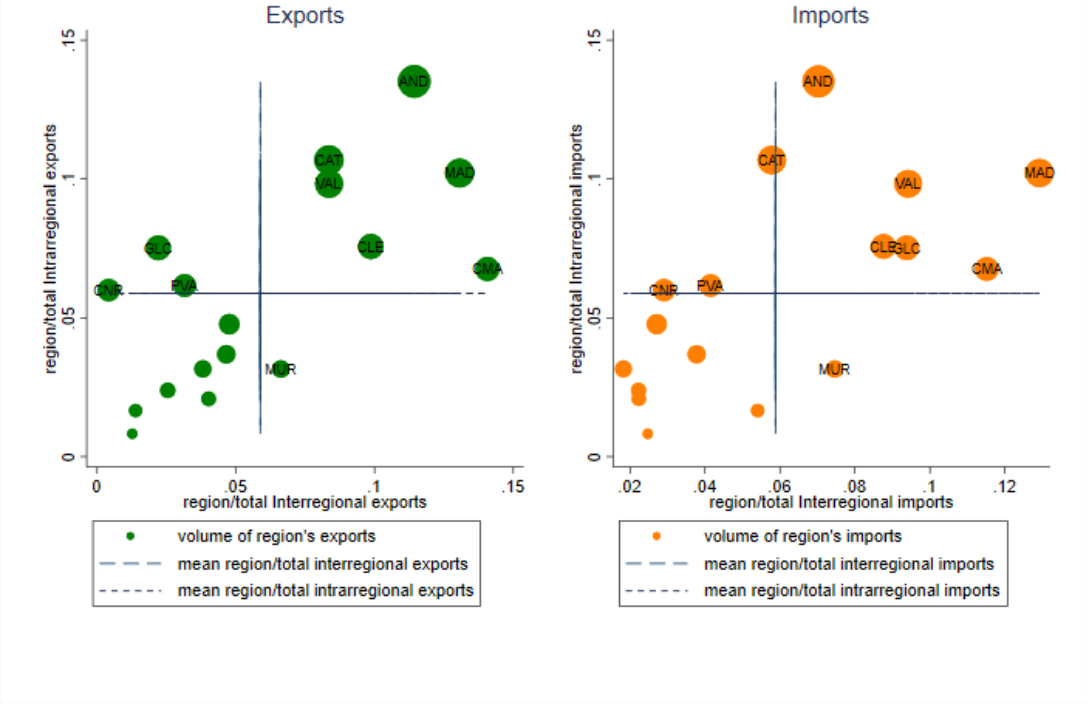
Sector 14 – Steel products (not ECSC)



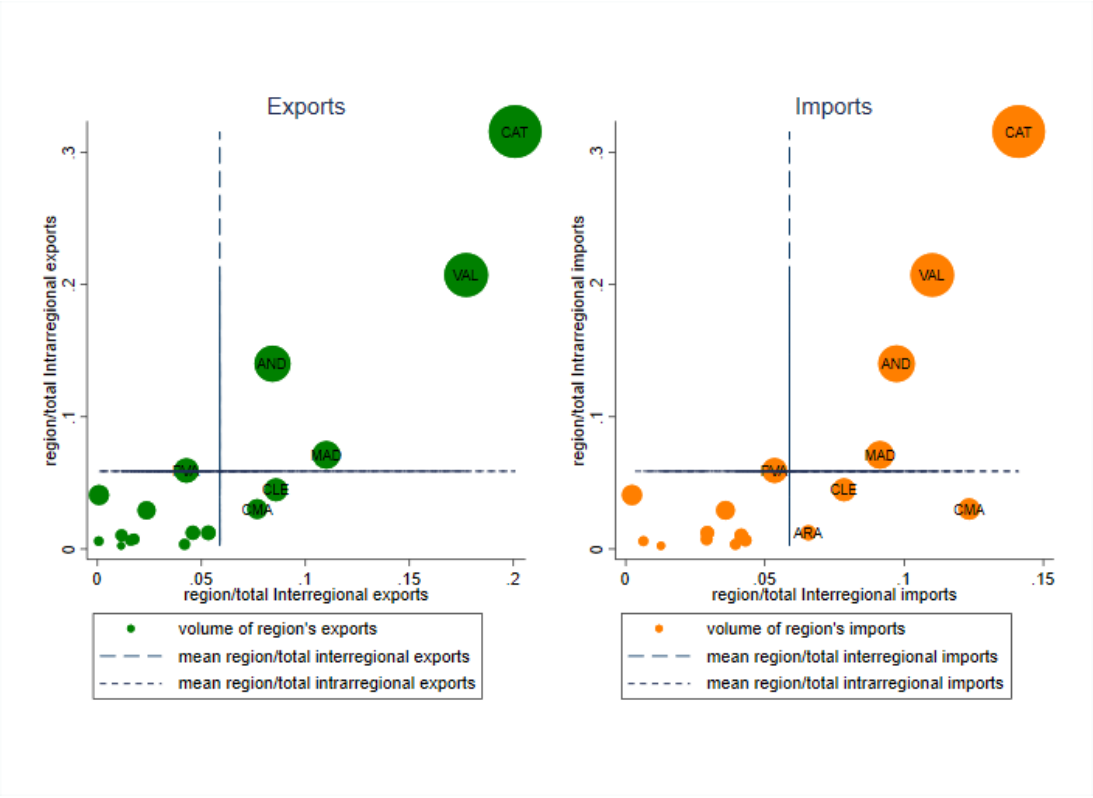
Sector 15 – Stones and ground, salt



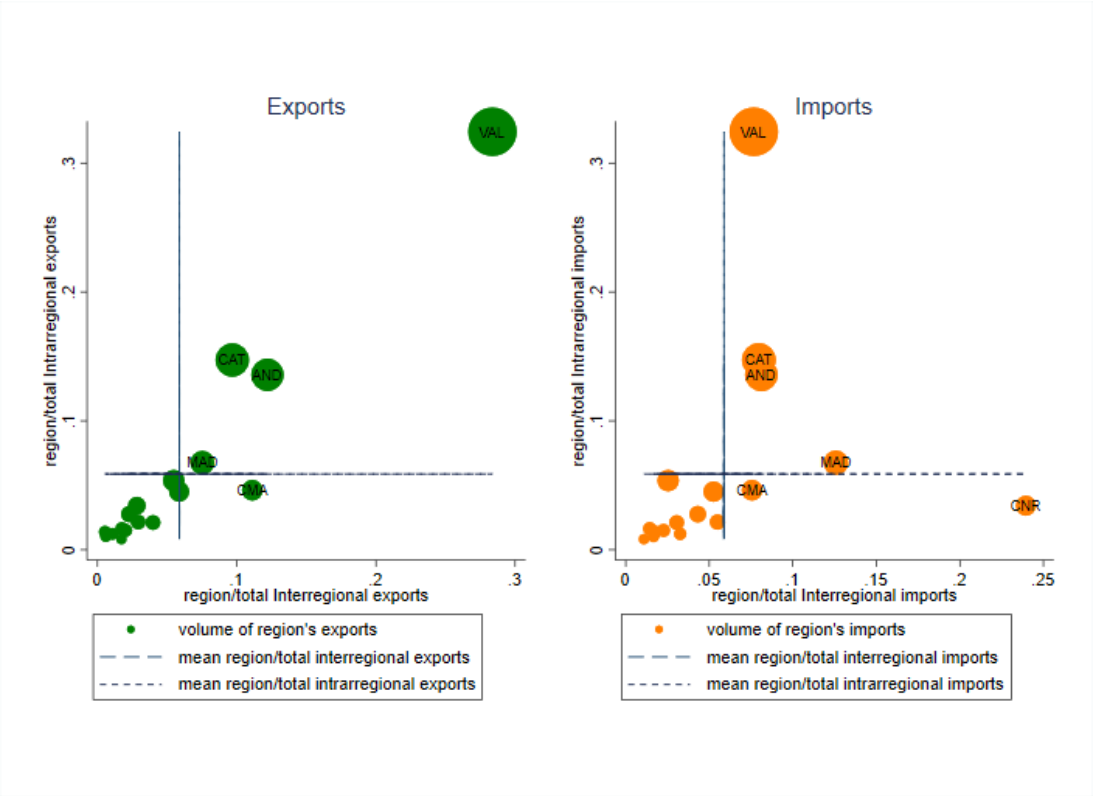
Sector 16 – Cements and limestones



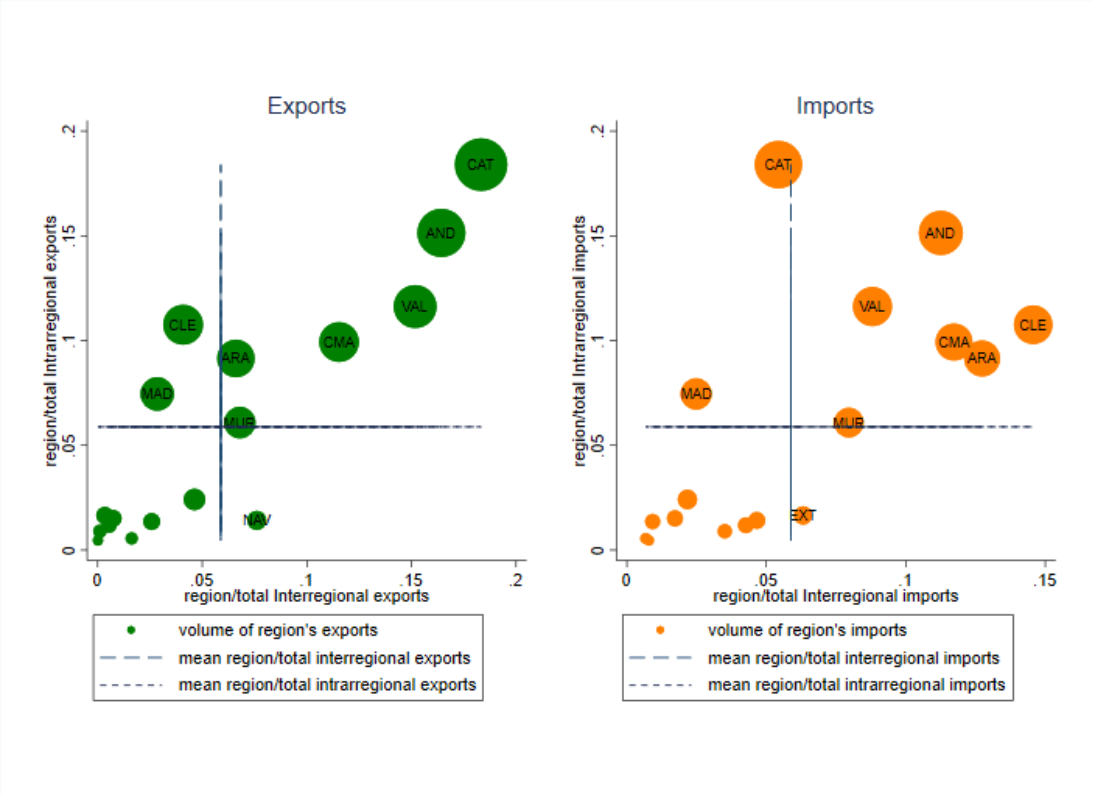
Sector 17 –Glass



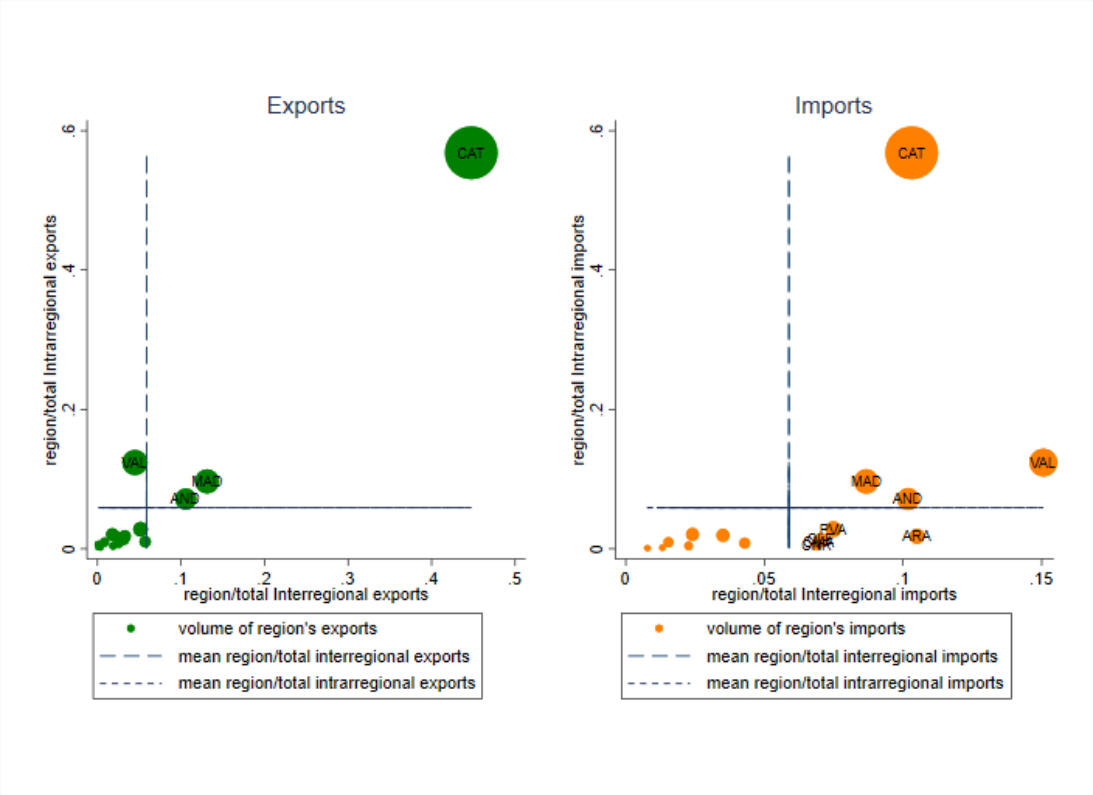
Sector 18 – Construction materials



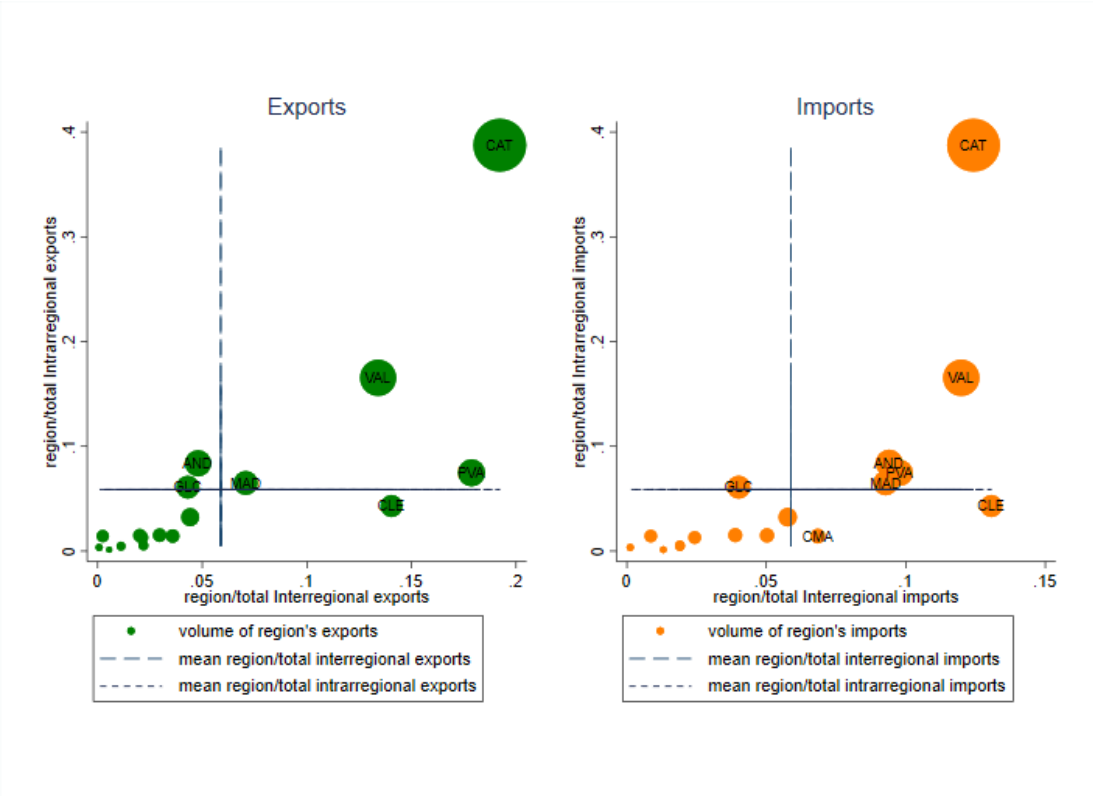
Sector 19 – Fertilizers



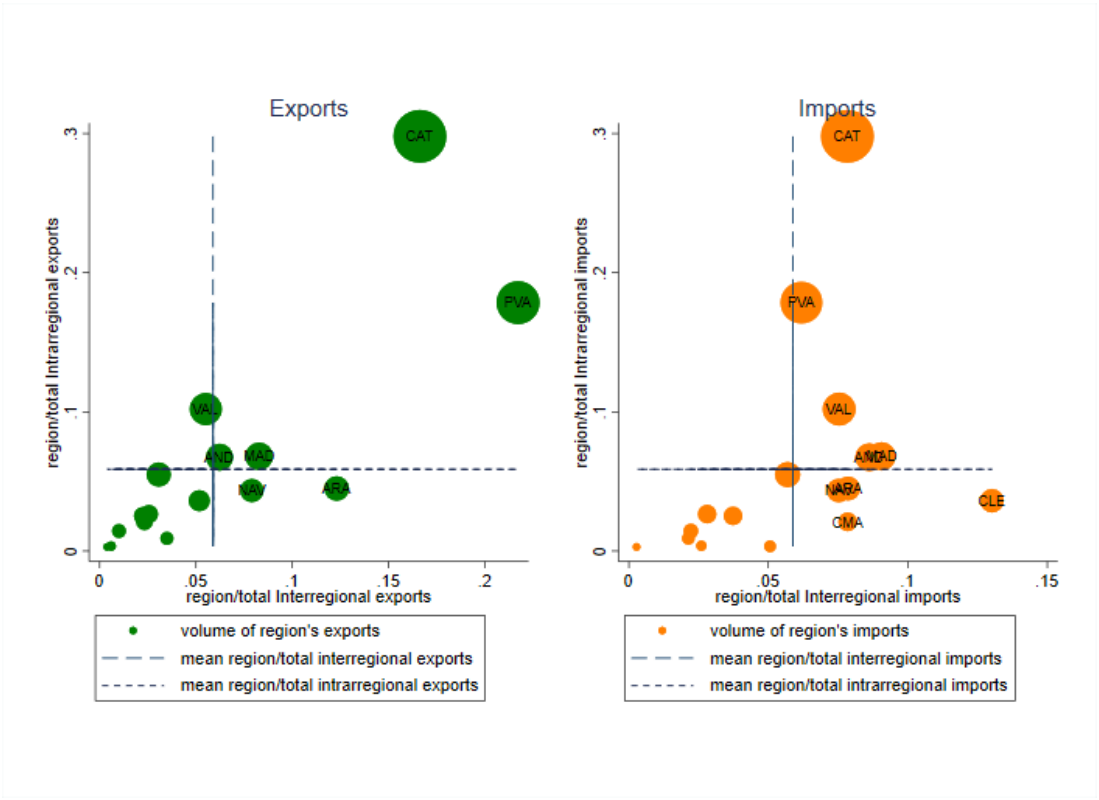
Sector 20 – Chemical products



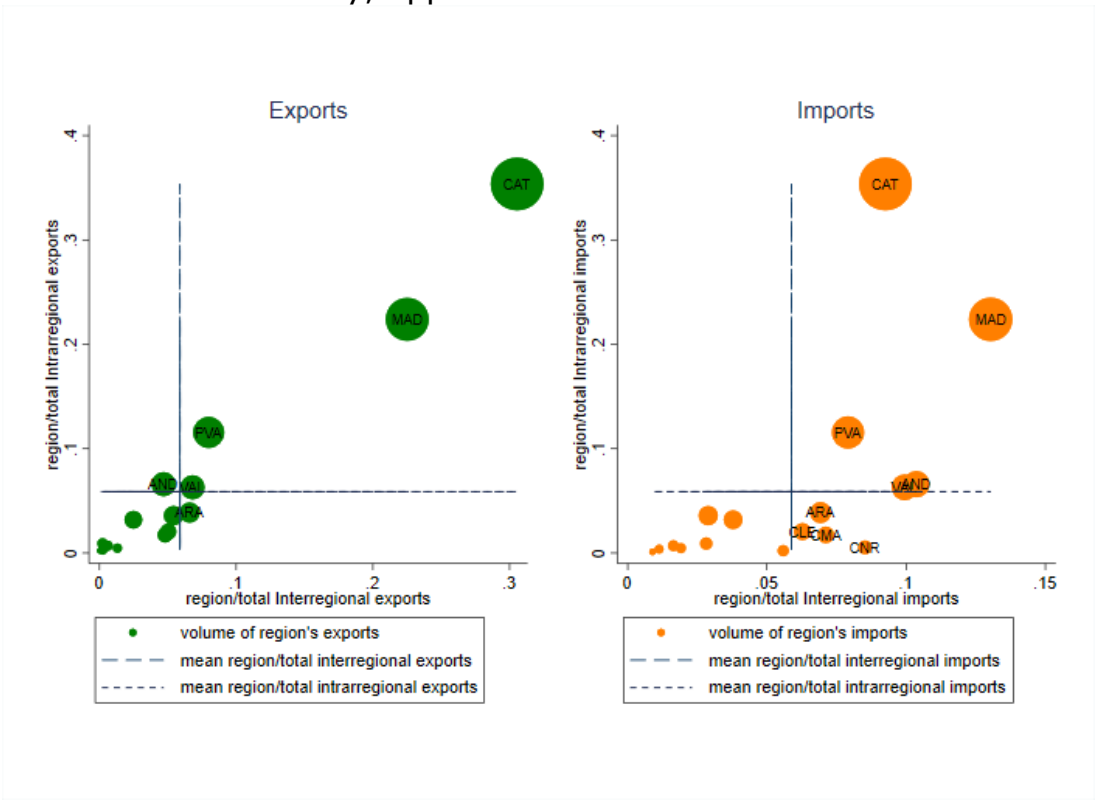
Sector 21 – Plastics and rubber



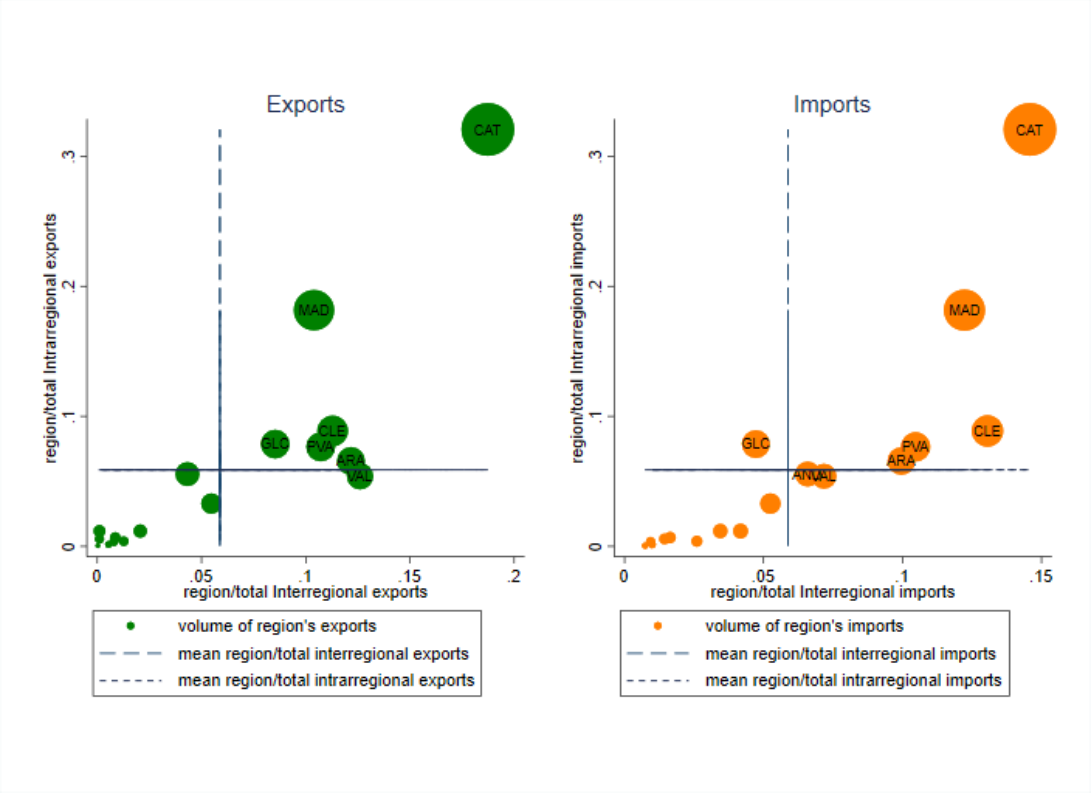
Sector 22 – Machinery, non-electric engines and motors, tractors, agricultural machinery and equipment



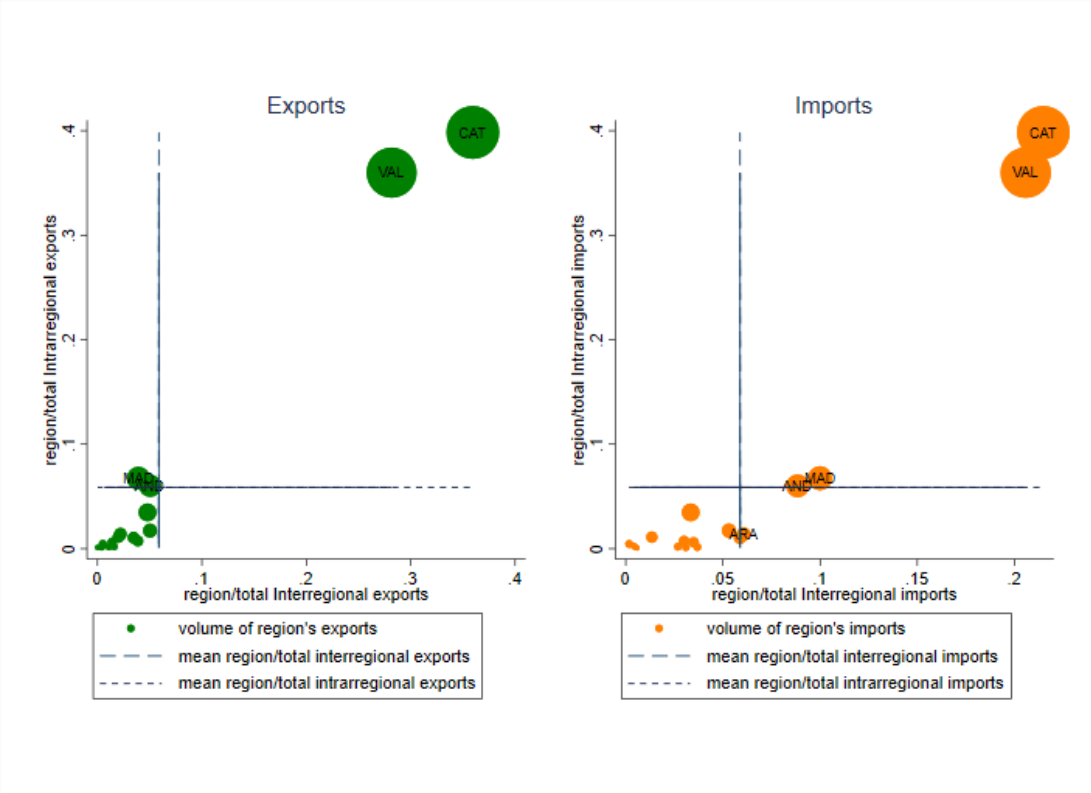
Sector 23 – Machinery, apparatus and electric motors



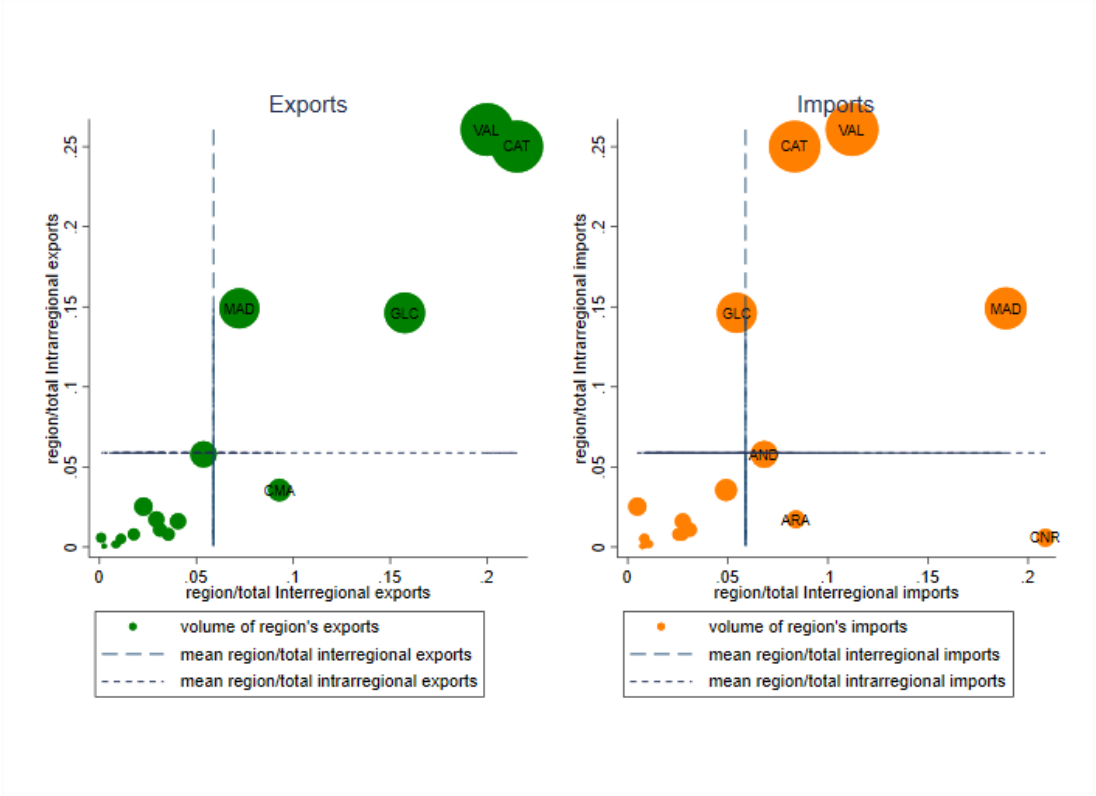
Sector 24 – Transport material



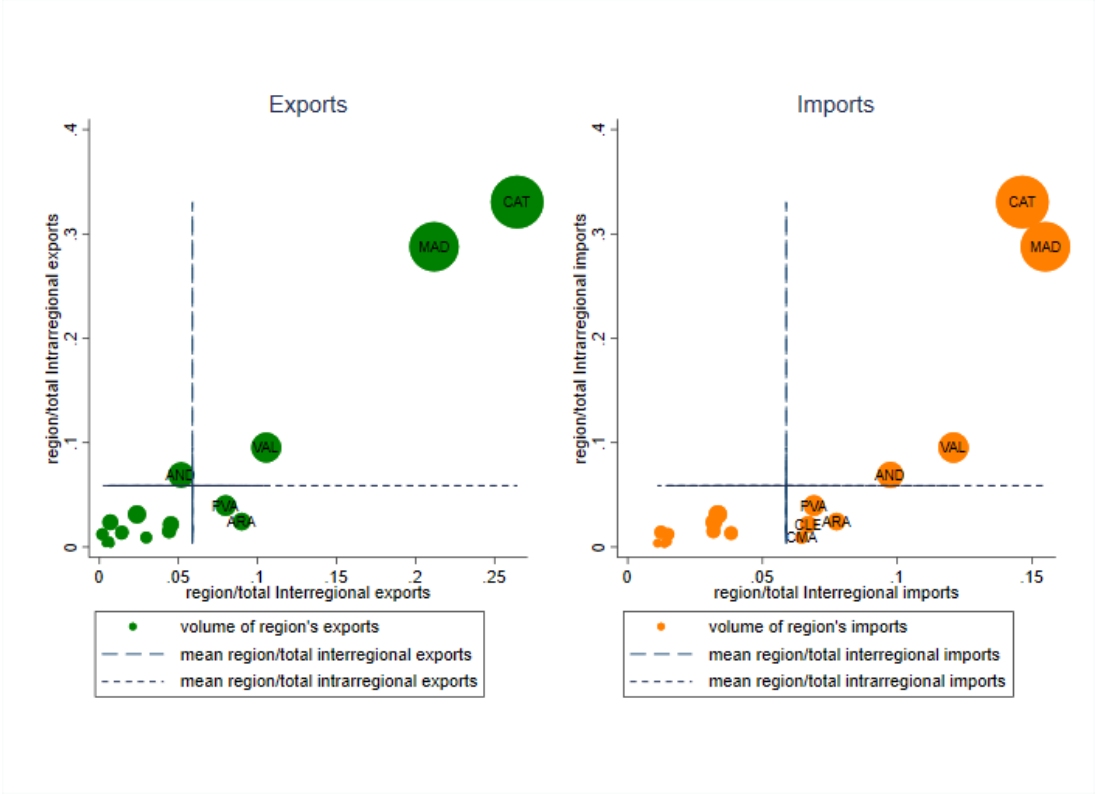
Sector 25 – Textile and clothing



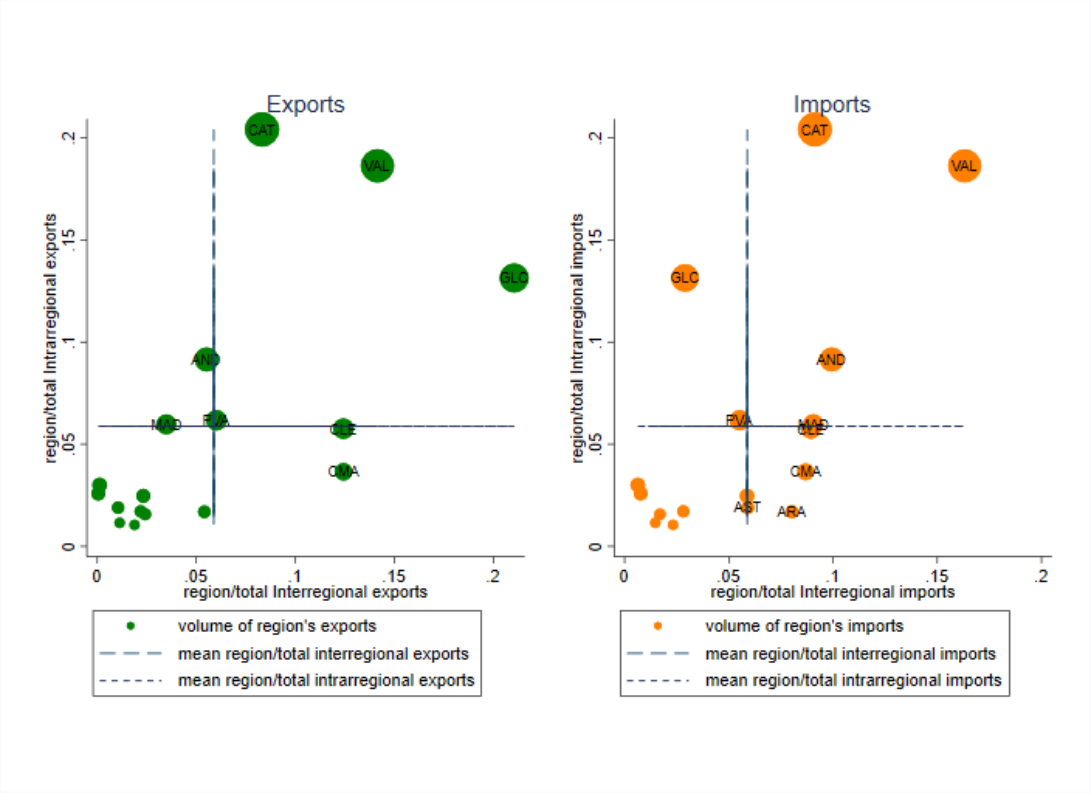
Sector 26 – Leather and footwear



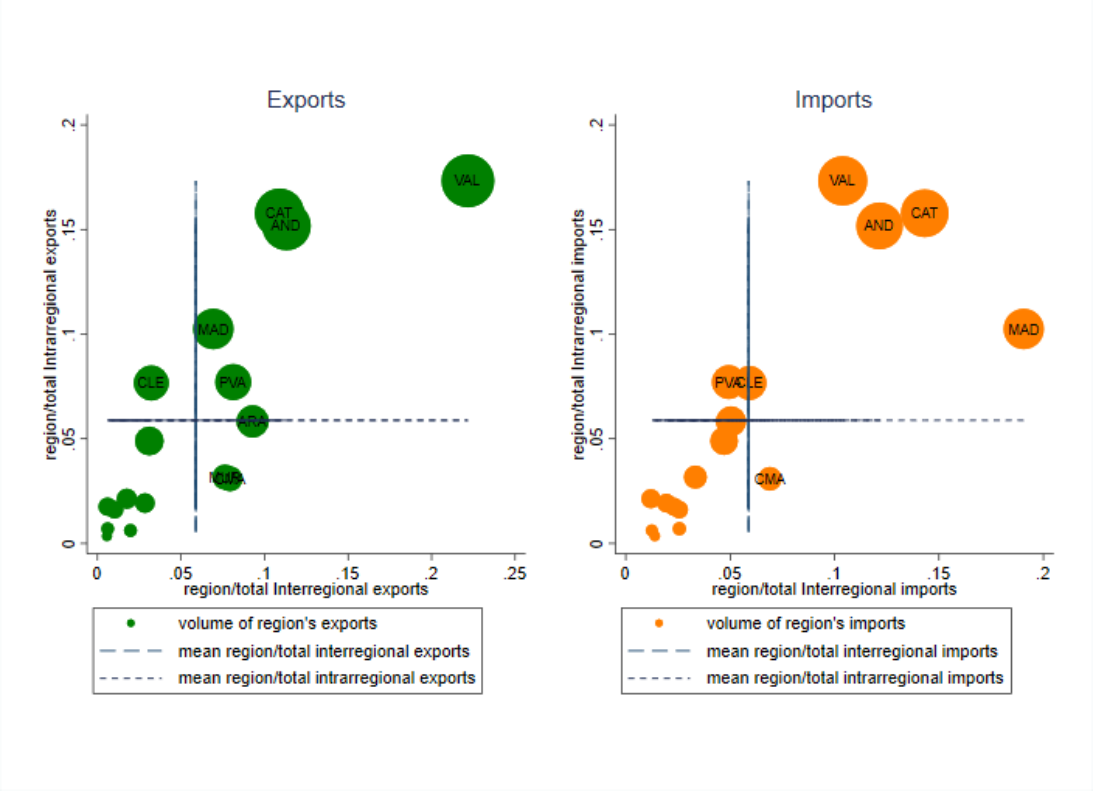
Sector 27 – Paper



Sector 28 – Wood and cork



Sector 29 – Furniture and furnishings, new. Other manufactured articles.



3. FINANCIAL STRENGTH OF BUSINESSES AND THE FINANCIAL SECTOR

3.1. Introduction

In 2011, business debt in Spain reached a peak of 132% of GDP after a sharp increase resulting from the expansionary period that began in the mid-nineties. This growth of debt in the non-financial business sector of the economy was caused by an excess of liquidity and low interest rates — even negative in real terms in some years — and overinvestment in different assets, particularly those related to the real estate sector. Since then, a deleveraging process has been underway due to several factors: the restructuring of the banking sector and the subsequent credit crunch; the recent strong recovery of GDP growth; and the continued expansive monetary policy that has kept interest rates low. This section assesses the financial strength of the non-financial business sector of the economy after the great financial crisis (2008–2012) and through the subsequent recovery (2013–2015). We also examine the role of the financial sector in the reallocation of capital across firms. We provide indicators on the financial health of the Spanish non-financial corporate sector in several dimensions, namely, liquidity, indebtedness, leverage, debt burden and profitability. To this end, we use a representative sample of 848,000 Spanish firms obtained from the SABI database (INFORMA), the Spanish partner of Bureau van Dijk's ORBIS. We also estimate the vulnerability of the non-financial corporate sector — in terms of outstanding debt, firms and employment at risk — still present in the corporate sector despite the favourable tailwinds in the Spanish economy. We also simulate how these variables would be affected if the European Commission's GDP projections for Spain did eventuate and if a change in the monetary policy of the European Central Bank (ECB) led to increased interest rates. Finally, we offer some insight into the challenges facing the Spanish economy due to the excessive debt burden and the large proportion of debt still at risk in the corporate sector. We focus on the relationship between firm indebtedness and the efficient allocation of capital.

This section is structured as follows. Section 3.2 provides an overview of the financial strength of Spanish firms in the European context. Section 3.3 maps out the financial strength of Spanish firms through the indicators of liquidity, financial structure, debt burden and profitability using a large sample of Spanish firms. In Section 3.4, we quantify the percentage of firms, outstanding debt and employment at risk in the business sector owing to excessive debt levels and burden. In Section 3.5, we simulate the effect that future financial and macroeconomic conditions in the euro area (i.e., changes in the monetary policy and GDP growth) could have on the percentage of firms, debt and employment at risk. Section 3.6 offers insights into the implications of the still high level of debt on the dynamism of the Spanish economy and on the efficient allocation of capital. Finally, the last section summarizes the main findings.

3.2. Financial strength of Spanish firms in the European context: surge and slowdown of corporate debt

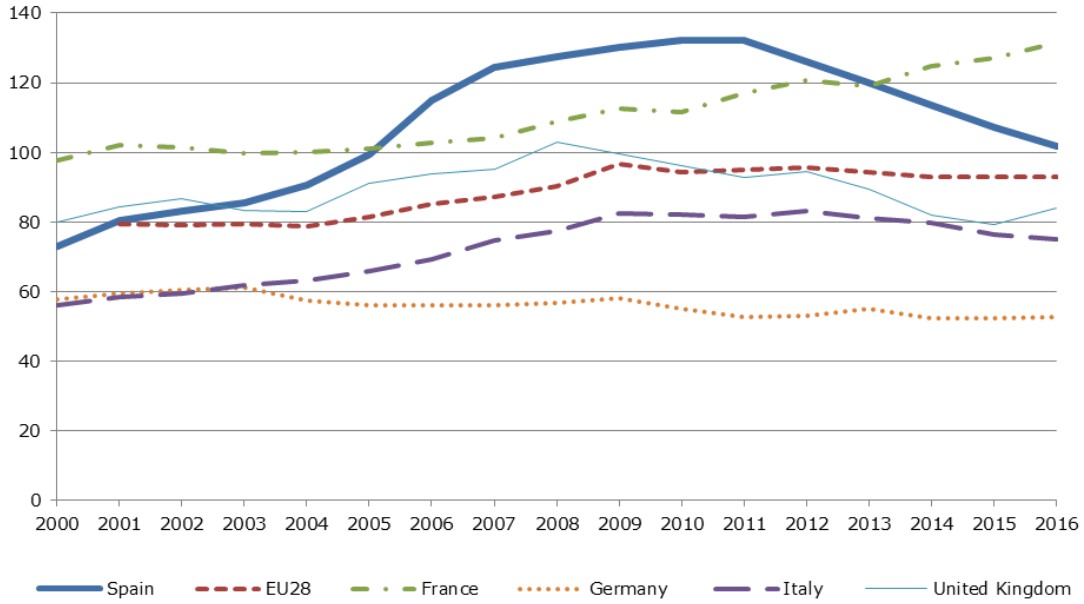
This section spells out the balance sheet development of the non-financial corporate sector in Spain compared with other EU countries from a macro-level perspective. Our main goal is to put the overall situation of Spanish firms into context in terms of their financial structure and debt burden.

To this end, Figure 3.1 shows, using data from Eurostat's Financial Accounts of the Economy, that, from 2000, total debt grew at a faster rate in Spain than in other large EU economies. The debt-to-GDP ratio in Spain almost doubled (by a factor of 1.8) from 2000 to 2011, reaching a value of 132% in 2011, 37 percentage points higher than the EU. In

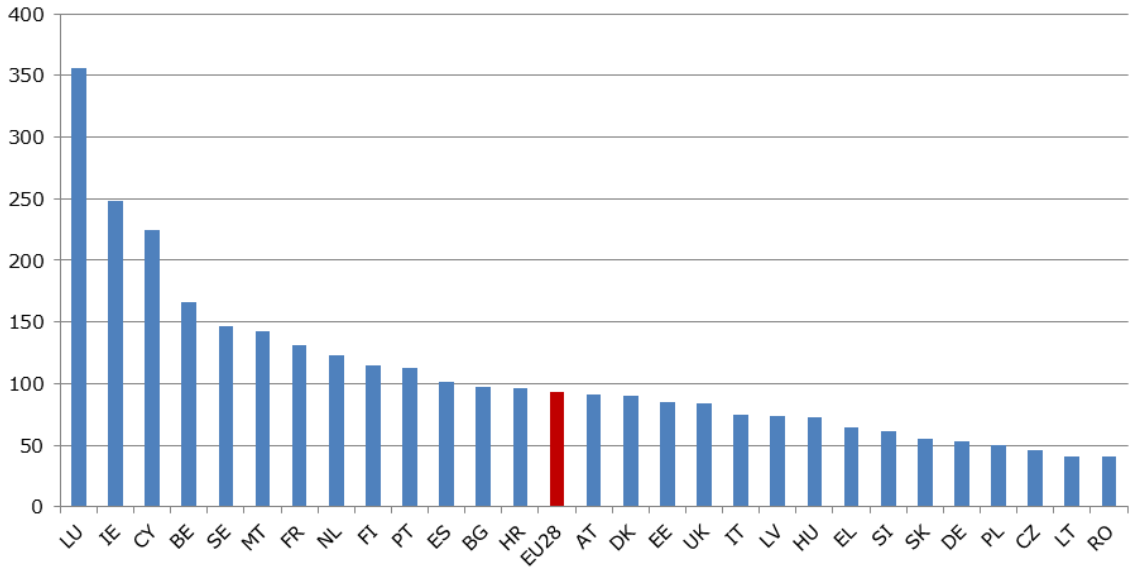
fact, out of the largest EU countries, Spain had the highest debt ratio in 2011. It was 7th for all EU countries. Since 2011, Spanish firms have deleveraged. In 2016, the debt ratio in Spain was 101.7%, still 9.2% higher than the EU average, but 2.6 percentage points below the average for the euro area.

Figure 3.1. Debt-to-GDP ratio of non-financial corporations

a) 2000–2016. Percentages



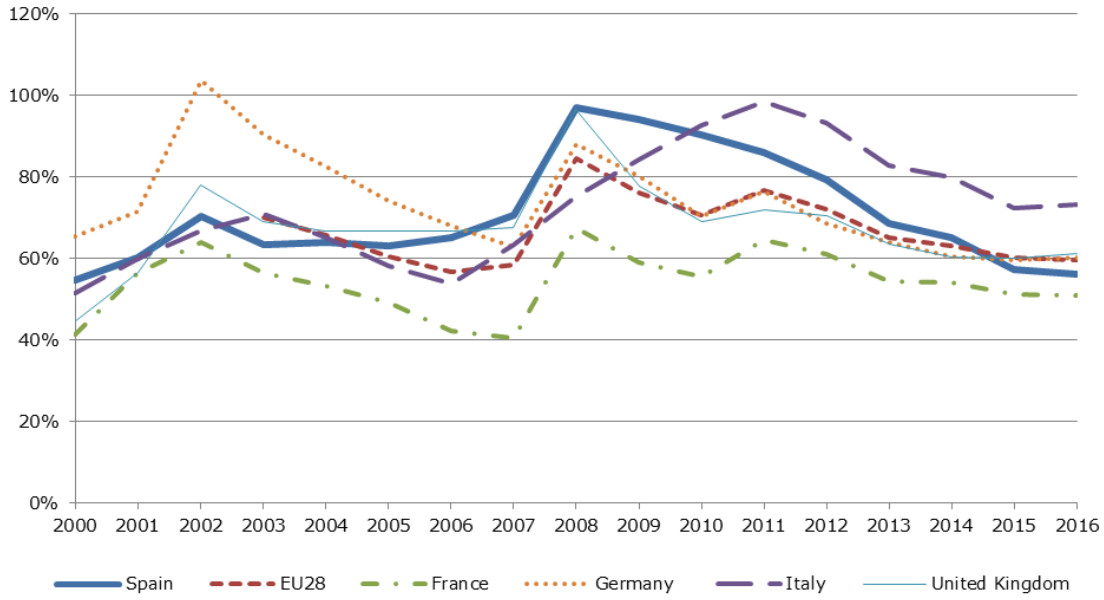
b) Ranking of European countries, 2016. Percentages



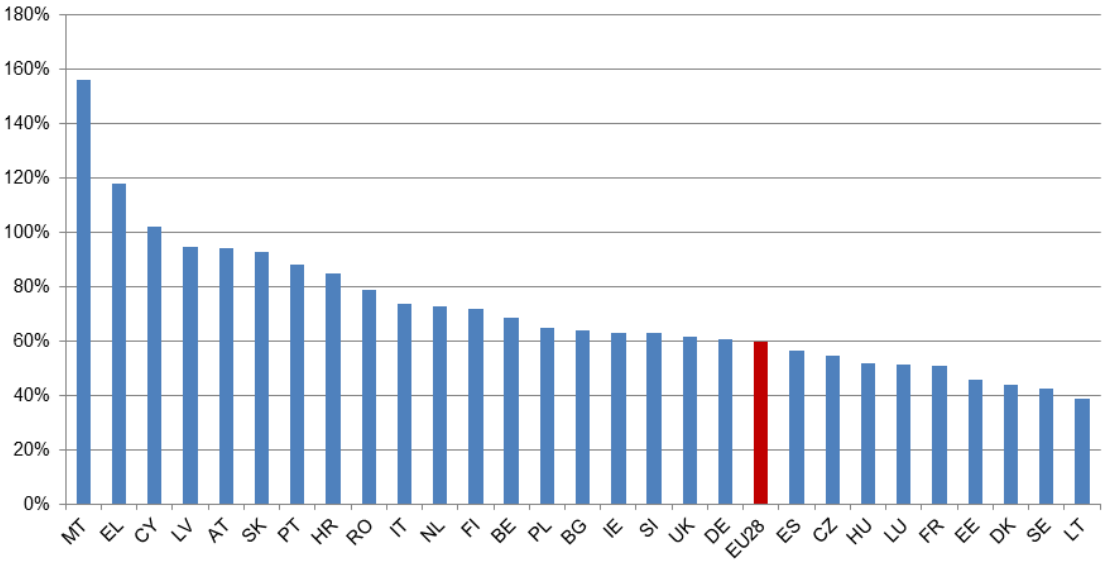
Source: Eurostat

Figure 3.2. Debt-to-equity ratio of non-financial corporations

a) 2000–2016. Percentages



b) Ranking of European countries, 2016. Percentages



Source: Eurostat

The corporate-debt-to-GDP ratio has some limitations when used to compare the financial position of non-financial firms. It compares a stock variable, i.e., debt, with a flow indicator that is generated not only for the corporate sector but for all institutional sectors of the economy. To overcome this problem, Figure 3.2 shows the debt-to-equity ratio. Debt increased in Spanish firms with respect to shareholders' funds during the years before the crisis. Whereas, at the beginning of 2000, debt represented 55% of equity, eight years later it had increased to 97%. Since then, debt has fallen. In 2016, it dropped to leverage levels similar to those at the beginning of the period. Several facts are worth mentioning. First, while total debt/GDP went down only from 2011 onwards, the debt/equity ratio started to decline from the beginning of the crisis. In other words, the inertia observed in

the first ratio came from a sharper fall in GDP than in debt. With the onset of the crisis, firms began to deleverage, but it was not possible for debt to be reduced at the same pace as GDP. In terms of equity, there has been a remarkable reduction in debt, with the debt/equity ratio returning to initial levels. Third, although Spain's debt/GDP ratio is high, its debt-to-equity ratio is similar to that of large EU countries and the EU average, especially in recent years.

Figure 3.3 compares outstanding debt with gross operating surplus in the non-financial corporations of some EU economies. In 2016, Spain would have needed to use its entire gross operating surplus for 4.4 years to settle its corporate debt. This ratio is similar to the values observed in the early 2000s and less than the maximum observed in 2007 (6.4 years). Among the largest EU countries, Spain ranked four for this ratio. As with the other dimensions, Spain is conspicuous not only for the steep rise of the indicator during the expansion period prior to the crisis, but also for making a strong recovery since then. In fact, Spain's 2016 values are similar to the EU average.

The Spanish economy has traditionally been characterised by a financial system based on bank intermediaries rather than on financial markets. A large proportion of the small and medium enterprises (SME) make up the business fabric compared to other countries. SMEs have difficulties accessing wholesale financial markets and depend heavily on bank financing. The dependence of the corporate sector on bank financing increased during the years of expansion before the crisis, reaching almost 70% of total debt in 2007–2008 (Figure 3.4). Since then, the proportion of bank debt over total debt has dropped to nearly 50% (52%) in 2016.

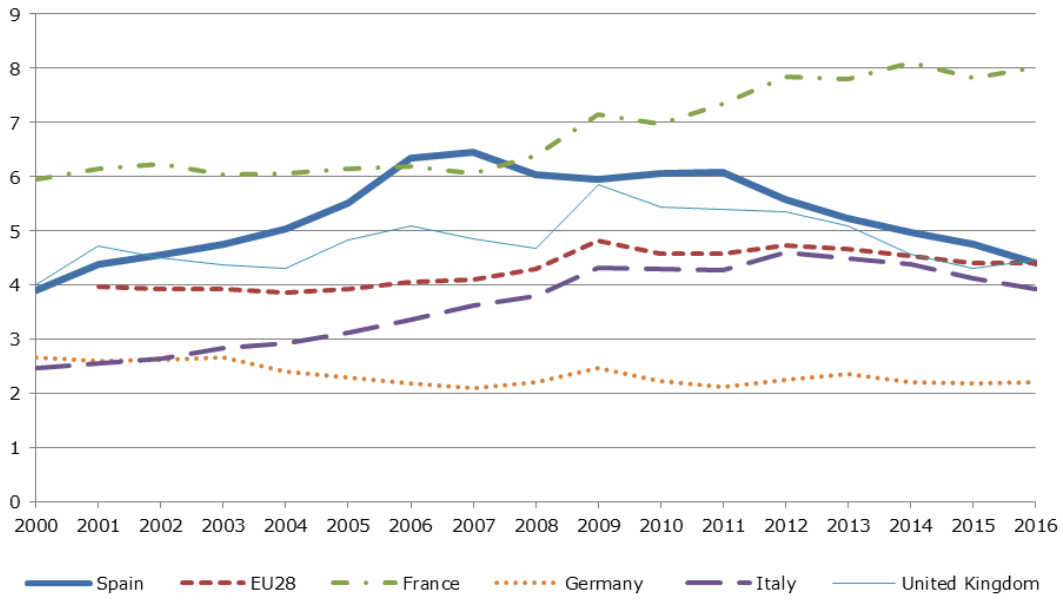
The 5th vintage of the CompNet database offers interesting data that complements the general picture of the financial situation of the non-financial corporate sector in Spain. The data, covering the period 2001–2013, includes financial information on firms in 12 EU countries. The financial position of Spanish firms in the international context can be drawn from this database.

First, in terms of the share of equity on total assets (total liabilities), the situation of firms in Spain compared with other countries in the database is not particularly different (Figure 3.5). From the beginning of the financial crisis, Spanish firms deleveraged, increasing internal funding and equity issuance. In the last year, Spain was, of the countries available, among those with the highest equity ratio. This figure also suggests a negative relationship between size and the equity ratio in Spain as small and medium enterprises had higher equity ratios (with almost six percentage points difference between small and large firms in 2013). In fact, Spain is the country with the largest differences across size classes. In France, Denmark and Belgium, large firms rely more on equity as a funding source than small firms.

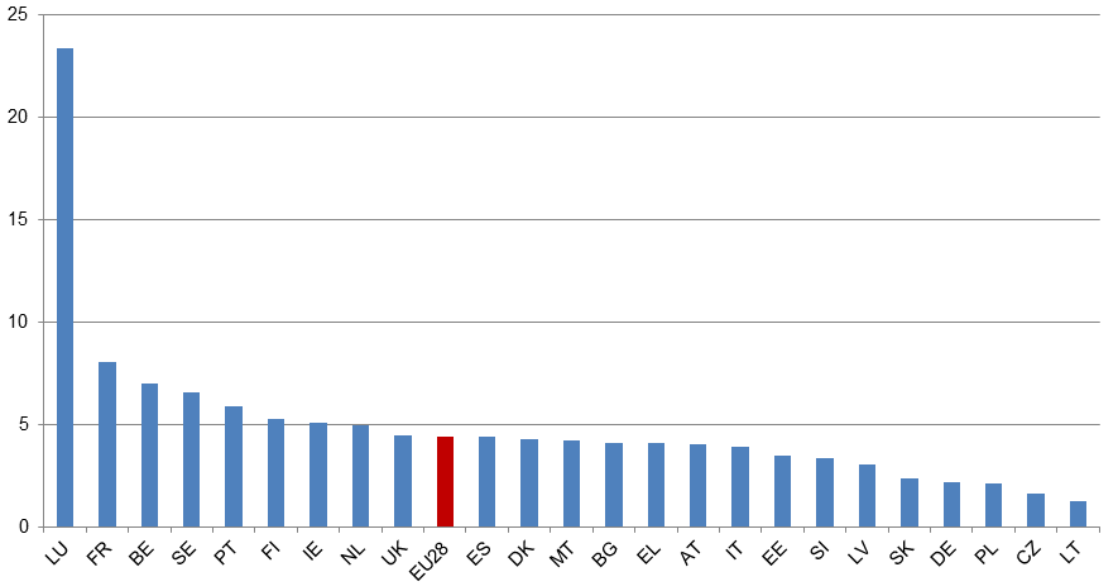
Second, even though the deleveraging since the beginning of the crisis corrected some of the debt excesses of Spanish firms, major vulnerabilities still remain, particularly reduced profitability. According to CompNet, profitability in Spain is low compared to in other countries in the database (Figure 3.6). In 2013, the return on assets (ROA) of Spanish firms was only 2.9%, similar to that of Italy, but lower than the profitability of Belgian and French firms (5.0% and 5.3%, respectively) or Danish and Finish firms (7.8% and 7.5%). The reduced profitability was driven by the severity of the crisis that hit the Spanish economy, particularly in 2009 and 2012. Again, there are significant differences when broken down by size class. Although the indebtedness of large firms was higher than for small firms, their profitability was twice that of small firms and was 33% higher than that of medium-sized enterprises in 2013. These differences in profitability between large firms and the other size classes were by far the highest in Spain compared to other countries. Therefore, leverage in small firms is lower than in large firms, but the threat facing debt sustainability stems from the reduced capacity to obtain returns from their activity.

Figure 3.3. Debt-to-operating surplus ratio of non-financial corporations

a) 2000-2016

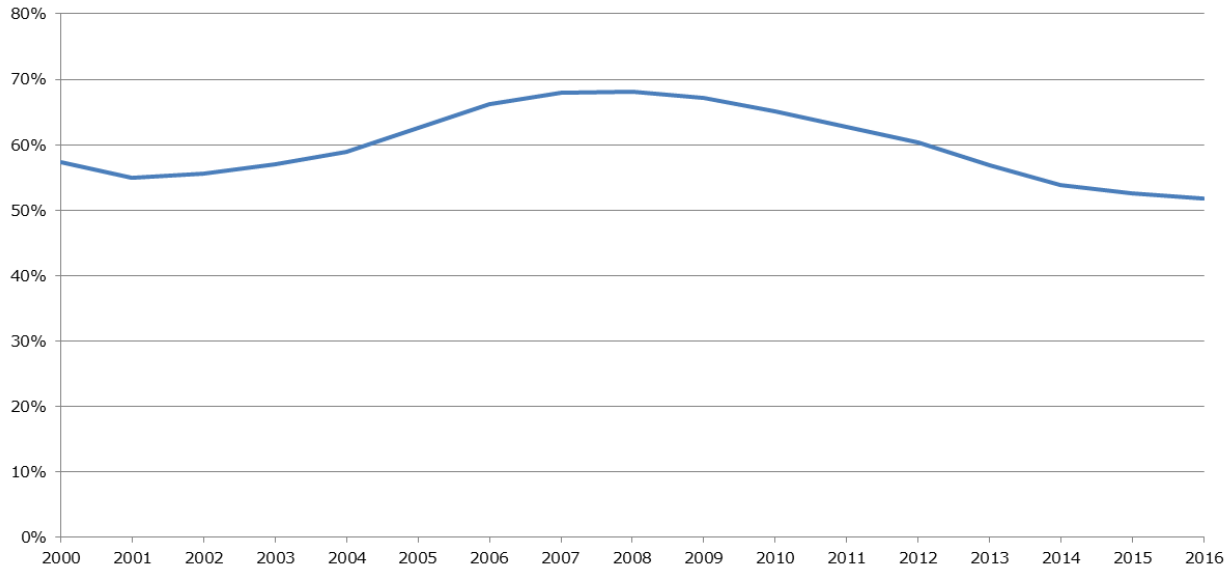


b) Ranking of European countries, 2016



Source: Eurostat

Figure 3.4. Bank Debt over Total Debt of non-financial corporations. 2000–2016. Percentages



Source: Financial accounts-ESA 2010 Bank of Spain

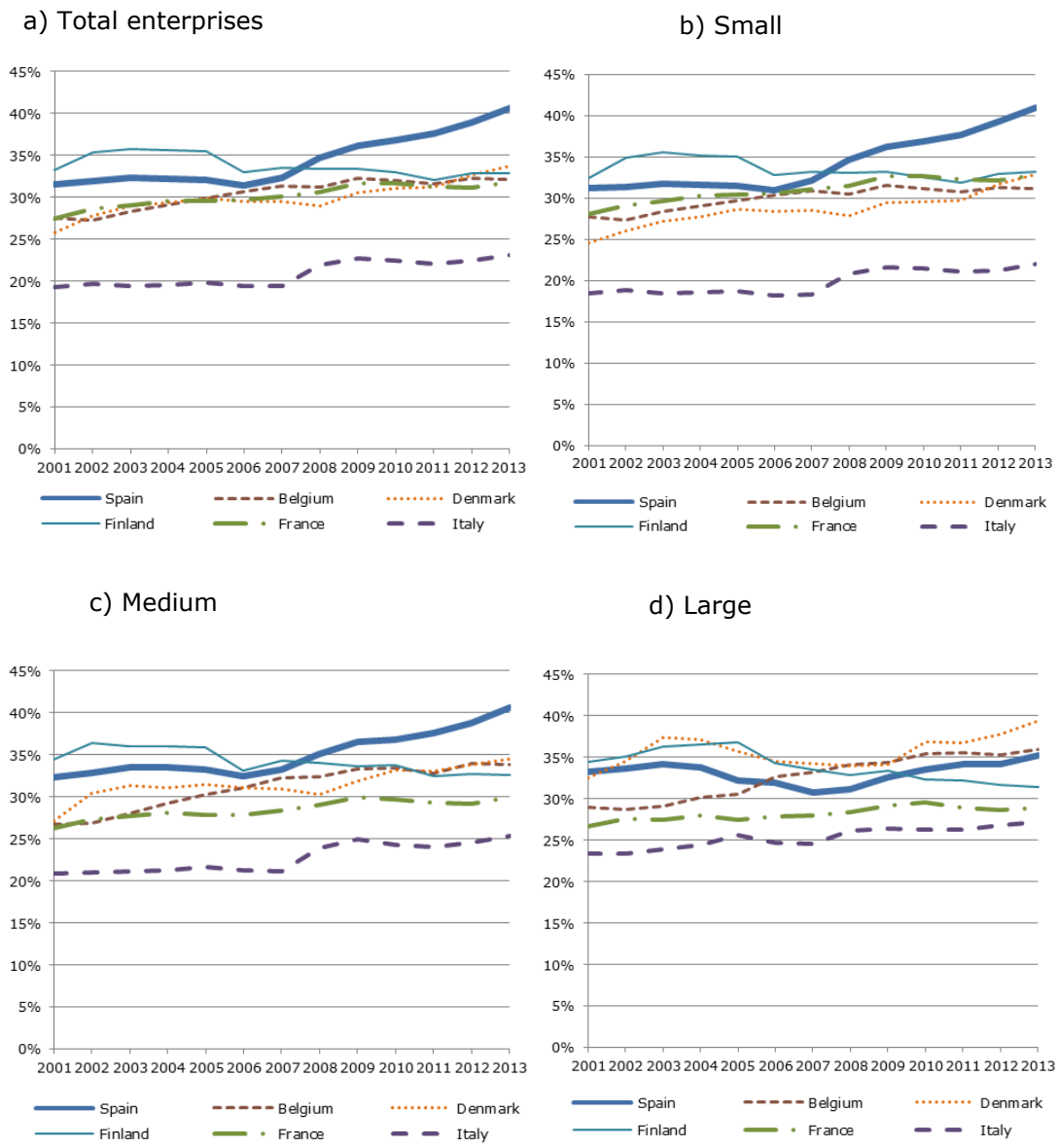
The interest payment burden ratio of Spanish firms confirms that the problems facing Spanish firms are due not only to excessive debt but also to difficulties in obtaining returns from their activities for meeting their financial obligations (Figure 3.7). This indicator is defined as the ratio between financial expenses and profits (plus financial revenues). Higher values indicate that interest expenses are not covered by the profits and financial revenues obtained by the firms. Spanish firms as a whole, regardless of size class, have higher interest payment burden values compared to other countries. Spain is only surpassed by Italy. Since 2008, when the interest payment burden peaked after three years of growth, the ratio had fallen, indicating an overall improvement in the financial situation of firms. Again, higher values of the interest payment burden are observed in small and medium-sized firms, whereas large firms are better off. In fact, in 2013, the ratio was 26% higher in small Spanish firms and 13% in medium-sized firms in comparison with large firms[25].

Interestingly, in the years prior to the crisis, Spain experienced strong economic growth based on the accumulation of inputs, labour and capital, with a nil or even a negative contribution of productivity. At the same time, corporate sector debt increased. Therefore, one hypothesis postulates that a misallocation of capital towards less productive industries or firms resulting from the increased debt in the corporate sector plays a central role in the sluggish growth in TFP (total-factor productivity). At the macroeconomic level, evidence of this misallocation effect can be found in Mas et al. (2015 and 2017), Pérez and Benages (2017) and Serrano et al. (2017). From a microeconomic perspective, García-Santana et al. (2016) analyse the misallocation of resources in Spain between 1995 and 2007 without finding a strong correlation between industry misallocation and financial dependence. Gopinath et al. (2017) show that in the Southern European countries, including Spain, the low interest rates before the crisis misallocated capital towards firms

[25] These results are in line with the evidence provided by Maudos (2018), who analyses the trend of the conditions for access to financing for Spanish companies in comparison with those of the euro area. Maudos provides desegregated data by sizes (micro, small, medium and large firms) through the survey of firms on the access to finance of the ECB.

that were not necessarily more productive. The CompNet database includes the average values of some selected financial variables by deciles of productivity. In general, the more productive firms, those in the higher deciles of productivity, have higher profitability (and, therefore, are less prone to be financially vulnerable), lower leverage and higher cash-holdings (i.e., more liquidity) (Figure 3.8). However, the relationship does not appear to be strong and with such incomplete evidence, causality cannot be traced.

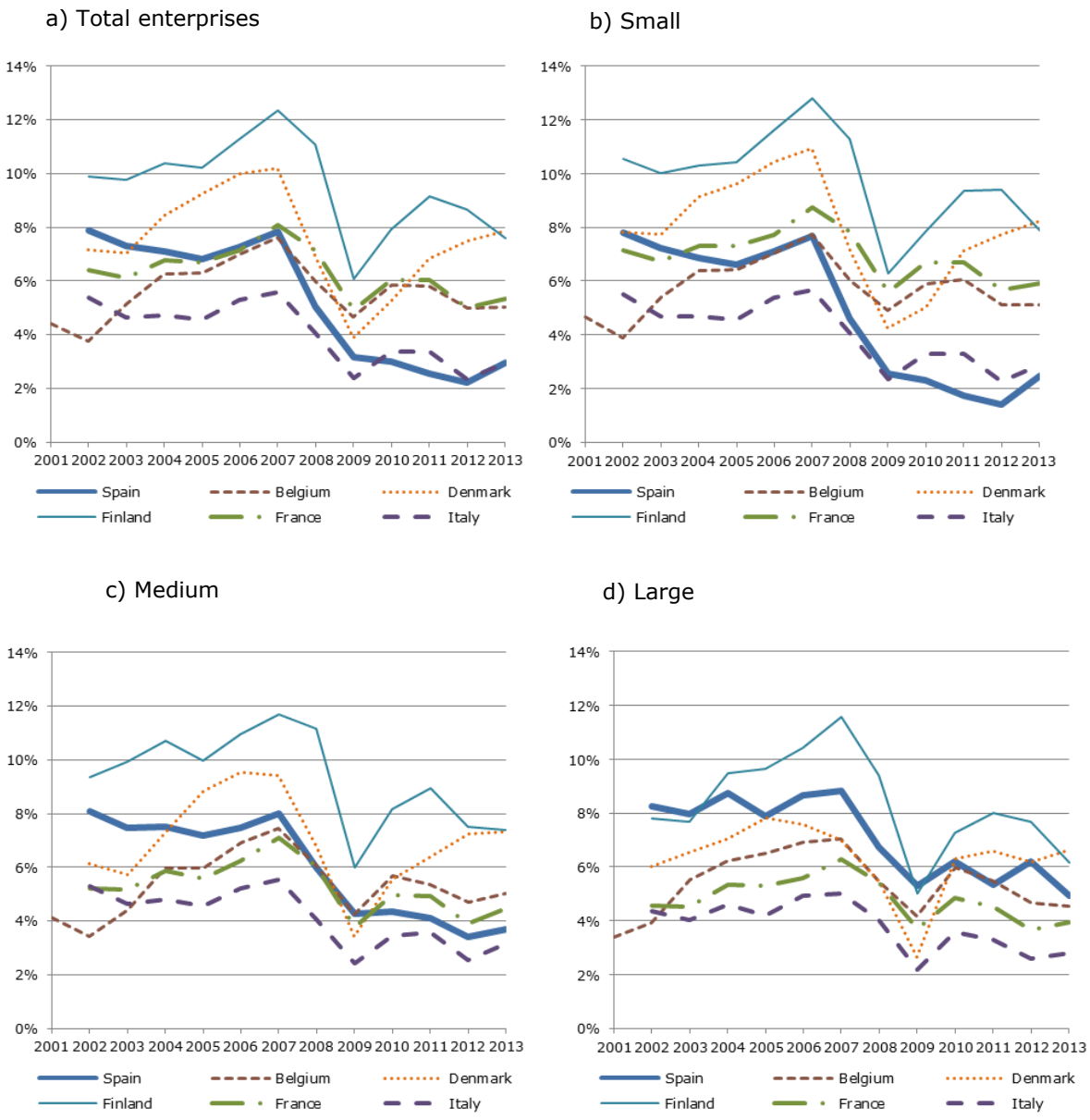
Figure 3.5. Equity ratio (equity or shareholders' funds over total assets). 2001–2013. Percentages



Note: Small (20–49 employees); medium (50–249 employees); large (250 and more employees)

Source: CompNet Database

Figure 3.6. Profitability (Return On Assets). 2001-2013. Percentages

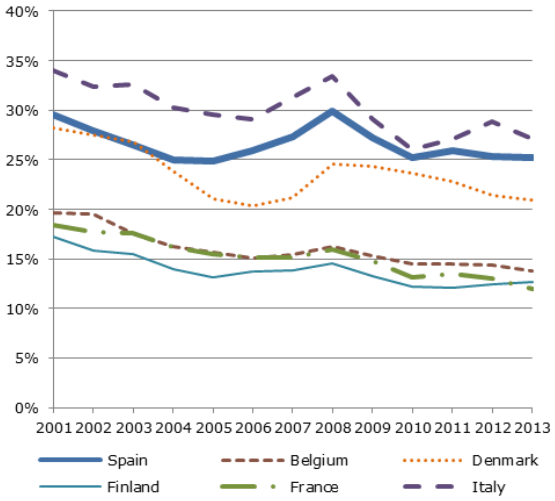


Note: Small (20–49 employees); medium (50–249 employees); large (250 and more employees)

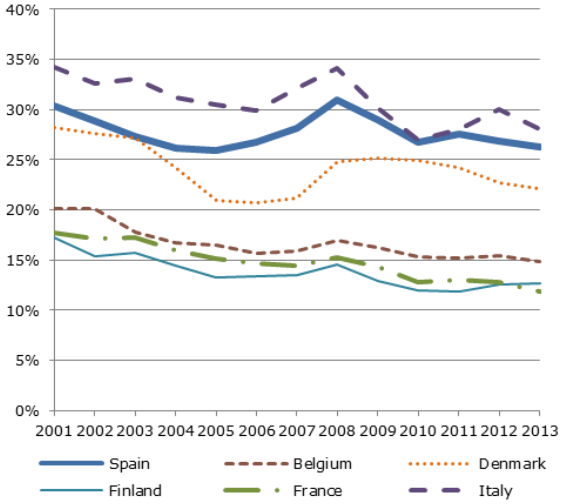
Source: CompNet Database

Figure 3.7. Interest payment burden ratio. 2001–2013. Percentages

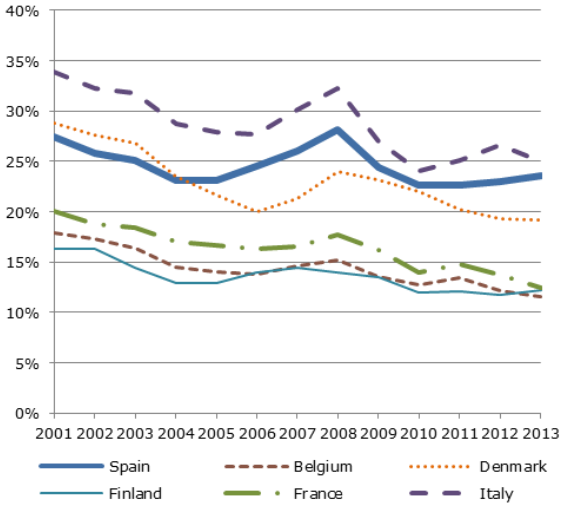
a) Total enterprises



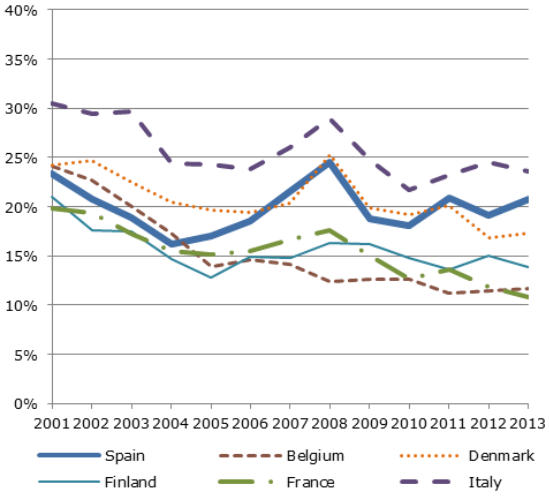
b) Small



c) Medium



d) Large

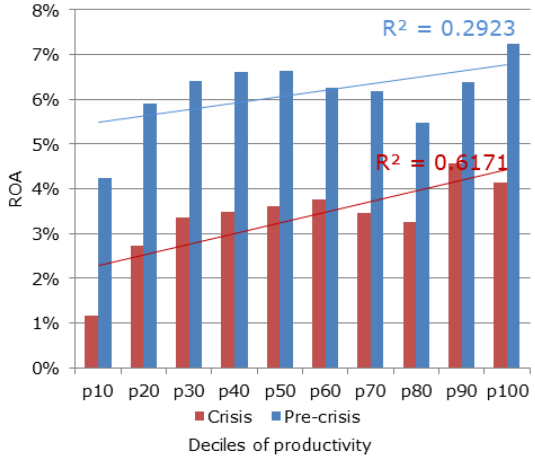


Note: Small (20-49 employees); Medium (50-249 employees); Large (250 and more employees)

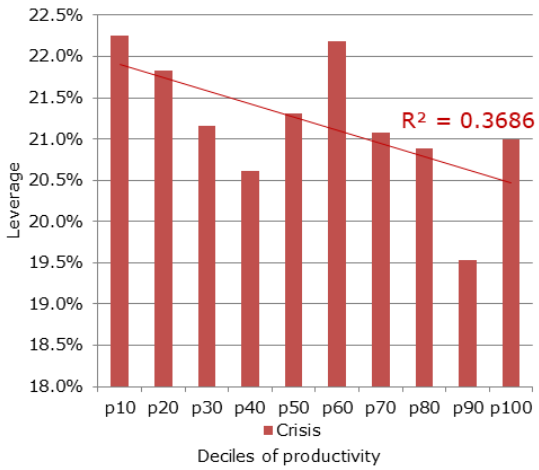
Source: CompNet Database

Figure 3.8. Relationship of profitability, leverage and liquidity with productivity. Crisis and pre-crisis. Percentages

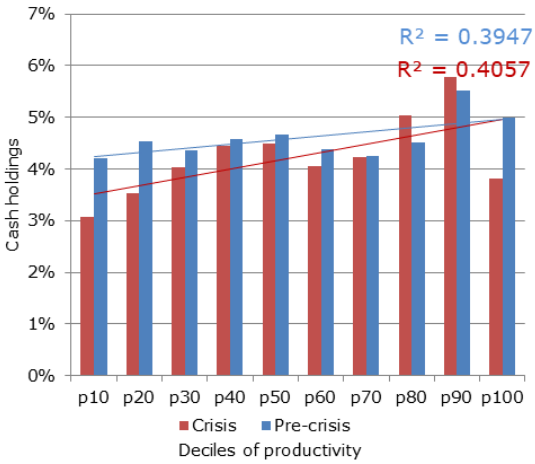
a) ROA (Return On Assets)



b) Leverage (debt over total assets)



c) Cash holdings (cash over total assets)



Note: Pre-crisis and crisis cover period 2001-2007 and 2008-13, respectively.

Source: CompNet Database.

3.3. Mapping the financial strength of Spanish firms

3.3.1. Data and sample coverage

The previous section outlined the aggregated trend in debt, profitability and debt burden of non-financial corporations in Spain in the international context. However, the aggregated values do not allow properly assessing the financial health of firms as the problems may not be located at the centre of the distribution of firms. Fragility might be at the tail end. Therefore, it is necessary to deepen the analysis with a representative sample of Spanish firms. To this end, we use data from SABI (INFORMA), the Spanish partner of ORBIS database (Bureau van Dijk). SABI's data can be traced back to the early 2000s. However, we focus on the period 2008–2015 for two reasons. First, we want to trace the financial vulnerability of Spanish firms in the aftermath of the financial and economic crisis that began that year. Second, from a practical point of view — the information contained in SABI includes a discontinuity in 2008 that prevents calculating the interest-bearing debt consistently for the entire period.

For 2008–2015, SABI includes 5,984,870 observations corresponding to 1,184,916 firms. From the total firms in SABI, we excluded firms that do not satisfy certain criteria. We considered only firms with unconsolidated financial statements and for which NACE (4-digits) activity information is available. We discarded observations that do not correspond to commercial companies or civil law partnerships and the sample firms in NACE Rev. 2 sections K, O, T and U (financial sector, public administration and defence, compulsory social security, activities of households as employers, and activities of extraterritorial organisations and bodies). We considered only private-sector companies, discarding, therefore, public entities. We also excluded firms for which there is not a complete record of the necessary information or that do not satisfy the criteria for the reliability of the information (where total assets are below zero, net profit for the year in the income statement does not coincide with shareholders' funds, etc.). Furthermore, we considered only firms that were in the sample for at least three consecutive years[26]. After we apply these filters, the final sample consists of an unbalanced panel of 4,263,427 observations corresponding to approximately 540,000 firms per year on average. Table 3.1 shows the number of firms, by year and size class in panel a), and by industry in panel b). Microenterprises represent 79% of total observations; small firms, 18%; medium-sized companies, 3%; while the 30,868 observations for large corporations represent 1% of the total. By industry, services, and construction and real estate account for 56% and 27% of the total observations in the sample, respectively. Manufacturing represents 12% and the primary sector and energy 2–3%. In this section, when we refer to construction, we always include real estate, and the services sector excludes real estate activities. Table A.3.1.1 includes the NACE 2 industries included in each of the five sectors.

A key issue in the analysis is whether the sample is representative and valid for analysing the financial vulnerability of firms. Figure 3.9 shows the comparison between Spain's *Central de Balances* (Central Balance Sheet Data Office, Bank of Spain) and SABI regarding four key ratios relevant for the purposes of this section. We include two calculations in the case of SABI. The first one, labelled *Total observations*, corresponds to all the firms in SABI without any filter associated to data quality. The second calculation corresponds to the data effectively used in the report, i.e., after data filtering. The variables selected are: solvency ratio (shareholders' funds/total assets); debt ratio (interest bearing debt/total assets); return on assets (ROA) and the average cost of interest bearing debt (financial costs/interest bearing debt). Overall, these four variables depict a similar picture, particularly for shareholders' funds/total assets and average financial costs. In the case of

[26] Appendix 3.1. describes the selection criteria for the sample.

interest-bearing debt ratio and profitability, although the time profile is similar, the indicators based on the SABI figures are somewhat higher than for the *Central de Balances*. Therefore, our sample reproduces the evolution of the main aggregates of the key variables and is compatible in general with the aggregate results of other microeconomic databases available for Spain, such as those from the *Central de Balances* of the Bank of Spain.

Although the sample offers a wide coverage of Spanish firms, there are some caveats. First, SABI, like Bureau van Dijk's ORBIS, underestimates the proportion of small firms (Kalemli-Ozcan et al. 2015; and Gal 2013). Additionally, the number of firms is not fixed over time. Therefore, the sample varies from year to year due to sample coverage, entry and firm churn. The main problem with SABI, and with other microeconomic databases, is that we cannot distinguish between firms that exit the sample because they really exit the market from those that are just not covered by the database. Both cases introduce a selection bias in the sample as distressed firms may be underestimated. Therefore, the calculations of employment, debt and firms at risk may be biased. These figures have to be interpreted as the lower bound of the actual level of firm fragility.

Table 3.1. Sample. Number of observations. 2008–2015

a) By size classes

	2008	2009	2010	2011	2012	2013	2014	2015	Total	% Total
Micro	380,323	415,450	423,892	426,887	444,083	451,306	423,291	382,760	**3,347,992**	**78.53**
Small	106,587	101,681	97,453	93,356	91,190	89,199	87,806	85,179	**752,451**	**17.65**
Medium	17,482	17,090	16,784	16,350	16,313	16,184	16,120	15,793	**132,116**	**3.10**
Large	3,871	3,964	3,952	3,892	3,860	3,772	3,802	3,755	**30,868**	**0.72**
Total	**508,263**	**538,185**	**542,081**	**540,485**	**555,446**	**560,461**	**531,019**	**487,487**	**4,263,427**	

b) By industries

	2008	2009	2010	2011	2012	2013	2014	2015	Total	% Total
Primary sector	13,159	14,289	14,811	15,824	16,655	17,409	16,669	15,612	**124,428**	**2.92**
Energy	8,421	9,660	10,663	11,132	12,065	12,583	12,161	11,110	**87,795**	**2.06**
Manufacturing	62,292	64,390	63,942	62,663	64,844	64,487	61,727	57,740	**502,085**	**11.78**
Construction	152,087	156,985	153,559	148,069	145,490	144,559	135,550	122,279	**1,158,578**	**27.17**
Services	272,304	292,861	299,106	302,797	316,392	321,423	304,912	280,746	**2,390,541**	**56.07**
Total	**508,263**	**538,185**	**542,081**	**540,485**	**555,446**	**560,461**	**531,019**	**487,487**	**4,263,427**	

Table 3.1. Sample. Number of observations. 2008–2015

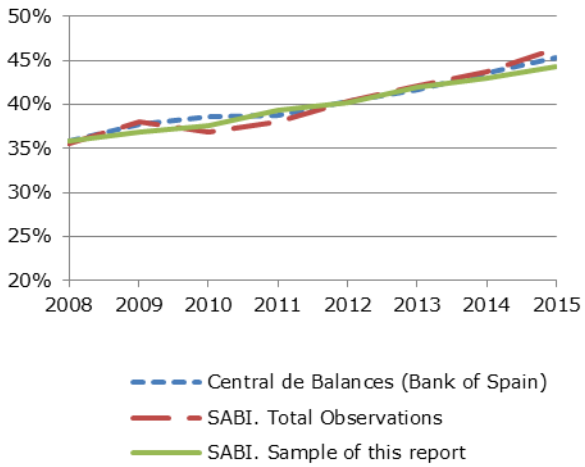
		2008	2009	2010	2011	2012	2013	2014	2015	Total	% Total
Agriculture, forestry and fishing	A	13,159	14,289	14,811	15,824	16,655	17,409	16,669	15,612	**124,428**	**2.92**
Mining and quarrying	B	1,695	1,730	1,719	1,657	1,610	1,539	1,442	1,344	**12,736**	**0.30**
Food products, beverages and tobacco	C10_C12	9,643	10,185	10,422	10,492	11,035	11,130	10,771	10,079	**83,757**	**1.96**
Textiles, wearing apparel, leather and related prodcuts	C13_C15	5,609	5,669	5,530	5,374	5,476	5,465	5,227	4,853	**43,203**	**1.01**
Wood and paper products; printing and reproduction of recorded media	C16_C18	8,940	9,152	8,982	8,752	9,045	8,836	8,374	7,860	**69,941**	**1.64**
Coke and refined petroleum products	C19	26	28	26	26	16	15	13	14	**164**	**0.00**
Chemicals and chemical products excl. pharmaceuticals	C20	1,939	2,022	2,040	2,037	2,227	2,272	2,193	2,060	**16,790**	**0.39**
Basic pharmaceutical products and pharmaceutical preparations	C21	275	296	291	295	307	306	292	270	**2,332**	**0.05**
Rubber and plastics products, and other non-metallic mineral products	C22_C23	6,273	6,447	6,346	6,155	6,289	6,232	5,951	5,555	**49,248**	**1.16**
Basic metals and fabricated metal products, except machinery and equipment	C24_C25	13,343	13,828	13,623	13,004	13,185	13,009	12,447	11,735	**104,174**	**2.44**
Computer, electronic and optical products	C26	864	937	945	957	960	961	960	895	**7,479**	**0.18**
Electrical equipment	C27	1,180	1,209	1,211	1,183	1,214	1,230	1,146	1,040	**9,413**	**0.22**
Machinery and equipment n.e.c.	C28	3,578	3,687	3,695	3,713	3,914	3,887	3,779	3,555	**29,808**	**0.70**
Transport equipment	C29_C30	1,349	1,406	1,398	1,390	1,461	1,442	1,408	1,319	**11,173**	**0.26**
Other manufacturing; repair and installation of machinery and equipment	C31_C33	9,273	9,524	9,433	9,285	9,715	9,702	9,166	8,505	**74,603**	**1.75**
Electricity, gas, steam and air conditioning supply	D	5,144	6,256	7,228	7,691	8,524	9,074	8,848	8,039	**60,804**	**1.43**
Water supply; sewerage, waste management and remediation activities	E	1,582	1,674	1,716	1,784	1,931	1,970	1,871	1,727	**14,255**	**0.33**
Construction	F	102,006	103,156	99,513	94,505	91,096	88,174	81,685	72,991	**733,126**	**17.20**
Wholesale and retail trade and repair of motor vehicles and motorcycles	G45	16,990	17,739	18,043	17,999	18,960	18,853	18,026	16,679	**143,289**	**3.36**
Wholesale trade, except of motor vehicles and motorcycles	G46	55,693	58,997	60,070	60,203	63,606	64,661	61,919	57,485	**482,634**	**11.32**
Retail trade, except of motor vehicles and motorcycles	G47	47,416	49,818	50,393	50,155	51,564	51,343	48,138	44,227	**393,054**	**9.22**
Transport and storage	H49_H52	17,974	19,080	19,646	19,800	20,800	21,349	20,424	19,117	**158,190**	**3.71**
Postal and courier activities	H53	500	540	558	570	585	611	577	538	**4,479**	**0.11**
Accommodation and food service activities	I	28,016	29,931	30,525	30,745	32,171	32,496	30,350	27,548	**241,782**	**5.67**
Publishing, audiovisual and broadcasting activities	J58_J60	4,776	5,064	5,026	4,938	4,912	4,879	4,535	4,111	**38,241**	**0.90**
Telecommunications	J61	1,163	1,254	1,317	1,359	1,397	1,457	1,347	1,218	**10,512**	**0.25**
IT and other information services	J62_J63	6,724	7,511	7,779	8,242	8,711	9,150	8,641	7,928	**64,686**	**1.52**
Real estate activities	L	50,081	53,829	54,046	53,564	54,394	56,385	53,865	49,288	**425,452**	**9.98**
Professional, scientific, technical, administrative and support service activities	M_N	64,020	70,179	71,513	73,110	75,285	76,862	73,384	67,522	**571,875**	**13.41**
Education	P	5,126	6,159	6,465	6,823	7,507	7,879	7,501	6,819	**54,279**	**1.27**
Health and social work	Q	8,965	10,262	10,981	11,589	12,873	13,450	12,962	12,015	**93,097**	**2.18**
Arts, entertainment and recreation	R	7,461	8,210	8,413	8,662	9,074	9,436	8,852	8,068	**68,176**	**1.60**
Other service activities	S	7,480	8,117	8,377	8,602	8,947	8,997	8,256	7,471	**66,247**	**1.55**
Total		**508,263**	**538,185**	**542,081**	**540,485**	**555,446**	**560,461**	**531,019**	**487,487**	**4,263,427**	

Note: Construction includes real estate activities. Services excludes real estate activities.

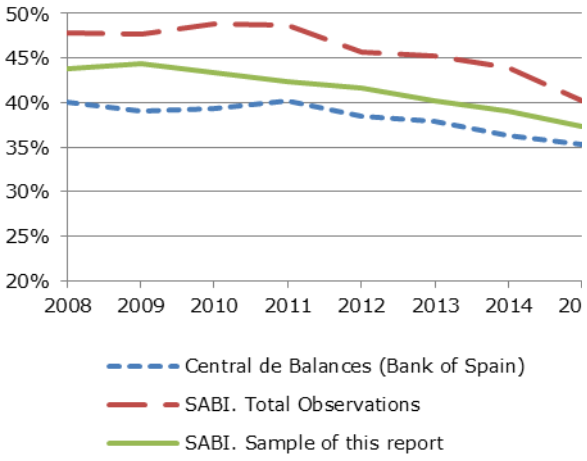
Source: SABI (Bureau Van Dijk) and own elaboration

Figure 3.9. Comparison of SABI and Central de Balances (Bank of Spain) databases. Percentages

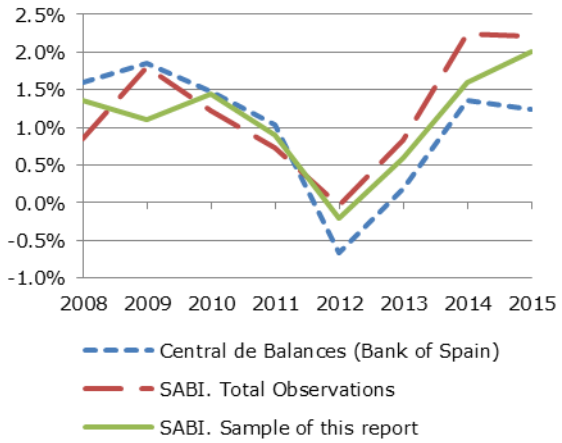
a) Shareholders funds / Total assets



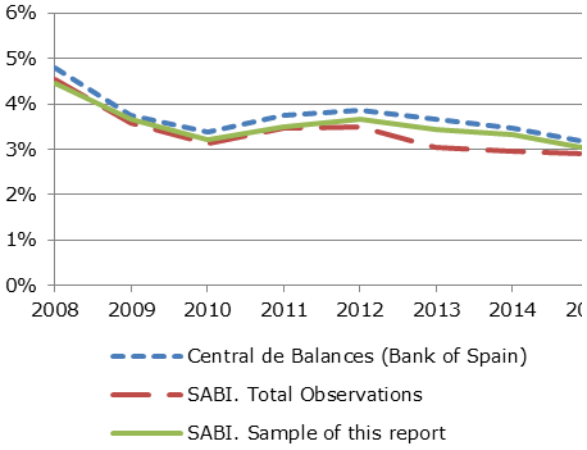
b) Interest bearing debt / Total assets



c) Return on Assets (ROA)



d) Average costs of interest bearing debt



Note: Total observations in SABI correspond to the whole sample available in SABI. The 'Sample of this report' series is the result of the applying the filters described in Section 3.3.1 to the 'SABI. Total Observations' data.

Source: SABI and Bank of Spain database

3.3.2. Financial situation of Spanish firms

Before quantifying the fragility of the Spanish non-financial corporate sector in the next section, we describe the financial situation of non-financial corporations by using indicators of four broad areas — liquidity, indebtedness, profitability and debt burden — as the key elements for measuring a firm's health. Appendix 3.2 provides the same information for a broader set of indicators for each dimension. The analysis is carried out by size class[27] and by industry (primary sector, construction and real estate, energy, manufacturing, and services).

Liquidity

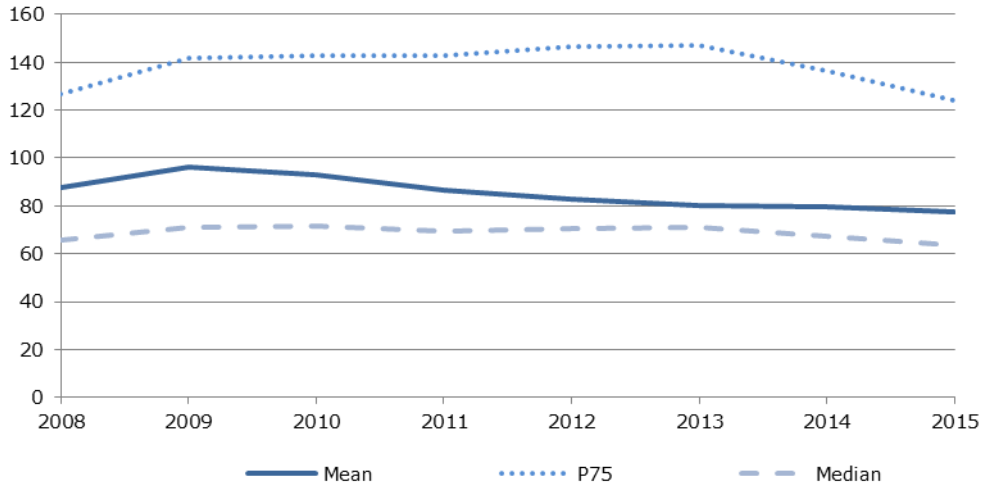
The first dimension is the liquidity of the firm, broadly defined as a firm's ability to pay short-term liabilities with its liquid assets. Figure 3.10 shows the credit period, which is defined as the ratio of creditors (trade credit)/operating revenue * 360, i.e., the number of days necessary to pay the trade credit with the current operating revenue. Both the aggregated value (weighted average) and the median show that in the first years of the crisis, up to 2010, the credit period increased. Since then, there has been a reduction: 17% for the aggregated ratio and 11% for the median. More noteworthy than this expected cyclical pattern of firms delaying payments during hard times and getting back on track when the economy recovers is the average and median levels of the ratio. The aggregated credit period (weighted average) was 77.3 days in 2015, which is 29% higher than the upper limit established in the Spanish legislation on late payments by public entities and businesses (60 days).[28] However, the median value is 64 days, which is close to the legal limit. The data also shows that a significant proportion of firms have liquidity problems that force them to delay payments. The credit period for firms in the 75th percentile was almost twice the median value (1.95 times higher), reaching 124 days. During the crisis, the credit period for the top 25% of firms reached 147 days in 2013.

Figure 3.11 shows the average (weighted), median and the 75th percentile of the credit period by sector and by industry. In terms of size, the biggest liquidity problems were faced by microenterprises, as they systematically had higher credit periods. In 2015, the average credit period of microenterprises was 104 days, higher than the 75, 70 or 76 days for the small, medium and large firms, respectively. In terms of the median values, the credit period was close to 60 days, even in microenterprises (65 days). The difference between the aggregated value and the median indicates that the disparity across firm size is significant. Indeed, the credit period for the 75th percentile was 140 days in 2015 for microenterprises, the size class that had the most severe liquidity problems. In small, medium and large firms, the 25th percentile in 2015 ranged between 87 (large firms) and 93 (small firms) days.

[27] Four size classes are defined following the European Commission Recommendation (2003/361/CE): 1) microenterprises: an enterprise that employs fewer than 10 persons and whose annual turnover and/or annual balance sheet total does not exceed EUR 2 million; 2) small enterprises: defined as an enterprise that employs fewer than 50 persons and whose annual turnover and/or annual balance sheet total does not exceed EUR 10 million; 3) medium-sized enterprises: enterprises that employ fewer than 250 employees and have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million; and 4) large firms: those that do not fulfil the criteria for the other groups.

[28] Spanish Law 15/2010, of July 5, amending Law 3/2004, of December 29, establishing measures to combat late payment in commercial operations.

Figure 3.10. Credit period (Creditors / Operating revenue*360). Total economy. 2008–2015. Number of days

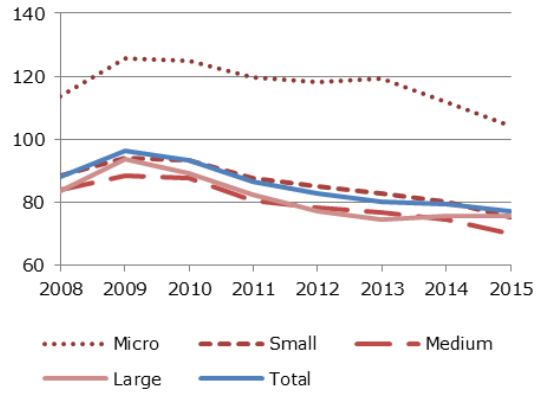


Source: SABI (Bureau Van Dijk) and own elaboration

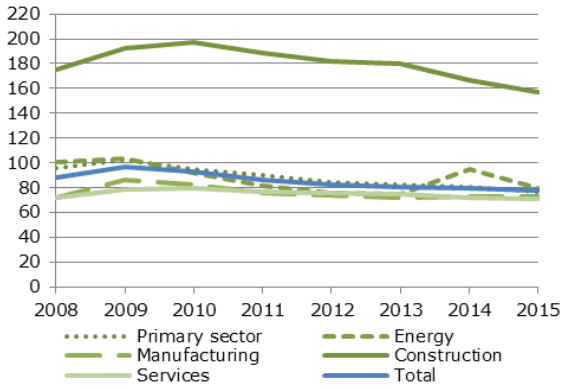
By industry, we find liquidity problems mostly in the construction sector, where the aggregated credit period reached 197 days in 2010 and dropped to a still high 157 days in 2015. The other industries (primary sector, energy, manufacturing and services) show similar values between 71–79 days. The median values of the other industries are close to 60 days. The credit period of firms with higher liquidity difficulties reached 175 days in the construction industry. There are also high values in the primary sector (138 days), manufacturing (126 days), services (113 days) and, to a lesser extent, in the energy sector (97 days).

Figure 3.11. Credit period (Creditors / Operating revenue *360) by size classes and industries. Number of days

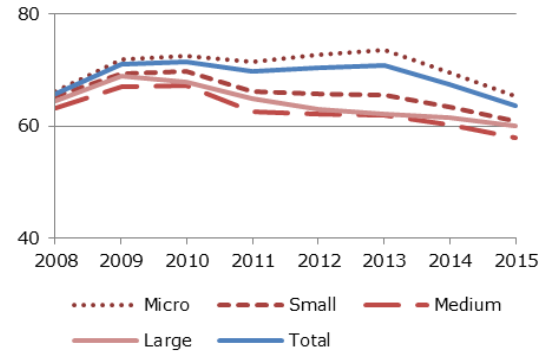
a) Weighted average by size



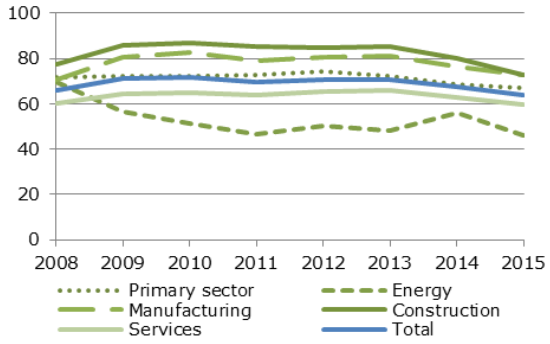
b) Weighted average by sector



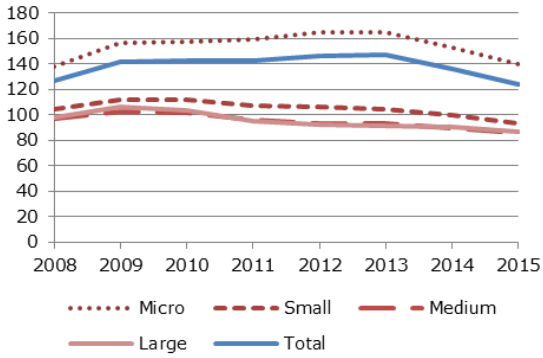
c) Median by size



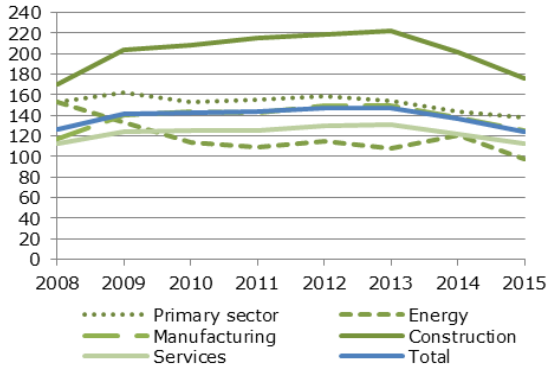
d) Median by sector



e) Percentile 75 by size



f) Percentile 75 by sector



Note: Construction includes real estate activities. Services excludes real estate activities.

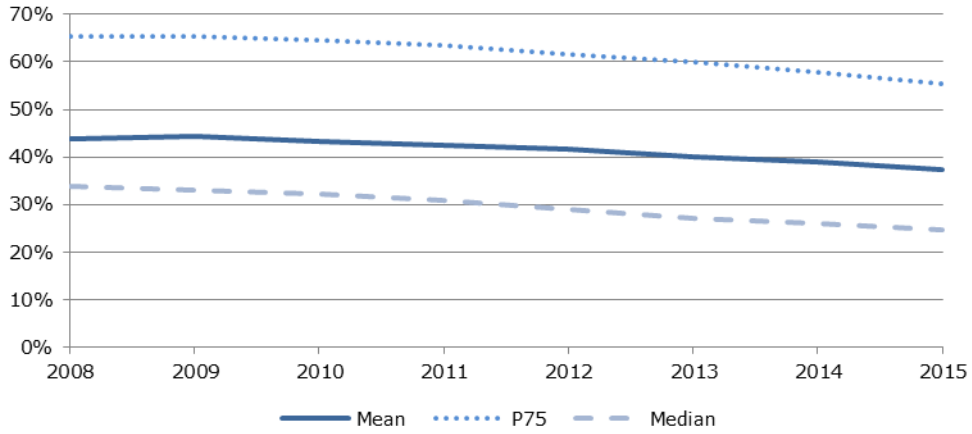
Source: SABI (Bureau Van Dijk) and own elaboration

Indebtedness

We define indebtedness as the ratio of interest bearing debt to total assets. Therefore, we exclude trade credit as the indicator of indebtedness. This is because trade credit does not have explicit costs and is arranged with suppliers; not in the financial markets. In the previous section, we showed that in the years prior to the financial crisis, the level of debt of Spain's corporate sector shot up. Although in terms of debt-to-GDP ratio it continued to grow until 2012, in terms of stocks of debt to equity or to total assets, the deleveraging began in 2008.

Figure 3.12 shows the change in the aggregated (weighted average) level, the median and the 75th percentile of the ratio debt-to-total assets. The figure shows that leverage dropped in Spanish firms by 15% (-2.2% annual rate) and 27% (-4.5% annual rate) in average and median terms, respectively. In 2015, the debt-to-assets ratio of Spanish firms was 37%, where a representative firm's indebtedness ratio was 25%, i.e., more than 12 percentage points lower than the aggregated value. This difference, both in terms of levels and the trend, between the mean and the median, indicates that highly indebted firms account for a large amount of the outstanding debt, and that the deleveraging of these firms has been slower than for the other firms. From 2008 to 2010, 25% of the sample had a debt-to-assets ratio above 65%. Since then, debt levels dropped to 55% at the 75th percentile in 2015. This means that the overall reduction in the debt ratio of the more heavily indebted firms was 15% (2.3% annually), similar to the full sample of firms. The concentration of debt in a small proportion of firms is reflected by the fact that 25% of firms with higher debt accounted for 96.5% of the total debt of the corporate sector on average over the 2008–2015 period.

Figure 3.12. Debt ratio (Interest bearing debt / Total assets). Total economy. 2008–2015. Percentages

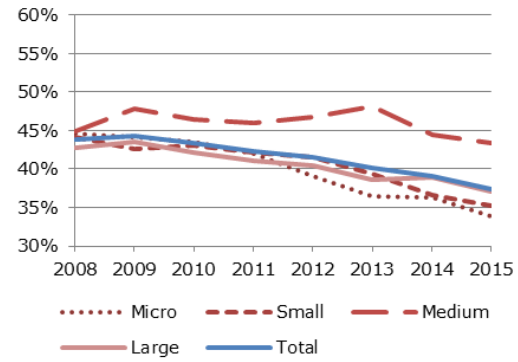


Source: SABI (Bureau Van Dijk) and own elaboration

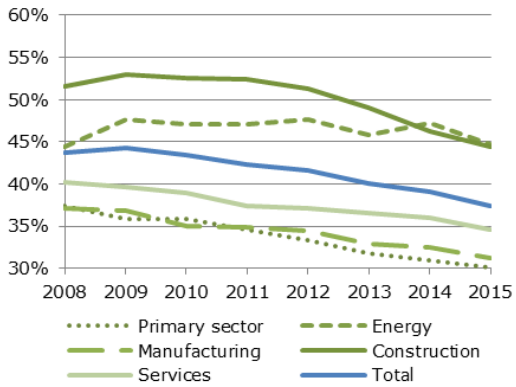
Both the mean and the median values are similar across size classes except in the medium-sized firms, for which average debt ratios (43% in 2015) is slightly higher in comparison with the overall sample (37%) (Figure 3.13). The median value of the medium-sized firms is similar to the other categories, approximately 25%. In all cases, the debt of all firm size classes has dropped since 2008. The debt ratio of 25% (75th percentile) of the microenterprise firms is higher than 59%. In the other size classes, the value at the 75th percentile is smaller, 44% approximately. Therefore, for a considerable percentage of firms, particularly microenterprises, debt levels are high.

Figure 3.13. Debt ratio (Interest bearing debt / Total assets) by size classes and industries. 2008–2015. Percentages

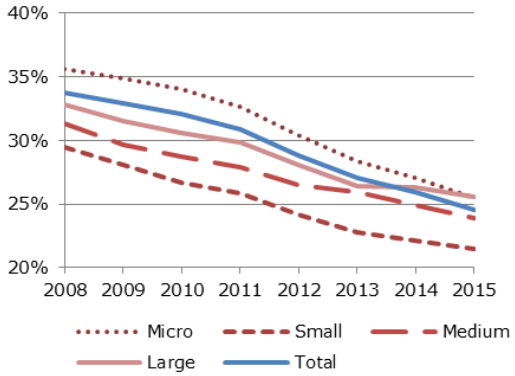
a) Weighted average by size



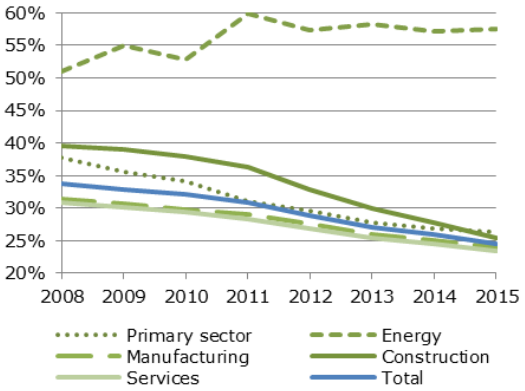
b) Weighted average by sector



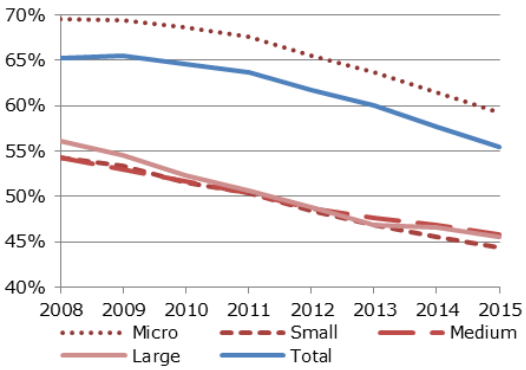
c) Median by size



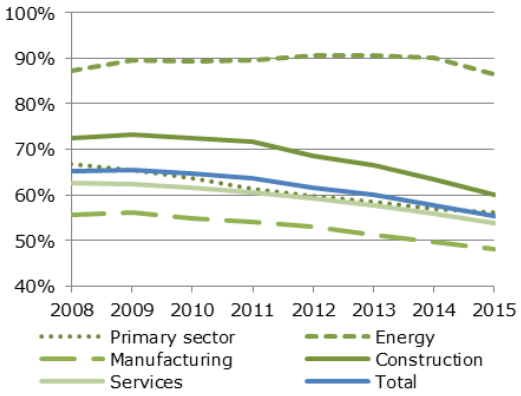
d) Median by sector



e) Percentile 75 by size



f) Percentile 75 by sector



Note: Construction includes real estate activities. Services excludes real estate activities.

Source: SABI (Bureau Van Dijk) and own elaboration

In all industries, the average debt ratio has dropped since 2008, by between 14% and 20%, except in the energy industry, where it has remained constant (Figure 3.13). The highest debt ratios were observed in 2015 in construction and real estate (44%) and energy. The primary sector and manufacturing have lower debt values, around 30–31%, i.e., 14 percentage points lower than the most indebted sector. The service sector is in the middle. The ranking of industries was stable across the seven years analysed. Except for the energy sector, there are small differences across industries in the median values (23–26%) of the debt ratio in 2015, and they all dropped over the period. In contrast, the indebtedness of the representative firm in the energy sector increased and was at an extremely high level (58% in 2015). The fact that the median value is higher than the weighted average indicates that the debt ratio of small firms in the energy sector is higher in comparison with large firms. 25% of firms in the energy industry have debt ratios that remained stable, above 87%. In construction and real estate, 25% of the more indebted firms had ratios above 60% in 2015, having reduced their indebtedness by 17% since 2008. In the primary sector and services, the 75th percentile of the debt ratios in 2015 is around 54–56%, whereas manufacturing is the industry with lowest value at the 75th percentile (48%).

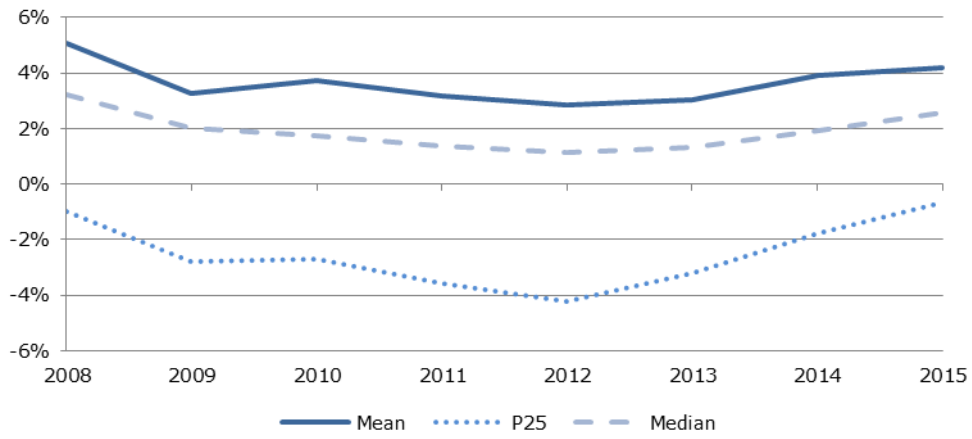
Profitability

The third dimension we analyse after liquidity and financial structure is profitability. Ultimately, the financial health of firms depends on their capacity to obtain resources from their activities. Profitability is measured as the return on assets (ROA), defined as operating income — including other operating income — plus financial income as a proportion of average total assets. This indicator allows comparing profitability across industries with different financial structures as it does not account for the financial costs associated to the differences in the external financing, and because the denominator is the average total assets, not equity. Additionally, we include financial revenue in the definition of profits as it contributes to the generation of the resources of firms.

ROA average values follow the expected cyclical pattern: a fall in profitability up to 2012, when ROA was 2.9%, from the 5.0% of 2008; and a recovery since then (Figure 3.14). In 2015, the aggregated return on assets obtained by Spanish firms from their assets was 4.2%, still below the 2008 levels. Therefore, for the last two years in the sample, profitability recovered part of the ground lost during the crisis. When analysing the profitability of a representative firm in Spain, we found that the median was systematically lower than the average, which implies that large firms also enjoy higher returns than small firms. In fact, the ROA of the median firm in the sample was 39% lower compared to the average in 2015. This difference was even higher during the crisis, reaching 60% in 2012.

Both in terms of aggregated profitability (aggregated average) and the median value, a direct relationship with size is observed (Figure 3.15). Large firms had much higher profitability, around 5%, than the other firms and were more resilient during the crisis. Medium-sized and small enterprises had lower profitability, although the former had higher values than the latter, particularly for the median values. Profitability levels of medium-sized enterprises converged with those of large companies in 2015. Small firms, despite the recovery in profitability, lagged behind. Microenterprises systematically showed reduced profitability, around 1.4% on average in 2008–2015, and between 1–2% compared to the median for most of the period.

Figure 3.14. Return on assets, ROA ((EBIT+Interest income) /Average Total assets). Total economy. 2008–2015. Percentages



Source: SABI (Bureau Van Dijk) and own elaboration

Construction and real estate are by far the industries with the lowest profitability (Figure 3.15), below 2%, both for median and average values during the 2008–2015 period. Aggregated and median profitability in this industry decreased up to 2012–2013, even dipping into negative values. After that, profitability increased, reaching 1.8% in 2015, although this was still below the initial value (3.4%). ROA in the other four industries was higher in general. The same cyclical pattern is observed in the other industries, with a strong recovery after 2013. The energy industry had the most volatile ROA. Manufacturing and services had an aggregated (median) profitability of 5.7% (3.2%) and 4.8% (3.1%) in 2015.

Particularly relevant for the financial health of firms is the lower tail of the distribution of firms. The profitability of 25% of Spanish firms (those below the 25th percentile) in 2015 was still negative (-0.7%). This is particularly relevant because the Spanish GDP was growing at an annual rate of 3.4% at that time. However, the situation of fragile firms in terms of profitability has improved. In 2012, 25% of firms had ROA ratios below -4.2%. Since that year, profitability improved in the 25th percentile up to the current levels. The negative aggregated values in the 25th percentile of ROA are driven basically by microenterprises. The 25% of microenterprises with the lowest profitability had a return on assets below -1.3% in 2015. In the other size classes (small, medium and large firms), the profitability in the 25th percentile was positive. In three industries, the profitability of the 25th percentile was negative in 2015: construction and real estate (-0.9%); primary sector (-0.7%); and services (-0.7%).

Three additional issues regarding profitability are worth mentioning. First, the low profitability of a large proportion of Spanish firms is not merely cyclical. According to Table 3.2, the differences in profitability across firms are persistent. More precisely, the table classifies the transition matrices for the quartiles of firms according to their profitability. Two different matrices are calculated. Panel a) shows the percentage distribution of firms for each quartile of productivity in year *t* and the quartile they were in one year later *(t+1)*. Panel b) shows the same information, but calculates the dynamics of profitability between 2008 and 2015, instead of the yearly changes in profitability. The main takeaway is that the relative positions of firms regarding profitability are persistent. 56% of firms in the lower quartile of profitability (quartile 1) remained in that same quartile the following year. The persistence in the other quartiles is similar: over 50% of the firms in each quartile remained in the same relative position one year later. If we look at the transition matrix between 2008 and 2015, the persistence is obviously lower, but still high. 36.9% of the firms in the quartile with the least productive firms in 2008 remained in that quartile seven

years later. Furthermore, given that the first quartile (P25) is always negative during the period, the conclusion is straightforward: fragility in firms owing to low profitability goes beyond any mere transitory issue and is persistent. Second, using data from the AMADEUS database, Menendez, Gorris and Dejuán (2017) show that the profitability and the percentage of firms at risk derived from a low level of profitability in Spain is higher than in what they call the 'central European Monetary Union' (Germany, Austria, Belgium, Finland, France and Netherlands) and similar to the 'non-central European Monetary Union' (Greece, Ireland, Italy and Portugal). Finally, since 2015, Spain's GDP has grown at over 3% and the profitability of Spanish firms has continuously risen. For example, according to the *Central de Balances* (Bank of Spain), in the fourth quarter of 2017, the ordinary return on net assets of Spanish firms was 6.3%, compared to 5.0% in the fourth quarter of 2015.

Table 3.2. Transition matrices of ROA quartiles. Percentages

a) Annual

		t+1			
		Quartile 1	**Quartile 2**	**Quartile 3**	**Quartile 4**
t	**Quartile 1**	56,83	17,63	10,58	14,96
	Quartile 2	20,75	53,29	18,45	7,52
	Quartile 3	12,14	21,77	50,61	15,48
	Quartile 4	12,30	8,96	20,92	57,81

b) 2008–2015

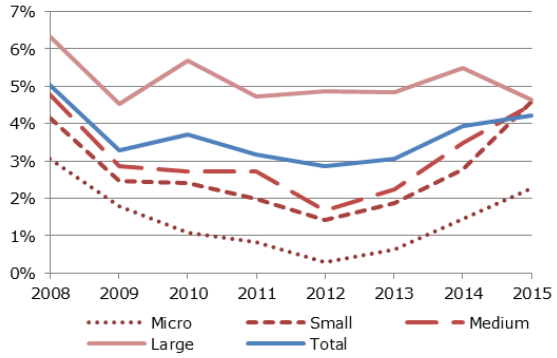
		final t (2015)			
		Quartile 1	**Quartile 2**	**Quartile 3**	**Quartile 4**
initial t (2008)	**Quartile 1**	36,94	22,17	19,38	21,51
	Quartile 2	25,30	39,33	22,53	12,85
	Quartile 3	19,28	29,06	34,07	17,59
	Quartile 4	19,93	19,85	28,55	31,66

Note: Quartiles are ordered from low (quartile 1) to high (quartile 4) profitability (ROA).

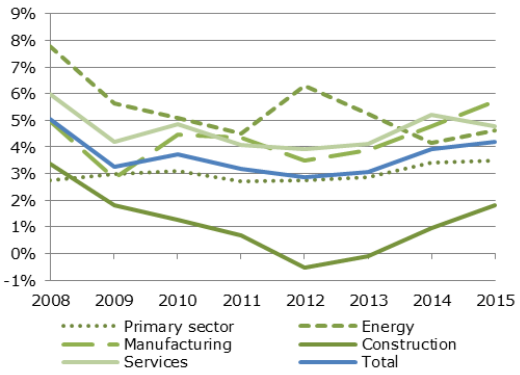
Source: SABI (Bureau Van Dijk) and own elaboration

Figure 3.15. Return on assets, ROA ((EBIT+Interest income) / Average Total assets) by size classes and industries. 2008–2015.Percentages

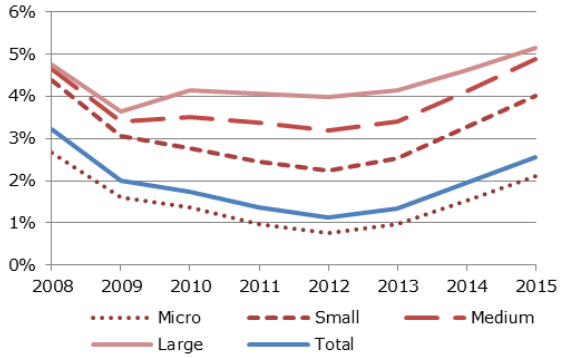
a) Weighted average by size



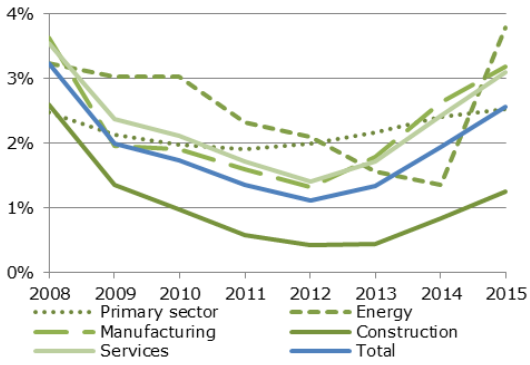
b) Weighted average by sector



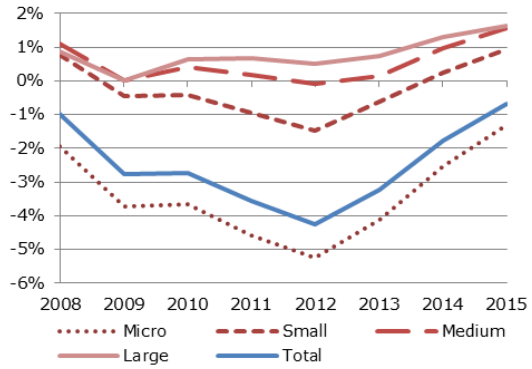
c) Median by size



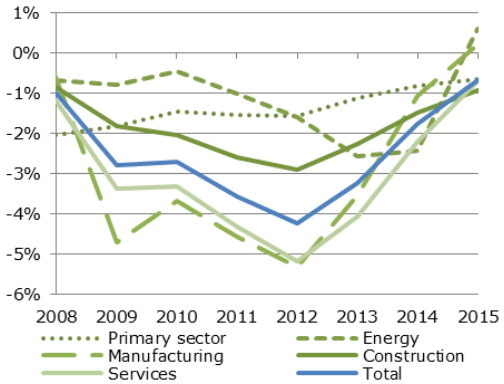
d) Median by sector



e) Percentile 25 by size



f) Percentile 25 by sector



Note: Construction includes real estate activities. Services excludes real estate activities.

Source: SABI (Bureau Van Dijk) and own elaboration

Debt burden

We also examine an indicator of debt burden, the interest coverage ratio (ICR), defined as the ratio of profits (including interest revenues)/interest expenses. The ICR measures to what extent a firm is able to service its debts with current profits. The higher the ratio, the lower the debt burden as firms obtain enough profits to make the interest payments on the debt. Values of less than one indicate that the firm is vulnerable because it is unable to pay back the interest expenses on the debt with the surplus obtained by its normal activity. As an indicator of profits, we use the sum of EBIT (operating income, including other operating income) and financial revenue. Therefore, we measure the long-run vulnerability of the firms as we subtract amortisation from the income flow.[29] Additionally, the ICR has been calculated only for firms with positive interest-bearing debt values.

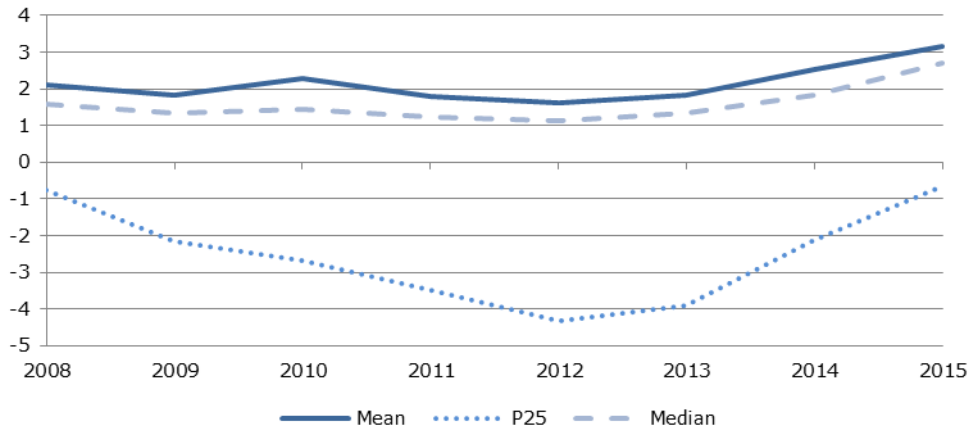
The aggregated and median ICR evolution (Figure 3.16) shows once again the cyclical behaviour already observed in other variables. The aggregated minimum value for the interest coverage ratio value was 1.6 in 2012. The ratio rose after that. In 2015, profits obtained by firms were 3.2 times higher than financial costs. The value for the representative firm in the sample, the median, was lower although similar to the aggregated indicator, both in terms of the trend and the level. The median value in 2015 was 2.70, similar to the value in 2008 of 2.11. Although the central values of the ICR (average or median) are important for the stability of the corporate sector, the lower part of the distribution of firms is also relevant. In 2015, 25% of the Spanish firms showed a negative ratio below -0.65. During the crisis, the situation was even worse as 25% of firms had losses four times higher than their financial costs. Therefore, a significant proportion of Spanish firms were clearly fragile. If instead of the 25th percentile of the distribution we consider only firms with an ICR below 1, the situation is even worse. In 2015, 32% of Spanish firms could have been considered at risk according to this criterion[30]. In 2013, the percentage of firms with an ICR below 1 reached a high of 48%.

There is a clear positive relationship between ICR and size class. Large firms have higher aggregated and median values. In 2015, the aggregated (median) ICR of large firms was 3.5 (5.6), higher than the 2.7 (2.2) of 2008. After 2011, the ICR of large firms increased continually, particularly from 2013. This means that large firms were able to deal with the 2007 crisis thanks to a drop in the financial costs that offset to some extent the loss of profitability. Medium and small firms reported similar ICRs: aggregate values that fell from 1.6–1.9 in 2008 to 0.7 in 2013 and then quickly recovered, reaching, in 2015, an ICR above that of 2008. The same trend over time was seen for microenterprises but at significant lower levels: the average even reached zero in 2012 before rebounding to 2.0 in 2015.

[29] Alternatively, we could have defined the ICR using the EBITDA as an indicator of profits instead of EBIT. The difference between the two indicators is that the former does not subtract the amortisation from the income flow, and therefore, focuses only on the short-term fragility of the firm. In hard times, firms could eventually opt to not amortize their fixed assets to meet financial commitments. Obviously, this strategy is only feasible in the short-run.

[30] This percentage of firms is high in comparison with Menéndez and Mulino (2018). In general, our ICR is lower due to the fact that we include a net-of-amortisations profit indicator, whereas Menéndez and Mulino use a gross indicator. In other words, we focus on the long-term fragility of firms in which we consider that the firm has to write off its capital.

Figure 3.16. Interest Coverage Ratio, ICR ((EBIT+interest income) / Interest expenses). Total economy. 2008–2015

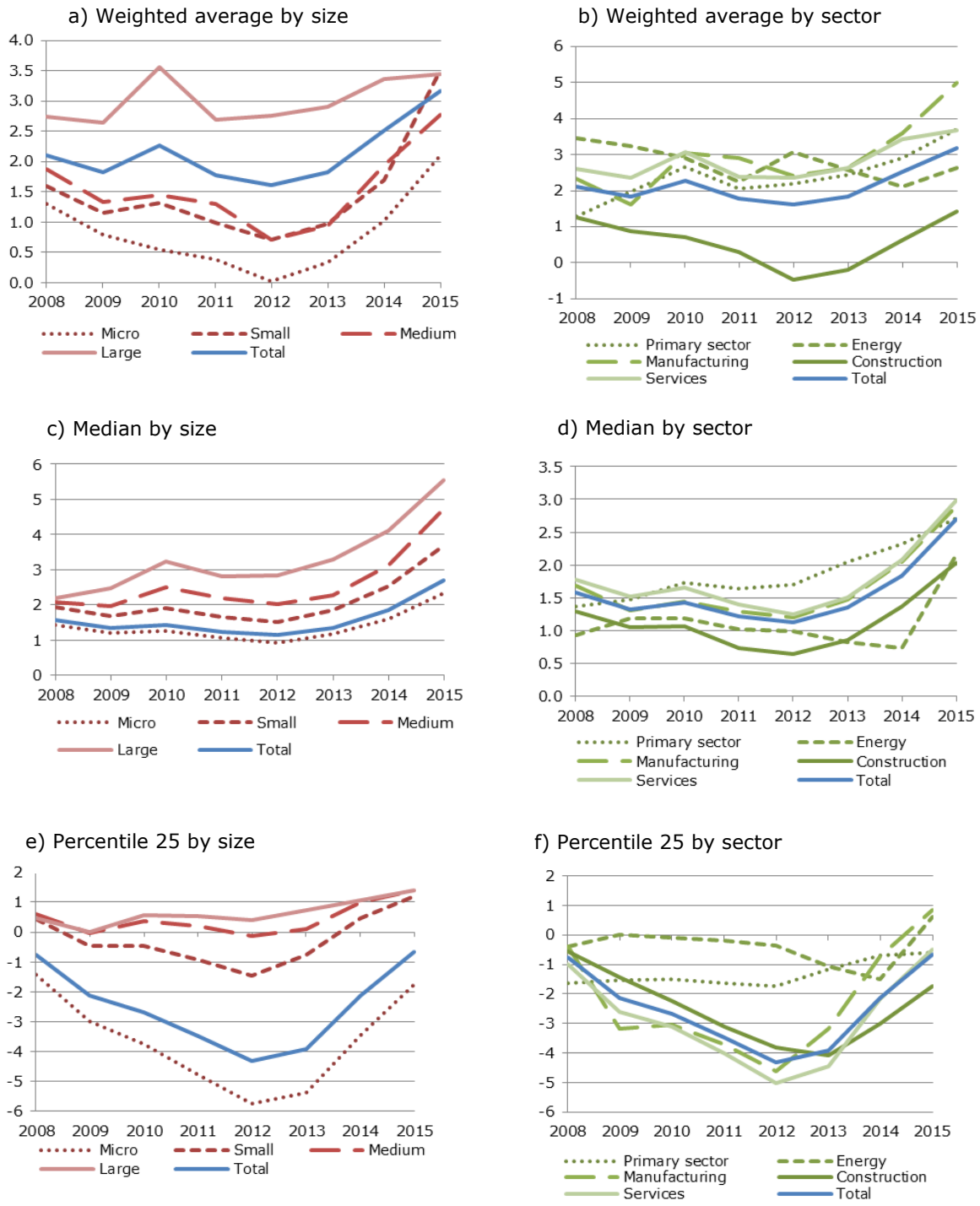


Source: SABI (Bureau Van Dijk) and own elaboration

By industry (Figure 3.17), the ICR of the construction and real estate sector (1.4) was on average 55% lower than the whole economy in 2015. In 2012, however, it was 128% lower. Furthermore, for all years except 2008 and 2015, it was lower than 1, which is the critical value typically used to detect vulnerable firms. In terms of the median, the ICR for the construction industry was on average 71% lower throughout this period with respect to the whole economy. The average ICR of the other industries was higher than in construction and real estate. For example, in terms of the weighted average, the ICR ranged in 2015 between 2.7 in the energy industry to 4.98 in manufacturing. In all these industries, the average and the median (except for the energy industry) were always above 1. When comparing the aggregated indicator and the trend of the representative firm in each industry, the low ICR of the energy industry's median value stands out alongside that of the construction industry. The energy industry also saw the sharpest recovery in the median of all industries in comparison to the weighted average (the aggregated).

Therefore, the ICR shows that, on average (and on median), fragility is higher in the construction and real estate sectors and in microenterprises. However, there is great dispersion in each category, and the situation of the more fragile firms needs to be analysed. When looking at the 25th percentile, we see that during the entire period (except for 2015), in all size classes and in all industries, 25% of firms in each category had an ICR below 1. In other words, they could not cover their financial commitments with current profits. This was more severe for microenterprises, in which the figure at the 25th percentile was almost -6 in 2012 and -1.8 in 2015, in all industries, particularly in construction and real estate, but also in services, manufacturing and energy.

Figure 3.17. Interest coverage ratio, ICR ((EBIT+interest income) / Interest expenses) by size classes and industries. 2008–2015



Note: Construction includes real estate activities. Services excludes real estate activities.

Source: SABI (Bureau Van Dijk) and own elaboration

3.4. Financial vulnerability of Spanish firms

3.4.1. Firms, outstanding debt and employment at risk

The indicators we have looked at up to now have shown that the financial situation of Spanish firms rapidly improved in 2014 and 2015 due to favourable macroeconomic conditions. GDP has been growing at a rate of over 3% since the beginning of 2015. Unemployment has fallen about 10 percentage points from the high of 26% in 2013, and nominal interest rates are at historically low levels, close to zero. Profitability and liquidity have rebounded to the average values of 2008, and the non-financial corporate sector has continued to deleverage, as described in the previous section. However, as we have also shown, despite the trend of the average and the median values, firms are still very vulnerable. There is still a significant percentage of firms with excessive debt. For these firms, the debt burden threatens short-term viability.

The OECD (2017a, 2017b) recently reported that a high number of Spanish firms can be considered 'zombie firms', stressing the implication of this on productivity and capital reallocation. Other previous reports (IMF 2013; Maudos and Fernández de Guevara 2014) warned about the high level of debt at risk in the Spanish economy due to the existence of a high proportion of firms that were weak owing to their financial structure. However, these reports analysed only the crisis period. They did not provide information on the recent recovery of the Spanish economy and the good financial conditions that Spanish firms currently enjoy. Some recent reports (Maudos and Fernández de Guevara 2018; Menéndez and Mulino 2017a and b; and Menéndez, Gorris and Dejuán 2017) show that this picture changed during the recovery period 2014–2015.

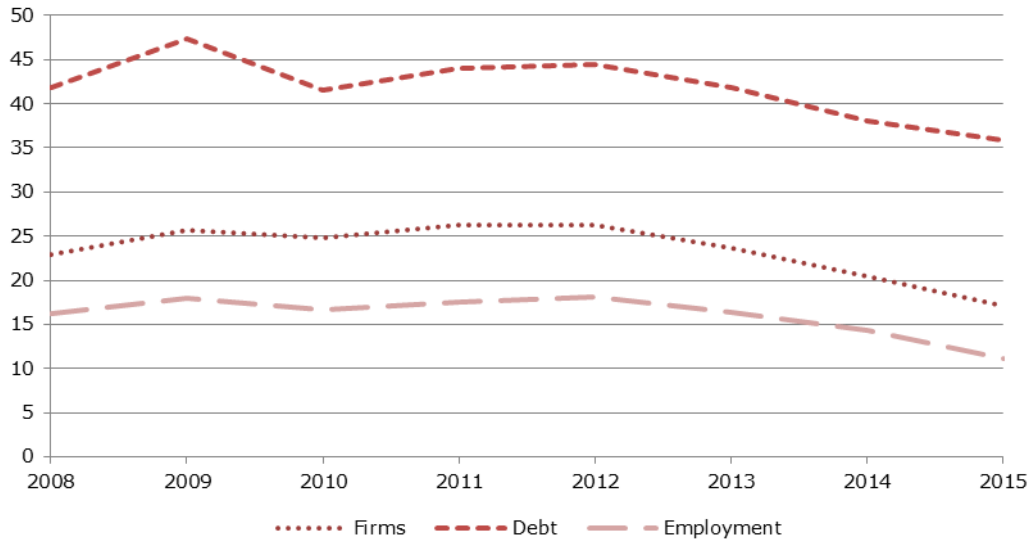
This section examines the financial strength of Spanish firms by calculating the percentage of firms, debt and employment of at risk. The key issue here is how to detect firms at risk due to an inadequate financial structure. Recently, this issue has been examined in different papers that use, in general, similar approaches based on a combination of indicators that include profitability, interest coverage ratio and leverage. For example, Klein (2016) only uses the criterion of an interest coverage ratio below 1. McQuinn and McCann (2017) use a criterion based on the indebtedness of firms, by which they consider a firm fragile if its debt-to-turnover ratio is above 1. De Socio and Michelangeli (2017), in their analysis of Italian firms in 2014 and 2015, and the IMF (2013a, 2013b), define vulnerable firms as having an interest coverage ratio below 1 or negative EBITDA. The Bank of Spain (2017a), in an analysis of Spanish firms between 2007 and 2015, combines three criteria: an interest coverage ratio below 1; two consecutive years with negative profitability and an equity-to-total-debt (including interest bearing debt and excluding trade credit) ratio below 1. The OECD uses the concept of zombie firms (McGowan, Andrews, and Millot 2017a, 2017b), which is also based on the interest coverage ratio. Zombie firms are defined as firms aged 10 years or more with an interest coverage ratio below 1 over three consecutive years. This definition is probably not optimal for measuring the financial challenges of firms in a country as it only focuses on firms older than 10 years. The objective of the OECD's analysis is to test the relationship of non-viable incumbents with productivity. However, the over-ten-years requirement does not seem to serve our purposes.

In this report, we consider three aspects to detect firms at risk. We define a firm as vulnerable when it a) has a debt overhang (interest-bearing debt to total assets is above a given threshold) for which b) the interest coverage ratio is below 1 or its profitability (EBIT + interest revenue) is negative. Industries differ in their external financial dependence due to structural factors such as product maturity periods or capital/labour ratios, for example. Therefore, we allow the debt threshold to differ across industries. More precisely, we classify firms with debt overload as those with interest-bearing debt above the median for the industry (33 industries based on groups of NACE rev. 2 sectors).

Assessing these three aspects allow us to identify the percentage of firms, outstanding debt issued and employment at risk. As in the previous section, the period covered is 2008–2015.

In 2015, 17% of firms, 11% of employment and 36% of debt in Spain were at risk according to the criteria adopted in the paragraph above (Figure 3.18). The fact that the percentage of debt at risk was twice the percentage of firms at risk and three times employment at risk indicates that debt is concentrated among fragile firms, i.e., fragile firms accumulate more debt than would be expected according to their proportion in number or employees. Therefore, particularly in terms of debt, more than a third of total debt and a bit less than a fourth of all firms are at risk despite favourable macroeconomic conditions. It is also true that macroeconomic conditions have sped up the reduction in the indicators. In the last three years, the values have fallen significantly. In 2012, the percentages of firms, debt and employment at risk were 26%, 44% and 18%, respectively. Therefore, there was an over 35% fall for the number of firms and employment and a 19% drop for debt.

Figure 3.18. Percentage of firms, interest bearing debt and employment at risk. Total economy. 2008–2015



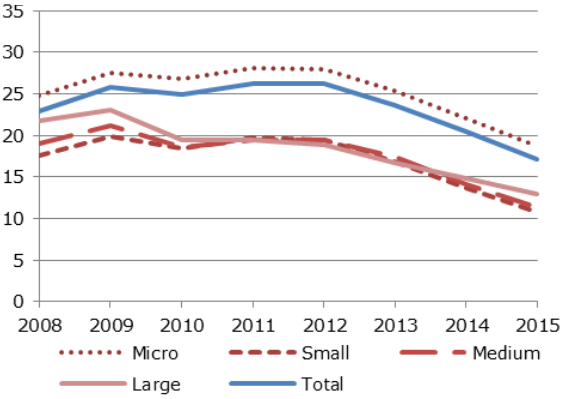
Note: At risk according to the criteria adopted (debt ratio above the median of the industry and ICR below 1 or negative profits).

Source: SABI (Bureau Van Dijk) and own elaboration

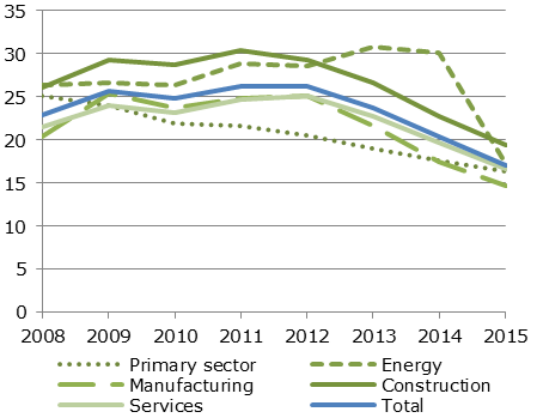
Interestingly, there is little difference in the percentage of firms and employment at risk by size class, except for microenterprises (Figure 3.19). The percentage of large, medium and small firms (employment) at risk in 2015 was around 11–13% (9–11%). However, in the case of microenterprises, the percentage was significantly higher, 19% (15% in employment). This distribution of employment and firms at risk by size class is observed over all the years: microenterprises are systematically more fragile than other size classes. This fact is particularly worrying given that Spain has a high proportion of microenterprises compared to other European countries. In 2016, according to Eurostat data, Spanish microenterprises made up 94.9%, 25.9% and 41.2% of the number of firms, value added and employment of the total economy, compared with 93%, 20.9% and 29.8% for the euro area.

Figure 3.19. Percentage of firms, interest bearing debt and employment at risk by size classes and industries. 2008–2015

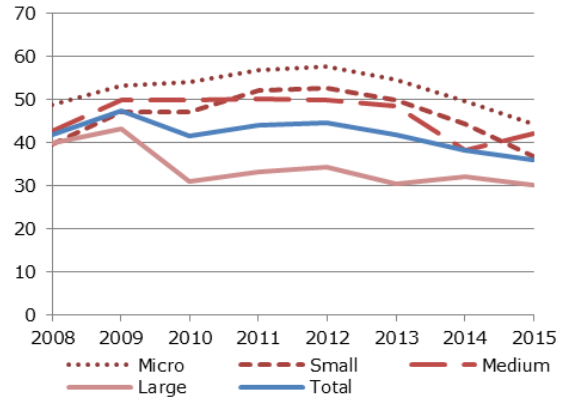
a) Percentage of firms at risk by size



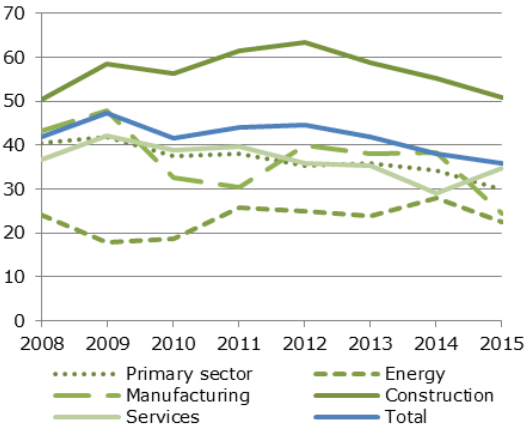
b) Percentage of firms at risk by sector



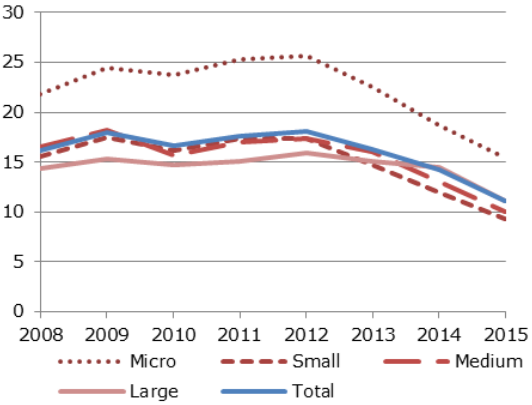
c) Percentage of debt in firms at risk by size



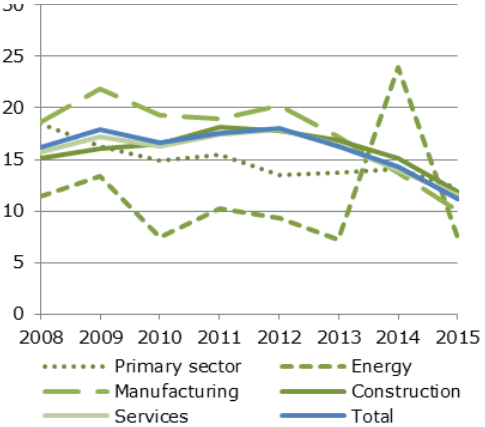
d) Percentage of debt in firms at risk by sector



e) Percentage of employment in firms at risk by size



f) Percentage of employment in firms at risk by sector



Note: At risk according to the criteria adopted (debt ratio above the median of the industry and ICR below 1 or negative profits). Construction includes real estate activities. Services excludes real estate activities.

Source: SABI (Bureau Van Dijk) and own elaboration

Microenterprises have the highest debt at risk, 44%. In contrast, 30% of the debt held by large firms is at risk, 6 percentage points lower than the aggregated. Large firms had the lowest percentage of debt at risk. In 2010, the percentage dropped sharply from 43% to a value close to 30% in 2011. It has remained stable since then. Small and medium-sized firms demonstrate similar trends and levels. In 2015, 37% and 42% of the debt of small and medium-sized firms was at risk.

By industry, as by size class, there is little difference in terms of the percentage of firms and employment at risk. In terms of firms at risk, the percentage in 2015 ranged from 15% for manufacturing and 19% for construction and real estate. For employment at risk, the differences were similar. The energy industry had the lowest level of employment at risk at 7%, which stands out compared to the other industries. The primary sector had the highest percentage at 12%. The trend in all industries is characterised by a continuous fall[31] of both the percentage of firms and employment at risk since 2012.

For debt at risk, the construction sector stands out at the upper end. 51% of total debt in this industry was still at risk in 2015. This percentage had dropped from the high of 63% in 2009. Thus, despite the rapid fall in debt in the construction industry from 2013, 13 percentage points in just three years, half the debt was still at risk. The energy sector had the lowest percentage of debt at risk. It rose slightly from 2009, from 18% to 22% in 2015. In the primary sector (30% in 2015), manufacturing (24%) and services (34%), the deleveraging and the rise in profitability meant that the percentage of debt at risk fell from the highest levels. For example, from 2009, debt at risk fell 50% in manufacturing, 72% in agriculture, 82% in services, 87% in construction and real estate, and 126% in energy. In all industries, the debt at risk in 2015 was lower than before the crisis (2008), except in construction, in which the percentage was similar.

Therefore, the financial fragility of firms has reduced since 2012. Firms have achieved this by either reducing debt, increasing profits, reducing interest expenses or doing all these things simultaneously. As already mentioned, the lower fragility of firms has been due to, on the one hand, the recovery of economic activity thanks to strong GDP growth that has increased firm profitability. On the other hand, the monetary policy of the European Central Bank has helped to contain financial costs.

The estimation of the firms, debt and employment at risk depends heavily on the assumptions made, basically the criteria for classifying a firm as being at risk. As mentioned above, the criteria used in this report entails a combination of excessive debt (above the median) and having an ICR below 1 or negative profits. The estimation of the ICR also depends on how profits are calculated (EBIT, EBITDA, for example). Therefore, the estimation of debt at risk may vary depending on the assumptions. Table 3.3 shows different robustness checks on the estimation of debt at risk in 2015. The first line of the table is the benchmark estimation already described of the percentage of firms, debt and employment at risk in 2015. Additionally, we include three robustness analyses. The first one (Robustness 1) consists of the same condition applied in the benchmark estimation (debt-to-assets ratio above the median for the industry, an ICR below 1 or negative profits), but we calculate the ICR and profits in an alternative way. Instead of using the EBIT (including the financial revenues) as the indicator of profits, we use the EBIDTA, i.e., we do not subtract amortisation from the flow of income of the firm. This means that we are analysing the vulnerability from a short-term perspective in comparison with our benchmark estimation. In the benchmark approach, we assume that the firm has to be able to cover depreciation to guarantee its long-term survival. Additionally, we calculate

[31] In the energy sector, there was a sharp jump in employment at risk in 2014. In 2015, the energy industry recovered the trend previous to 2014. This spike was owing to a very large firm in the waste collection subsector entering the category of weak firms for only a year. Its capital was subsequently increased, and it left the category of firms at risk.

two additional robustness checks that replicate the calculations of the benchmark estimation and Robustness 1, respectively, but that evaluate the condition that defines a firm as weak over two consecutive years. Thus, we consider a firm to be financially vulnerable if the condition is observed over two consecutive years. Robustness 3 corresponds to the calculation carried out by Menéndez and Mulino (2017) . Robustness checks are ordered according to the stringency of the criteria. Consequently, indicators of corporate vulnerability in the different robustness analyses should decrease with each robustness check.

Table 3.3. Firms, debt and employment at risk in 2015 with different conditions

	% of firms at risk	% of debt at risk	% of employment at risk
Benchmark estimation of the report	17.07	35.84	11.14
Robustness 1. EBITDA instead of EBIT in the ICR definition	15.31	27.46	9.25
Robustness 2. Benchmark estimation but the conditions for classification as a firm at risk have to be satisfied for two consecutive years	10.62	25.27	6.64
Robustness 3. Same calculation as Robustness 1 but the conditions for classification as a firm at risk have to be satisfied for two consecutive years	9.13	18.96	5.30

Note: Definition of firm at risk in Benchmark and Robustness 1.

Source: SABI (Bureau Van Dijk) and own elaboration

The percentage of firms, debt and employment at risk varies from 17.1%, 35.8% and 11.1%, respectively, in the benchmark scenario to 9.1%, 19.0% and 5.3% of Robustness check 3. In other words, owing to the change in the criteria from considering weak firms from less to more demanding criteria, the percentages of firms and employment is 7.9 and 5.9 percentage points lower. The variation of debt at risk is even higher, 16.9 percentage points, almost half the percentage of the benchmark. These percentages under Robustness 4 are similar in broader terms than in Menéndez and Mulino (2017). In any case, the indicators show that the financial fragility of Spanish firms was still high in 2015. Debt at risk was higher than 19% of total debt if we use a narrow concept of vulnerability, but it can be as high as 35.8% if the criteria are more general, as we have described.

3.4.2. Financial constraints in firms at risk

It would be logical to assume that companies that are more vulnerable financially face greater restrictions for accessing finance, since their high debt levels, accompanied by a high financial burden and/or low profitability, pose a greater risk to their lenders. Consequently, financial restriction and debt at risk should be closely related. In this context, this section aims to analyse the degree of financial restriction on Spanish firms at risk.

As CompNet does, we measure the level of each firm's credit constraint with the indicator of financial restriction proposed by Pal and Ferrando (2010) and Ferrando and Ruggieri (2015). This indicator classifies each firm in one of three categories: not credit constrained; relatively credit constrained and absolutely, or strongly, credit constrained. The variables used to classify each firm into one of the groups are investment, financial gap (difference between investment and cash flows), variation of debt, issue of new shares and average financial costs in comparison with average market costs. According to the indicator, absolutely or strongly constrained firms are those that cannot obtain external funds. Relatively constrained firms are firms that can obtain external funding but at a

higher cost than the market average. Non-constrained firms are those that can increase debt when needed.

In 2015, 29.7% of firms at risk were not credit constrained (Figure 3.20), 40.5% had difficulties accessing external funds as they were relatively constrained and 29% were absolutely constrained. As with the other variables presented, the level of credit restrictions on firms at risk showed a marked cyclical evolution: it worsened up to 2012 and subsequently recovered. However, in contrast to the other variables already examined, the ensuing recovery was not sufficient to compensate for the effect of the crisis, i.e., the percentage of unconstrained firms at risk in 2015 was lower than in 2009[32], and the percentage of strongly restricted firms at risk was even higher.

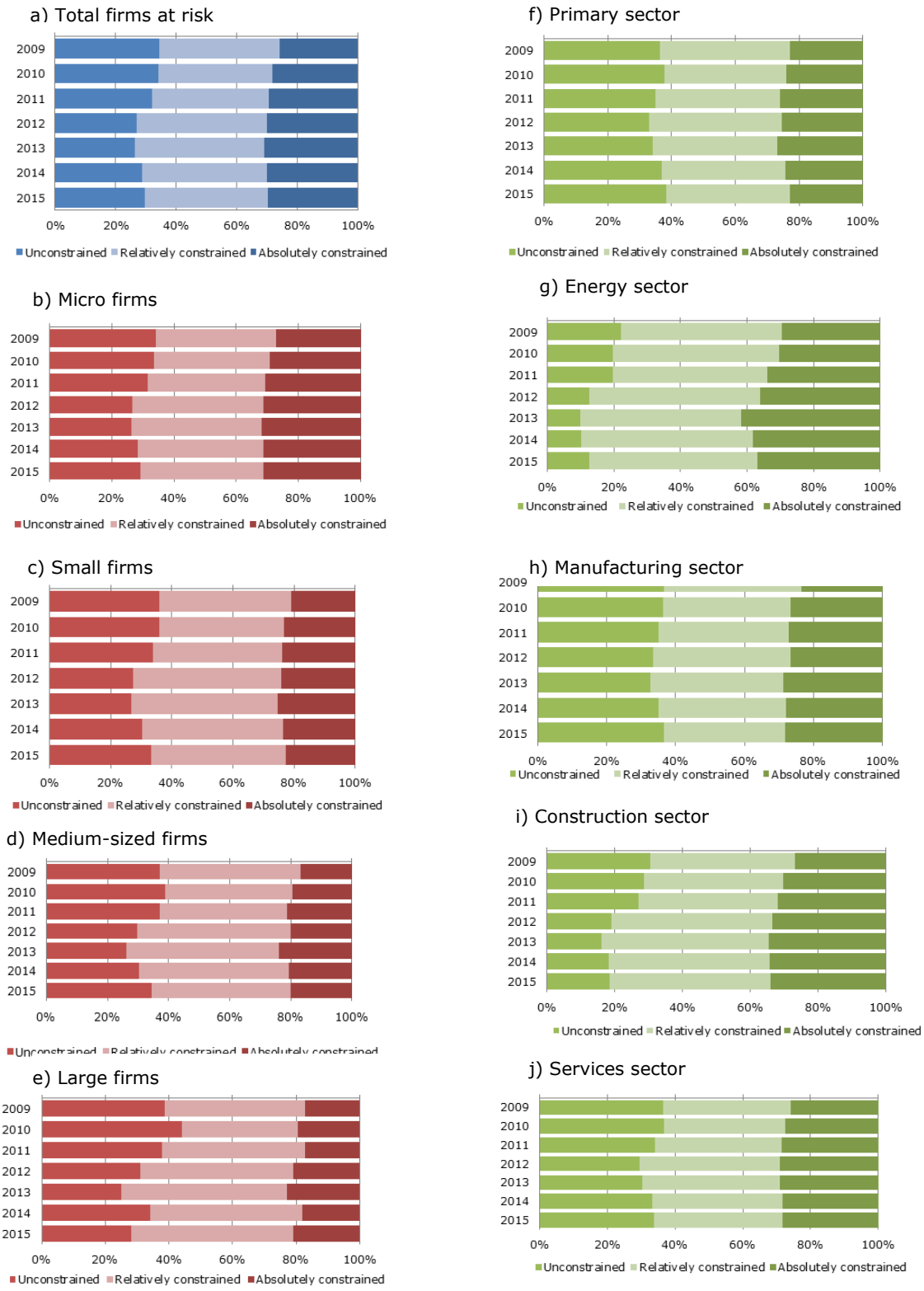
By size class, although the percentages are relatively similar, the smaller the firm, the lower the proportion of firms at risk that are financially unconstrained. On average during the period, 30% of microenterprises were unconstrained compared to 35% of large firms. By industry, firms at risk both in the construction and real estate and the energy sectors had greater credit constraints during the crisis. In 2015, only 12.7% of firms at risk in energy and 18.4% in construction were not financially constrained. In the other industries, although credit constraint was also significant, it was lower than in those two industries.

If we look at the distribution of debt at risk according to the intensity of the firm's financial constraint, several interesting facts emerge (Figure 3.21). Debt at risk in 2015 was mainly present in firms relatively constrained (57% of the total debt at risk). Unconstrained firms at risk had only 22% of debt at risk. The percentage of debt at risk held by unconstrained firms remained stable from 2012, around between 20–24% for all firms. On the other hand, the percentage of strictly constrained firms at risk reduced by nine percentage points in favour of the relatively constrained firms at risk.

There are not many differences when broken down according to size class in terms of the proportion of unconstrained firm at risk. The main differences are in the distribution between the strictly and relatively constrained firms at risk. There was a higher percentage of debt at risk in medium and large firms that were relatively constrained than in small firms and microenterprises. By sector, the energy and construction and real estate sectors again reported higher proportions of debt in relatively constrained firms at risk.

[32] The indicator of the intensity of credit constraint is not available for 2008 as it is not possible to calculate the average cost of external funding homogeneously due to the change in financial standards in that year.

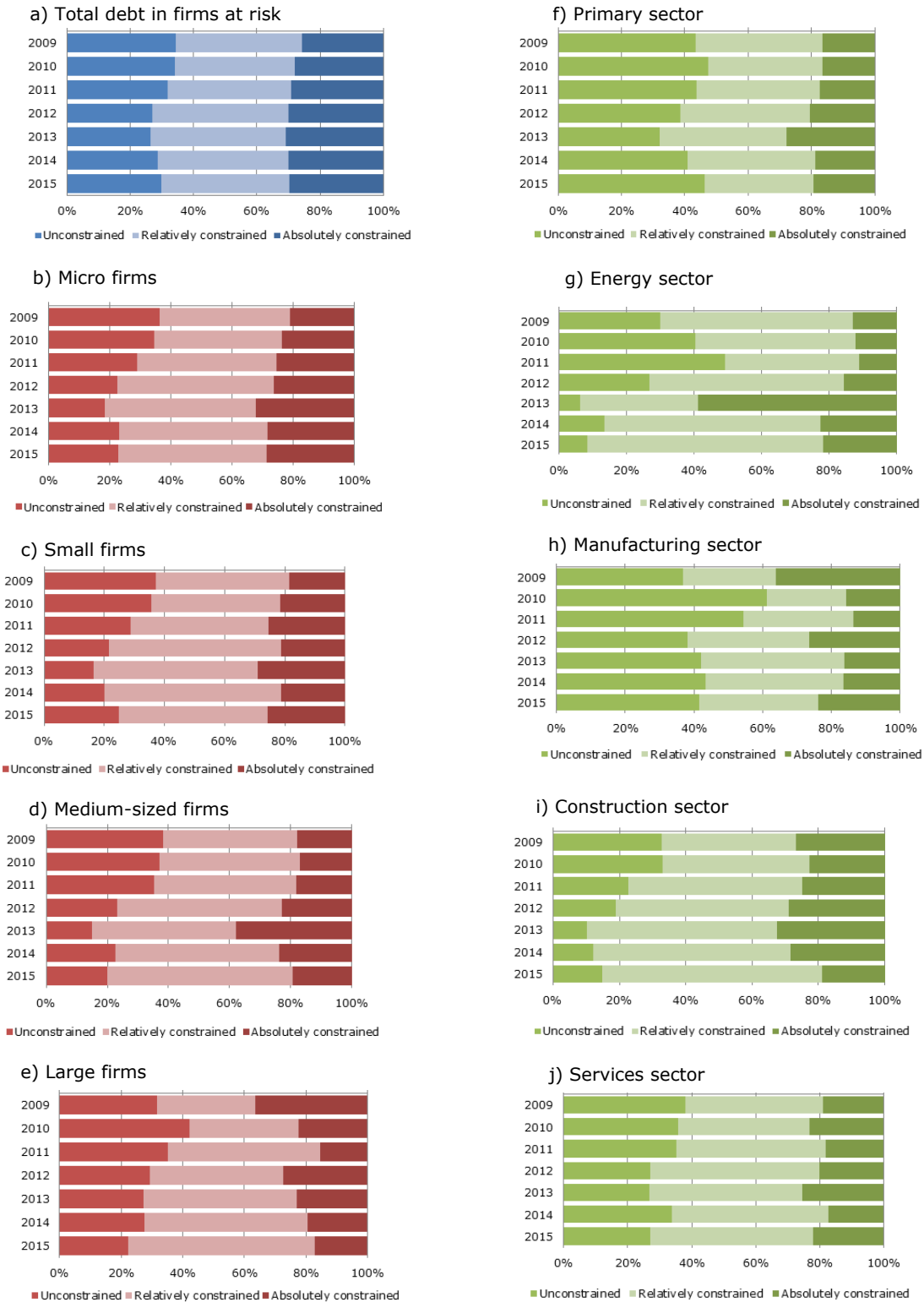
Figure 3.20. Percentage distribution of firms at risk according to the level of credit constraint. 2009–2015



Note: The classification of firms according to the credit constraint uses the indicator proposed by Pal and Ferrando (2010) and Ferrando and Ruggieri (2015). Construction includes real estate activities. Services excludes real estate activities.

Source: SABI (Bureau Van Dijk) and own elaboration

Figure 3.21. Percentage distribution of debt at risk according to the level of credit constraint. 2009–2015



Note: The classification of firms according to the credit constraint uses the indicator proposed by Pal and Ferrando (2010) and Ferrando and Ruggieri (2015). Construction includes real estate activities. Services excludes real estate activities.

Source: SABI (Bureau Van Dijk) and own elaboration

3.4.3. Determinants of financial vulnerability

Once we have classified Spanish firms according to their financial vulnerability, it is of interest to analyse the determinants of this vulnerability. We estimate panel data logit models to determine which factors are better at predicting the probability of a firm being financially vulnerable. The sample for this exercise consists of the whole sample used in this section of the report. However, not all variables used are available for the whole set of firms. Therefore, the sample in each regression may vary with respect to the total. Our dependent variable is a variable that takes on the value of 1 if the firm is considered vulnerable according to the criteria used in this section. Otherwise, it is zero.

The possible determinants of financial fragility include a wide range of dimensions. However, we are limited by the firm-level variables available in SABI. Additionally, given that we base the indicator of firm fragility on a criterion that depends on a threshold of debt, profitability and the ICR, we do not include any such dimensions among the explanatory variables. Determinants include the following. First, we consider several variables to capture a firm's characteristics such as size and age. With these variables, we aim to determine possible effects on the probability of being vulnerable, of being too small or too large, or of being a young firm versus an older one. We also include productivity as an indicator of firm efficiency. We expect that the higher a firm's productivity, the lower the probability of a firm being at risk as productivity is the source of long-term success. We use labour productivity (value added in constant 2010 euros per employee) growth as the benchmark indicator in the regressions. We test the robustness of the results using TFP growth[33]. Although TFP is a better indicator of the efficiency of the firm than labour productivity as it accounts for the differences in the capital/labour intensity, the sample is smaller. Additionally, we include a dummy variable that measures whether firm exports. In other words, we aim to capture the effects of the higher market discipline associated with operating in international markets. We expect that firms that export and are internationalised will have more diversified sources of income, more solid distribution channels, etc. These advantages may make them less prone to being financially vulnerable.

In general, firms with collateral may gain access to the financial intermediaries and markets more easily. In principle, this may favour a firm's access to the desired or optimum financial structure (combination of equity and debt). On the other hand, if higher collateral eases the access to external funds, this may encourage excessive debt and therefore be detrimental to the firm's health. Collateral is measured as the ratio of tangible fixed capital to total assets.

We include two sets of variables to capture the ownership structure. First, we include two variables that measure the financial support that firms may potentially receive owing to the fact that they belong to a corporate group. The first variable takes the value of 1 if the firm is the parent of a corporate group. The second variable indicates if the firm belongs to a corporate group, regardless of whether it is the parent. We expect that belonging to a group may imply less financial fragility due to having better access to funding sources from the firms in the group, and maybe at more favourable rates. Finally, we also control for the industry of the firms and for time effects. As our data has a panel data structure, we estimate fixed effects logit models.

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[33] TFP is calculated as a superlative index, which is similar to Solow's TFP indexes, but based on the comparison of a firm's productivity in relation to a benchmark, e.g., another firm or aggregate. Compared to Solow's methodology, this approach favours the cross-section/time-series comparisons of productivity levels and growth across units. Input shares are based on a firm's observed expenditure and revenue information and the factor of production is total capital stock and number of employees. For the definition of the variables of the TFP indicators, we closely follow Gal (2013).

The results of the determinants of the probability of a firm being at risk (Table 3.4) indicate that size is inversely related to the chance of being at risk, particularly if the firm is a microenterprise. Evaluated at the average of the sample for all determinants, a microenterprise (the reference category in the regression) is 3.9 percentage points more prone to being financially at risk than a small firm, and more than 4 percentage points more prone than a medium or large firm (Column 1 of Table 3.). The disadvantage of the microenterprises is robust in the different specifications.

Age is negatively related with the probability of being at risk. At the average sample values (11 years in the sample), one more year implies 0.1 percentage point of being at risk. However, the relationship between age and the probability of being at risk is non-lineal, i.e., it is U-shaped (Column 2 of Table 3.4). According to the coefficients of the estimation, the minimum of the relationship is 68 years. This value is above the 99th percentile of the sample, which indicates that the relationship between a firm's age and the probability of being at risk decreases with age but at a lower rate as age increases.

Productivity is positively related with a firm's health. An additional percentage point of labour productivity reduces the probability of being financially restricted by more than 5 percentage points. Therefore, the impact of productivity growth on a firm’s financial risk is remarkable. The result is robust when using TFP growth (Column 5) instead of labour productivity. This result reinforces the relevance of productivity for the health of a firm. On average, firms that operate in international markets and export have an almost 3 percentage points lower probability of being at risk than firms with exactly the same characteristics that do not export.

Collateral shows a positive and statistically significant coefficient (Column 3). This means that higher collateral is associated with a higher probability of being at risk. Thus, firms with a higher share of tangible assets on the balance sheet are more likely to be at risk compared to other firms with the same characteristics (industry, productivity, size, age, etc.). A likely hypothesis for this is that having collateral makes it easier to access financial markets, which in turn increases the chance that these firms will fall further into debt.[34]

Having higher financial restrictions is negatively related to the probability of being at risk (Column 4). Therefore, being financially restricted helps discipline a firm and encourages it to reduce its debt burden and, therefore, reduces the probability of being at risk. Being a parent company in a group (Column 6) reduces the probability of being at risk by 4.4 percentage points in comparison with non-parent firms of similar characteristics. However, we did not find evidence regarding the relevance of being part of a corporate group (Column 7).

[34] The partial correlation between the debt ratio and the collateral-to-total-assets is positive (0.23) and statistically significant once we control for time, industry and firm fixed effects.

Table 3.4. Determinants of firm at risk. Panel data logit models

	eq1		eq2		eq3		eq4		eq5		eq6		eq7	
Small	-0.03932	***	-0.03912	***	-0.04079	***	-0.03926	***	-0.0382	***	-0.04047	***	-0.04069	***
	(0.010)		(0.010)		(0.010)		(0.010)		(0.013)		(0.010)		(0.010)	
Medium	-0.04306	***	-0.04353	***	-0.04156	***	-0.03879	***	-0.03753	***	-0.04013	***	-0.0412	***
	(0.023)		(0.023)		(0.023)		(0.024)		(0.030)		(0.023)		(0.023)	
Large	-0.04041	***	-0.04215	***	-0.03522	***	-0.03256	***	-0.03849	***	-0.03338	***	-0.03468	***
	(0.048)		(0.048)		(0.048)		(0.049)		(0.063)		(0.048)		(0.049)	
Productivity growth	-0.05551	***	-0.05547	***	-0.05916	***	-0.05692	***	-0.01674	***	-0.05924	***	-0.05916	***
	(0.004)		(0.004)		(0.004)		(0.004)		(0.017)		(0.004)		(0.004)	
TFP growth									-0.03853	***				
									(0.017)					
Age	-0.0013	***	-0.00187	***	-0.00242	***	-0.00235		-0.00248	***	-0.0024	***	-0.00242	***
	(0.001)		(0.001)		(0.001)		(0.001)		(0.001)		(0.001)		(0.001)	
Age^2			0.00001	***	0.00002	***	0.00002	***	0.00002	***	0.00002	***	0.00002	***
			(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
Export	-0.02813	***	-0.02852	***	-0.02383	***	-0.02139		-0.02551	***	-0.02346	***	-0.02375	***
	(0.019)		(0.019)		(0.019)		(0.020)		(0.025)		(0.019)		(0.019)	
Collateral					0.15708	***	0.14737	***			0.15682	***	0.15704	***
					(0.015)		(0.017)				(0.015)		(0.015)	
Relatively constrained							-0.02394	***						
							(0.007)							
Absolutely constrained							-0.0346	***						
							(0.007)							
Matrix											-0.04387	***		
											(0.039)			
Group													-0.00127	
													(0.016)	
Obs.	2411581		2411581		2411581		2111218		1333098		2411581		2411581	
Log Likelihood	-930084.5504		-930027.731		-918713.0436		-788349.0112		-500283.4752		-918581.0159		-918712.3317	
Chi2	69761.29169		69913.91233		85445.46098		76483.35177		39237.38428		85550.03141		85441.89584	

Note: The dependent variable in all estimates is the dummy variable of firm at risk. Marginal effects are reported. All estimates include fixed effects, sectoral effects (33 branches of activity) and temporary effects. *** Significance at 1%, ** significance at 5%, * significance at 10%. Typical errors robust to heteroscedasticity.

Source: SABI (Bureau van Dijk) and own calculations

3.5. Debt at risk prospects: the impact of increased interest rates and GDP changes

This section evaluates both the impact of a change in monetary policy and the future growth in GDP on the financial fragility of the Spanish corporate sector. We simulate the number of firms, debt and employment at risk in 2015, the last available year, with changes in the macroeconomic environment. More precisely, we simulate different scenarios of firm fragility to evaluate the consequences of a possible tightening of monetary policy by the European Central Bank, with subsequent increase in the interest rates, and of the cyclical evolution of the Spanish economy according to the European Commission's projections.

3.5.1. Increased interest rates

To simulate the effects on the fragility of firms that an increase in interest rates would have, we follow a similar approach as Klein (2016). The procedure consists in using the same criteria as in the previous section to classify firms at risk and simulate the effects of an increase in interest rates on the financial costs of a firm, and therefore on the ICR. Thus, we calculate the hypothetical ICR of each firm existing in 2015 assuming that interest expenses increase due to a rise in the interest rates. Given that the ICR is the quotient of EBIT (including also the financial income) and interest expenses, we must also compute to what extent the interest income of each firm would also increase.

Therefore, we proceed as follows. First, to simulate the effects of an increase in the interest rates, we calculate for each firm *i* in the sample in 2015 its interest expenses if the effective interest expenses ($i_{effective2015}$) suffer a shock of *X* percentage points in the firm's interest rates according to the following expression:

$$Interest\,Expense_{i2015\_shock} = (i_{effective2015} + X) * \alpha Debt_{i2014} + (i_{effective2015}) * (1-\alpha) Debt_{i2014} \quad (3.1)$$

Where α is the percentage of debt that is rolled over with the higher interest rate. Klein (2016) assumes a value of 50% for α, whereas, in the case of the IMF (2013a), the value is 1/3. We take 60% as the base scenario due to the fact that the variable interest rate (yearly renewed) is habitual in Spain[35]. The results of the simulations are robust to assuming a value of 89%.[36] The effective interest rate ($i_{effective2015}$) is calculated as the ratio between the interest expenses and the interest-bearing debt in 2015[37].

Additionally, in the event of higher interest rates, the EBIT is also prone to increase. We calculate this new EBIT as:

[35] The European Central Bank (ECB 2017) has information from 2003 on the proportion of loans with short-term interest rate fixation. In Spain, the average proportion was about 60% in 2014 for the outstanding amount and about 85% for new businesses.

[36] We have contrasted this information with professionals working for some large banks operating in Spain. The feedback received indicates that it is now usual for the interest rates on most loans to firms to be renewed annually (or even biannually), and they suggested a higher value than 80%.

[37] The effective interest rate is calculated only for firms in which the ratio of interest bearing debt/total assets is higher than 3%, and the financial costs/interest-bearing debt is below 17%. In SABI, we cannot distinguish the financial costs associated to debt payment from any other financial costs (fees, commissions, etc.). Therefore, for those firms with low debt, the ratio of interest expenses to interest-bearing debt is not a good proxy for the average funding costs the firm is facing.

$$EBIT_{i2015\_shock} = EBIT_{i2015} + financial\ assets_{\ i2014} * X\ (1-\beta) \quad (3.2)$$

Where $EBIT_{i2015}$ and $financial\ assets_{i2014}$ are the actual EBIT and stock of financial assets of firm *i* in 2014, respectively. We exclude from the financial assets all shares in affiliates and other companies. As our objective is to isolate the effect of an increase in interest rates on a firm's fragility, we assume that the dividend income that firms receive from their shares in companies does not directly depend on the current interest rate. Dividends, although influenced by interest rates in the long-run, depend to a greater extent on the trend in profitability in subsidiaries in the short-run or other factors. Finally, β is the average spread between the interest rates firms pay for their external liabilities and the average interest income they receive from their financial assets. We assume that β is 10%. Monetary policy interest rates dropped from 4.25% in 2008 to zero in 2017. According to the Bank of Spain, the interest rates on bank deposits of non-financial corporations and the short-term public debt fell on average for different maturities by 3.9 and 3.7 percentage points in Spain, respectively. Therefore, the 4.25 reduction in interest rates also generated a slightly lower fall in the interest rates banks could receive from their financial assets.[38] We assume that an increase of, for example, 100 basis points on the costs to firms would increase the average remuneration of the financial assets held by banks by 90 basis points.

Based on this assumption, the new interest coverage ratio for each firm can be calculated as follows:

$$ICR_{i2015\_shock} = \frac{EBIT_{i2015\_shock}}{InterestExpense_{i2015\_shock}} \quad (3.3)$$

With this new ICR, we evaluate the condition for classifying a firm at risk and compute the percentage of firms, debt and employment at risk for different thresholds of interest rates. Firms at risk are those with a ratio of interest-bearing debt/total assets above the median of the industry and an ICR below 1 or negative profits. We assume three base scenarios to assess the impact of an increase in interest rates: an increase of 100, 200, 300 basis points. The European Banking Authority (EBA 2018) assumes, as a probable adverse scenario for the Spanish economy, an increase in the long-term interest rate of 115, 118 and 111 basis points in 2018, 2019 and 2020, respectively. Therefore, the most realistic scenario, and close to the EBA's, is the first (a 100 basis points rise).

Table 3.5 shows the simulation of the evolution of the percentage of firms, debt and employment at risk if, instead of the current interest expenses of firms, they suffer a financial shock consisting of an increase in interest rates with the assumption that α is equal to 60%. Table 3.6 shows the same information but for the case that α is 89%. The information is offered for all firms in the sample and is broken down by size class and industry. The table includes in the first column of the upper panel the current ICR of the firms in the sample in 2015. The following columns show the simulated ICR that would be obtained if the firms suffered a shock equivalent to an increase of 100, 200 and 300 basis points in the cost of debt. As expected, the increase in the firms' costs of funds reduces the ICR. According to our estimations, an increase of 100, 200 or 300 basis points in the interest rates would reduce the average ICR by 16%, 26% and 33%, respectively. The effects of the rise in the costs of funds on the ICR are similar across size classes, except for microenterprises, in which they are lower. For example, if the interest rate increases by 100 basis points, the ICR of small firms falls by about 17%, and by 16% in large and

[38] Altavilla et al (2017) calculate that an increase of 100 basis points in the euro area's short-term interest rates would produce an increase of 2.5 basis points on the net interest margin.

medium-sized firms. At the other end of the spectrum, the ICR of microenterprises would fall by 11% for the same shock.

Table 3.5. Impact on firm fragility of an increase of interest rates in 2015 (alpha=60%)

	Effective 2015 rates	Scenario of interest rates increased by 100 basis points	Scenario of interest rates increased by 200 basis points	Scenario of interest rates increased by 300 basis points
ICR mean (with EBIT+ financial income)				
Total	3.17	2.66	2.35	2.12
Micro	2.10	1.87	1.64	1.48
Small	3.52	2.91	2.57	2.31
Medium	2.78	2.34	2.08	1.89
Large	3.45	2.89	2.57	2.31
Primary sector	3.69	3.05	2.67	2.39
Energy	2.65	2.17	1.93	1.75
Manufacturing	4.98	4.22	3.71	3.31
Construction	1.41	1.16	1.05	0.96
Services	3.66	3.18	2.83	2.55
Proportion of firms at risk (%)				
Total	17.07	19.24	20.90	22.35
Micro	18.74	21.07	22.85	24.37
Small	10.81	12.46	13.74	14.97
Medium	11.32	12.53	13.69	14.73
Large	12.94	14.14	14.91	15.87
Primary sector	16.32	18.63	20.60	22.00
Energy	17.25	20.41	22.34	24.62
Manufacturing	14.65	17.11	19.14	20.83
Construction	19.36	21.77	23.54	25.07
Services	16.61	18.56	20.07	21.41
Proportion of debt in firms at risk (%)				
Total	35.84	38.64	41.43	43.38
Micro	44.16	49.04	52.72	55.36
Small	36.88	41.52	44.48	47.12
Medium	42.20	44.22	46.88	49.77
Large	30.25	32.00	34.50	35.75
Primary sector	29.89	33.43	38.19	40.25
Energy	22.41	25.71	31.16	32.95
Manufacturing	24.44	25.63	27.78	28.81
Construction	50.86	55.60	58.19	60.78
Services	34.80	36.26	38.60	40.64
Proportion of employment in firms at risk (%)				
Total	11.14	12.49	13.88	14.80
Micro	15.45	17.59	19.28	20.77
Small	9.32	10.77	12.00	13.17
Medium	10.02	11.12	12.17	13.12
Large	11.14	12.30	13.81	14.41
Primary sector	12.16	13.89	15.53	16.86
Energy	7.31	8.70	24.06	24.79
Manufacturing	10.01	11.25	12.34	13.40
Construction	11.86	13.18	13.96	14.87
Services	11.48	12.86	13.90	14.78

Source: SABI (Bureau Van Dijk) and own elaboration

By industry, the reduction in the average ICR, as a result of an increase in 100 basis points in the costs of funds, would be higher in the energy sector and in construction and real estate as the aggregated ICR would fall by 18%. In the primary sector, the reduction in the ICR would be 17%, and in manufacturing and services, only about 15–13%. Further increases in interest rates of up to the 300 basis points would produce an ICR below 1 in construction and real estate, which means that on average this industry would not be able to meet its financial commitments with operating profits. In the other industries, the lower ICR does not produce a fall below this threshold. In the event of an increase of 300 basis

points in the interest rates, the reduction in the average ICR would be similar in all industries (between 30% and 35%).

The calculation of the percentage of firms, debt and employment at risk depends not so much on the average value of the ICR but on the lower end of its distribution by firms. Our simulations indicate that the increase in the cost of external funding by 100 basis points increases by 2.2, 2.8 and 1.4 percentage points the number of firms, debt and employment at risk, respectively. In other words, 19.2% of firms, 38.6% of debt and 12.5% of employment would be compromised[39]. Further increases in the interest rates of up to 200 (300) basis points would mean that 20.9% (22.4%) of firms, 41.4% (43.4%) of debt and 13.9% (14.8%) of employment would be jeopardised by the increase in the interest rates. An interesting characteristic of the simulation is that the effect of successive increases in the interest rates of over 200 basis points has a positive but decreasing impact on the fragility of the corporate sector. For example, the rise in debt at risk derived from an increase of 100 basis points in the interest rates would be 2.8 percentage points. An additional increase of 100 basis points, up to 200 basis points, would generate a further increase in debt at risk of another 2.8 percentage points, up to a total increase of 5.59. Finally, 100 additional points, up to 300 basis points, would increase debt at risk only by 1.9 percentage points, 70% lower than the initial effect of the first 100 basis point increase.

To assess the importance of these numbers, recall that the observed reduction from 2012 in firm fragility in terms of firms, debt and employment was 9.1, 8.6 and 6.9 percentage points, respectively. Therefore, the increase in interest rates would reverse the improvement in the number of firms at risk since 2012 by 23%, 42% or 58%, depending on if we consider an increase of 100, 200 or 300 basis points. The reversion in the employment at risk is similar to the number of firms, though lower, but not in the case of debt, which is much higher, in which case 33%, 65% and 87% of the improvement since 2012 would be lost. Therefore, the impact of the increases in interest rates on debt at risk would be much higher in comparison with the number of firms or employment at risk. This means that, as expected, the impact of the increase in the financial costs would mainly affect more indebted firms.

Focusing on debt at risk, the results indicate that a tightening of the monetary policy would have larger effects on microenterprises and small firms than on the medium-sized firms and far larger effects than on large firms. The increase of 100 basis points in the interest rate would increase by 4.9 and 4.6 percentage points the proportion of debt of micro and small firms at risk, whereas this increase would only be 2.0 and 1.8 percentage points for medium and large firms, respectively. Therefore, the percentage of debt at risk would be 49% for microenterprises, 41.5% for small firms, 44.2% for medium firms and only 32% for large firms. Interestingly, further increases in the interest rate generate similar increases across size classes for the proportion of debt: about 2.5–2.9 additional percentage points when the increase is 200 basis points, except in microenterprises, where the increase is higher (3.7 percentage points); and between 2.6 and 2.8 additional percentage points when the rise in interest rates reaches 300 basis points (except in large firms, which is lower, 1.3 percentage points).

By industry, the largest effect of the increase in the cost of funds would be in the construction and real estate industry. An increase of 100 basis points in the interest rates paid by firms would generate an increase of 4.7 percentage points of debt at risk: from 50.9% to 55.6%. In the primary sector, energy, manufacturing and services, there would be increases of 3.5, 3.3, 1.2 and 1.5 percentage points, respectively. The primary sector

[39] In the case of the EBA adverse scenario (an increase in the long-term interest rate of 115 basis points for 2018) the percentage of firms, debt and employment at risk is 15.5%, 38.9% and 12.6%, respectively.

(33.4%) and services (36.3%) would be the industries with the highest amount of debt at risk, after construction. Additional increases in the interest rates would have diminishing effects except in the primary sector and the energy industry, where an increase of 200 basis points would increase debt at risk by 4.8 and 5.5 percentage points, up to 38.2% and 31.2% of total debt, respectively.

Table 3.6 shows the same information as Table 3.5 but assuming that the parameter α, the proportion of debt that is rolled over, is 89% instead of 60%. In this case, the percentages of vulnerable firms, debt and employment at risk would be higher. More precisely, an increase of 100 basis points would also increase firms at risk to 20.2%, debt at risk to 39.9% and employment at risk to 13.1%.

Table 3.6. Impact on firm fragility of an increase of interest rates in 2015 (alpha=89%)

	Effective 2015 rates	Scenario of interest rates increased by 100 basis points	Scenario of interest rates increased by 200 basis points	Scenario of interest rates increased by 300 basis points
ICR mean (with EBIT+ financial income)				
Total	3.17	2.47	2.08	1.81
Micro	2.10	1.70	1.40	1.22
Small	3.52	2.70	2.27	1.97
Medium	2.78	2.18	1.85	1.61
Large	3.45	2.70	2.28	1.99
Primary sector	3.69	2.81	2.34	2.02
Energy	2.65	2.03	1.73	1.52
Manufacturing	4.98	3.93	3.28	2.83
Construction	1.41	1.07	0.91	0.81
Services	3.66	2.97	72.51	2.18
Share of firms at risk (%)				
Total	17.07	20.18	22.49	24.35
Micro	18.74	22.07	24.50	26.40
Small	10.81	13.22	15.13	16.87
Medium	11.32	13.25	15.00	16.63
Large	12.94	14.43	16.01	17.71
Primary sector	16.32	19.72	22.14	24.17
Energy	17.25	21.60	24.73	28.07
Manufacturing	14.65	18.20	20.92	23.15
Construction	19.36	22.77	25.25	27.06
Services	16.61	19.42	21.54	23.28
Share of debt in firms at risk (%)				
Total	35.84	39.85	43.86	46.66
Micro	44.16	51.60	56.08	59.44
Small	36.88	43.36	47.92	51.52
Medium	42.20	46.18	50.64	53.70
Large	30.25	32.50	36.00	38.25
Primary sector	29.89	35.76	40.80	43.63
Energy	22.41	26.34	32.95	35.18
Manufacturing	24.44	26.51	28.97	31.19
Construction	50.86	57.33	61.21	64.66
Services	34.80	37.72	41.52	44.15
Share of employment in firms at risk (%)				
Total	11.14	13.10	14.93	16.32
Micro	15.45	18.52	20.89	22.77
Small	9.32	11.49	13.31	15.07
Medium	10.02	11.80	13.40	15.05
Large	11.14	12.72	14.48	15.43
Primary sector	12.16	14.66	17.03	18.98
Energy	7.31	8.89	25.00	27.09
Manufacturing	10.01	11.87	13.49	15.06
Construction	11.86	13.65	15.00	16.72
Services	11.48	13.50	14.91	16.18

Source: SABI (Bureau Van Dijk) and own elaboration

3.5.2. GDP growth

We also simulate the impact of the growth forecasted for Spanish GDP on firm financial fragility. More precisely, assuming constant 2015-level interest expenses for Spanish firms, we simulate the evolution of firm-level EBIT (plus financial revenues) assuming that GDP grows as forecast in the European Commission Winter 2018 Economic Forecast for Spain[40]. Our aim is to estimate each firm's 2015 EBIT so that we can compute the ICR that the firm would have had if Spanish GDP had grown in 2015 at the rate that the European Commission forecasted for 2018 and 2019, holding constant all other factors such as interest rates.

The key issue in this simulation is the estimation of the EBIT for each firm depending on the evolution of aggregated GDP. To this end, we estimate panel data regressions for each industry where firm EBIT (including financial revenues)-total assets ratio is regressed against aggregated GDP growth. Therefore, we calculate the EBIT/total assets that each firm would have if GDP growth were as predicted by the European Commission for 2018 (2.6%) and 2019 (2.1%) instead of the actual GDP growth in 2015 (3.4%). Therefore, the procedure allows calculating the ICR counterfactual for each firm in the sample associated to the scenarios forecasted by the European Commission. This ICR counterfactual allows, in turn, estimating the percentage of firms, debt and employment at risk.

The panel data regression for each industry (33 industries) is estimated for the period 2002–2015. So a complete economic cycle is included. We estimate separate models for the firms in each industry so that we allow for industry specific EBIT elasticities with respect to the aggregated evolution of the economy. We include dummies for the firm's size and the log variation of the total assets as controls. Real GDP growth for the Spanish Economy for the 2002–2015 period is taken from the National Accounts published by the Spanish Statistical Office (INE).

Figure 3.22 shows the evolution of the ROA already shown in Figure 3.14 but including the expected value of the profitability if the Spanish economy would have grown as predicted by the European Commission for 2018 and 2019. Independently of the indicator, aggregated value or median at the 25th percentile, the growth prospects for the Spanish economy would spell a halt to the recovery of profitability that started in 2012. Profitability would be back at 2014 levels.

With this simulated profitability, the aggregated (weighted average) ICR in 2015 would be (Table 3.7) somewhat lower (3.06 and 2.99, respectively) than the actual value for 2015 (3.17). The forecasts indicate a slight deceleration in Spanish GDP from 3.4% to 2.6% in 2018 and 2.1% in 2019, suggesting that, all other things being equal, firm profitability would fall and fragility would rise. More precisely, the proportion of firms at risk would increase by 0.8 and 1.3 percentage points (i.e., 4.6% and 7.6%, respectively), depending of the scenario considered (2018 or 2019 GDP growth). In other words, instead of 17.1% of firms at risk, we would observe 17.9% and 18.4%, respectively. In terms of debt, the percentage of debt would be 37% and 37.8% in the two scenarios, which implies an increase of 1.2 and 2.0 percentage points (an increase of 3.4% and 5.4%, respectively). Finally, in terms of employment at risk, the simulated percentage increase is the highest of the three dimensions considered. Employment at risk would increase by 0.8 percentage points if GDP growth was as predicted for 2018 (up to 12% for employment at risk), or by 1.3 percentage points (up to 12.5% for employment at risk). These figures suggest that vulnerability would increase to levels relatively similar to 2014.

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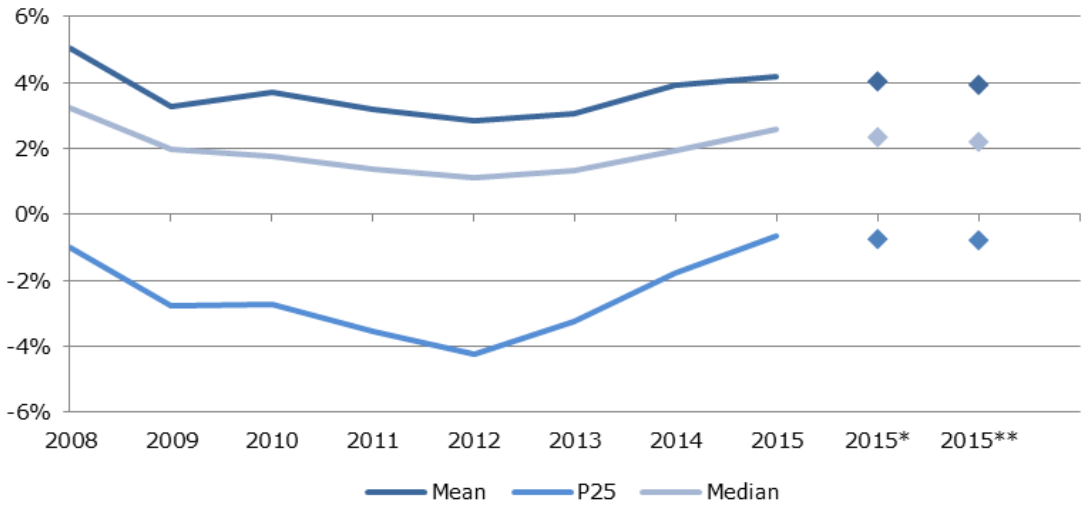
[40] https://ec.europa.eu/info/business-economy-euro/economic-performance-and-forecasts/economic-forecasts/winter-2018-economic-forecast_en.

Figure 3.22. Evolution of ROA and forecasted ratios. Total economy. 2008–2015. Percentages



Note: 2015* corresponds to the estimation of GDP in 2018; 2015**, GDP in 2019.

Source: SABI (Bureau Van Dijk) and own elaboration

Looking at debt at risk, the highest impact in terms of size class is observed in small and medium-sized firms. The percentage of debt at risk in small and medium firms would increase by 1.8 percentage points (4.8%) and by 1.7 percentage points (4.1%), respectively in the macroeconomic scenario for 2018. For large firms and microenterprises, the increases would be lower, 2.5% and 2.7%, respectively. According to the estimations of debt at risk if the growth were as predicted for 2018 (2019), the percentage of debt at risk would be 45.4% (46.2%) in microenterprises, 38.6% (39.8%) in small firms, 43.9% (44.7%) in medium-sized firms and 31.0% (31.5%) in large firms. By industry, the highest impact of the macroeconomic environment is observed in manufacturing and services, with increases of 6.8% and 3.4% (1.7 and 1.2 percentage points higher) in the 2018 scenario, respectively. In the construction sector, the impact increases by 1.29 percentage points. In the primary and energy sectors, the variations of debt at risk are almost nil. However, as in the actual debt levels at risk, debt at risk would be highest in construction and real estate, 52.6% when the 2019 forecasted GDP growth is assumed. Debt at risk would also be high in services (36.8%) and the primary sector (29.9%).

Overall, the simulations indicate a small increase in corporate fragility caused by a slowdown of 0.8 percentage points in economic activity, as we assume in the scenario of the 2018 forecasts, for example. Therefore, the shock from increased interest rates would have a higher effect on corporate sector fragility.

Table 3.7. Impact on firm fragility of the expected GDP evolution

	Effective 2015 rates	Scenario of GDP growth forecast for 2018	Scenario of GDP growth forecast for 2019

ICR mean (with EBIT+ financial income)			
Total	3.17	3.06	2.99
Micro	2.10	2.63	2.97
Small	3.52	4.03	4.36
Medium	2.78	2.49	2.30
Large	3.45	3.12	2.90
Primary sector	3.69	3.69	3.69
Energy	2.65	2.45	2.33
Manufacturing	4.98	3.88	3.18
Construction	1.41	1.77	2.00
Services	3.66	3.70	3.72
Share of firms at risk (%)			
Total	17.07	17.85	18.37
Micro	18.74	19.42	19.88
Small	10.81	12.00	12.73
Medium	11.32	12.47	13.17
Large	12.94	13.69	14.17
Primary sector	16.32	16.32	16.32
Energy	17.25	17.42	17.49
Manufacturing	14.65	16.25	17.28
Construction	19.36	20.32	20.93
Services	16.61	17.21	17.62
Share of debt in firms at risk (%)			
Total	35.84	37.06	37.79
Micro	44.16	45.36	46.16
Small	36.88	38.64	39.76
Medium	42.20	43.93	44.74
Large	30.25	31.00	31.50
Primary sector	29.89	29.89	29.89
Energy	22.41	22.50	22.50
Manufacturing	24.44	26.11	27.06
Construction	50.86	52.16	52.59
Services	34.80	35.96	36.84
Share of employment in firms at risk (%)			
Total	11.14	11.99	12.48
Micro	15.45	16.30	16.90
Small	9.32	10.56	11.34
Medium	10.02	11.10	11.85
Large	11.14	11.71	11.91
Primary sector	12.16	12.16	12.16
Energy	7.31	8.06	8.29
Manufacturing	10.01	11.30	12.07
Construction	11.86	13.42	14.19
Services	11.48	12.16	12.56

Source: SABI (Bureau Van Dijk) and own elaboration

3.6. Debt and capital allocation

Previous sections have examined measuring the debt overhang of Spanish firms and the deleveraging process that began at the outbreak of the economic and financial crisis. We also quantified the corporate debt still at risk and simulated its foreseeable evolution. In this section, we offer some insights into the contribution of the financial sector to the allocation of financial funds to more productivity activities, or if, to the contrary, its debt is a burden of the past. To this end, we focus on two aspects. First, we analyse the scarce information available on the relevance of the bank debt restructuring in Spain. This will give us a view of the role of the financial sector in (re)financing potentially non-viable firms. Second, we provide evidence that gives some insights into the relationship between resource reallocation and the debt overhang of the Spanish economy.

3.6.1. Refinancing and restructuring

Refinancing and restructuring is a banking practice that consists in renegotiating the conditions of a loan to alleviate the financial pressure on a borrower that, despite temporary problems, is still viable. This renegotiation/restructuring aims to enable a company to meet its financial obligations by avoiding extreme situations such as the enforcement of a guarantee and the rapid sale of business assets. It is a practice that benefits both the lender and the borrower as long as the latter has a viable business, since otherwise it can mask a situation of delinquency and delay the recognition of a loss. The evidence provided by some studies shows that banks sometimes avoid recognising doubtful loans to avoid losses, which allows zombie companies that are not competitive to survive in the market thanks to the tolerance of banks that keep them alive artificially. This phenomenon can be harmful to competitive companies whose access to finance is reduced as part of the credit that would otherwise be available to them goes to the zombie companies. In the long-run, this situation represents a misallocation of the productive resources that harms the productivity of economies[41].

In the Spanish economy, the evidence shows that after the outbreak of the crisis in 2007, the volume of refinanced loans skyrocketed, with widespread suspicion that there were hidden non-performing loans on bank balance sheets. For this reason, the Memorandum of Understanding (MoU) that accompanied the financial assistance programme that Spain received in 2012 included among its measures the requirement to establish more transparent criteria for classifying assets according to their risk to combat the practice of refinancing to delay foreclosures. In December 2012, the Bank of Spain published Circular 6/2012 that amended CBE 4/2004 and required credit institutions to disclose in their annual accounts specific information related to refinancing and restructuring operations. It also introduced a precise definition of this type of operation. Subsequently, on 30 April 2013, the Bank of Spain sent a communication to financial entities with more detailed criteria on the accounting classification of these operations to guarantee the uniform interpretation of the regulatory requirements on this matter. The information provided by the entities in response to this notice showed that there were discrepancies between entities when classifying these operations, which led the Bank of Spain to develop a set of criteria for use when elaborating and approving refinancing policies and for the accounting classification of affected operations.

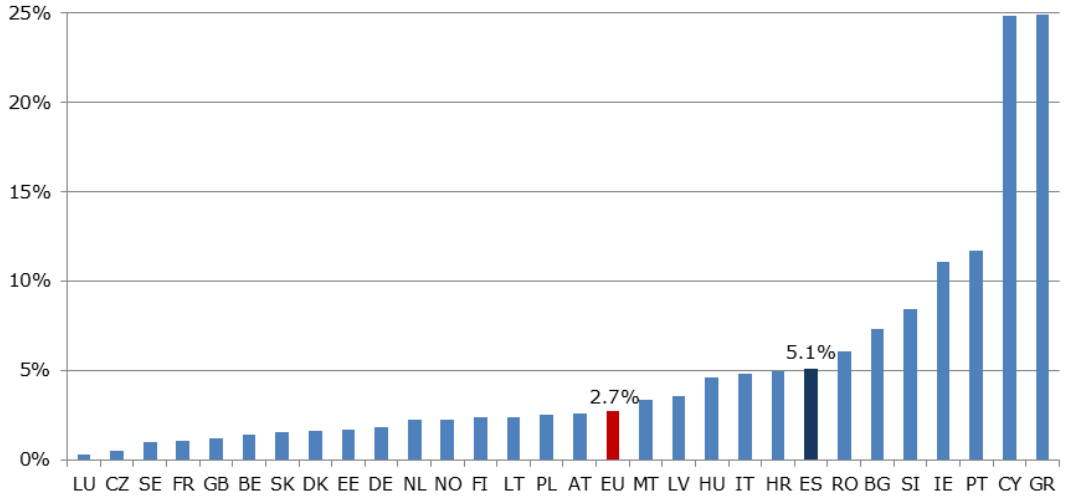
Once these criteria were published, the Bank of Spain asked the entities for a review of their refinanced portfolios, information that became public in September 2013. The information showed that before the reclassifications, Spanish banks had 182,435 million euros in refinanced/restructured loans, 40.3% classified as standard-risk loans, 20.2% as sub-standard loans and 39.3% as doubtful. After the reclassification, doubtful loans increased to 50.9% and sub-standard loans to 22.6%. Consequently, standard-risk loans fell to 26.6%. Therefore, there was a sharp drop in the portfolio of standard-risk loans and a significant increase (29%) in the doubtful category. The refinancing mainly involved real estate credit. Furthermore, the increase in doubtful activities also involved mainly this type of activity. With this outpouring of assets at risk, banks had to make loan loss provisions for an amount close to 5,000 million euros. The reluctance of banks to recognize losses would have been impeding creative destruction — keeping zombie companies in the market and preventing a more efficient allocation of credit to the most productive (competitive) companies.

[41] See Andrews and Petroulakis (2017) for references on zombie firms and bank forbearance.

The European Banking Authority (EBA) has recently begun to provide information on refinancing/restructuring in response to concern over its magnitude in European banking. As shown in Figure 3.23, the forbearance ratio of Spanish consolidated bank groups (including both domestic business and business abroad) is much higher than the EU average, although the breach was reduced considerably from 2015. In the first quarter of 2015, it was 9.6%, but by the third quarter of 2017, it had fallen to 5.1%, which cut the gap with the EU from 5.8 percentage points to 2.4 percentage points. In September 2017, Spain was the eighth-highest ranking EU-28 country for forbearance ratio (Figure 3.24) and number one for volume of refinanced loans: 21.8% of the total of the EU (108 billion euros in Spain out of a total of 497 billons euros in the EU). Spain is followed by Italy (14.6% of the total), France (9.2%), the United Kingdom (8.6%) and Greece (8.5%).

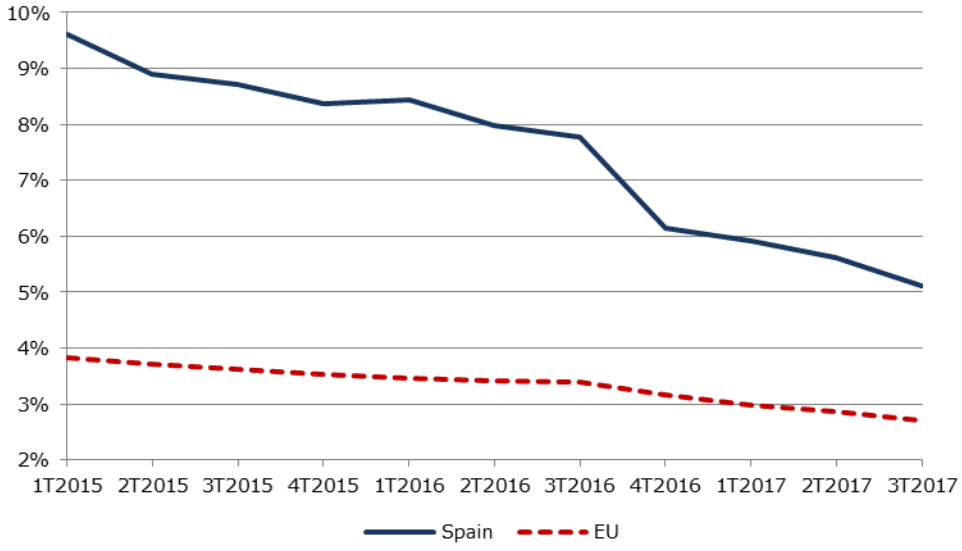
Figure 3.23. Forbearance ratio for loans and advances. September 2017

a) Ranking by countries. September 2017. Percentages



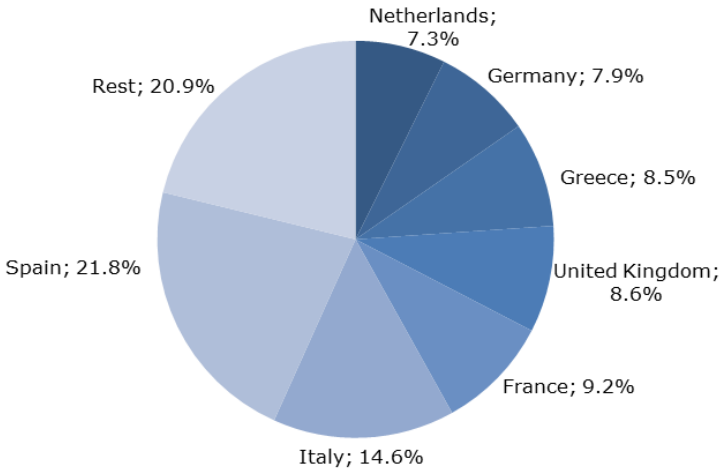
Source: European Banking Authority

b) Evolution (2015/1st quarter-2017/3rd quarter). Percentages



Source: European Banking Authority

Figure 3.24. Distribution of refinancing / restructuring across EU countries. September 2017. Percentages



Source: European Banking Authority

In 2014, aware of the importance of refinancing in Spain and with the objective of favouring both the situation of companies and banks, the Spanish government approved Royal Decree Law 4/2014 on urgent measures on refinancing and debt restructuring. The purpose of this statute was to facilitate the refinancing of debt outside of bankruptcy proceedings to ensure the survival of companies but always on the condition that they were viable. Therefore, it is a measure aimed at favouring highly indebted companies that, owing to their debt and the macroeconomic situation, cannot meet their financial obligations. Refinancing can include withdrawal, conversion of debt into equity, postponement of payment, suspension of foreclosures, tax exemptions in debt refinancing processes, etc. The statute also provides incentives for banks to improve how they provision the refinanced loans. Basically, the measure seeks to find a balance between the debt that banks can demand and the amount that viable companies can actually pay through the use of agreements as an alternative to bankruptcy proceedings.

Unfortunately, as far as we know, there is no information on the impact of Royal Decree Law 4/2014. There is no information that allows quantifying the amount of refinanced debt that may have benefited from this measure. However, in view of the information reported in Figure 3.24, the forbearance ratio of Spanish banks has fallen by almost half in just three years, with a significant drop in the volume of refinanced loans. However, it is still a sizeable amount — 21% of the EU total and 8.6% of the volume of credit to individuals of the banking operations business in Spain.

3.6.2. Firms productivity and capital misallocation

The second question we address in this section is the assessment of the efficiency of the financial sector as a resource allocator. Ideally, the financial sector should provide funds for firms with investment opportunities, and hence foster economic growth. On the other hand, the asymmetries of information may cause banks and financial markets in general to not necessarily fund more profitable long-term investments in favour of less risky investments that promise higher short-term profitability. For example, banks may be more prone to finance investment in tangible fixed assets, particularly those related to real

estate, than other types of investments such as intangibles because intangibles cannot be used as collateral. Another key factor in the Spanish case is the importance of the burden of the past in terms of bad loans, generally associated to real estate. This large proportion of non-performing assets on the balance sheet of banks may be crowding out funds that should be channelled towards productive firms.

The main question here is about the magnitude of the misallocation of resources. In this report, we aim to give only some hints to the relevance of this problem, given that a more in-depth analysis is out of our scope. The first fact to note is the differences in debt levels according to firm productivity. Taking the average values of the debt ratio for the firms classified according to their TFPs in quartiles from lower to higher productivity, we observe that there is a negative relationship between the average productivity by quartiles and the debt ratio (Figure 3.25a). The more productive firms, those grouped in the fourth quartile, are less indebted than the other firms. In 2008, the debt ratio of firms in the first quartile was 28% higher than those in the fourth quartile. The four quartiles deleveraged, but the relative differences among them remained fairly stable, except for the group of less productive firms, which reduced its debt more quickly than the other quartiles. However, this relationship disappears when firms are grouped in quartiles according to TFP growth (Figure 3.25.b). In any case, neither figure suggests a negative relationship between firm debt and productivity (in terms of levels or growth).

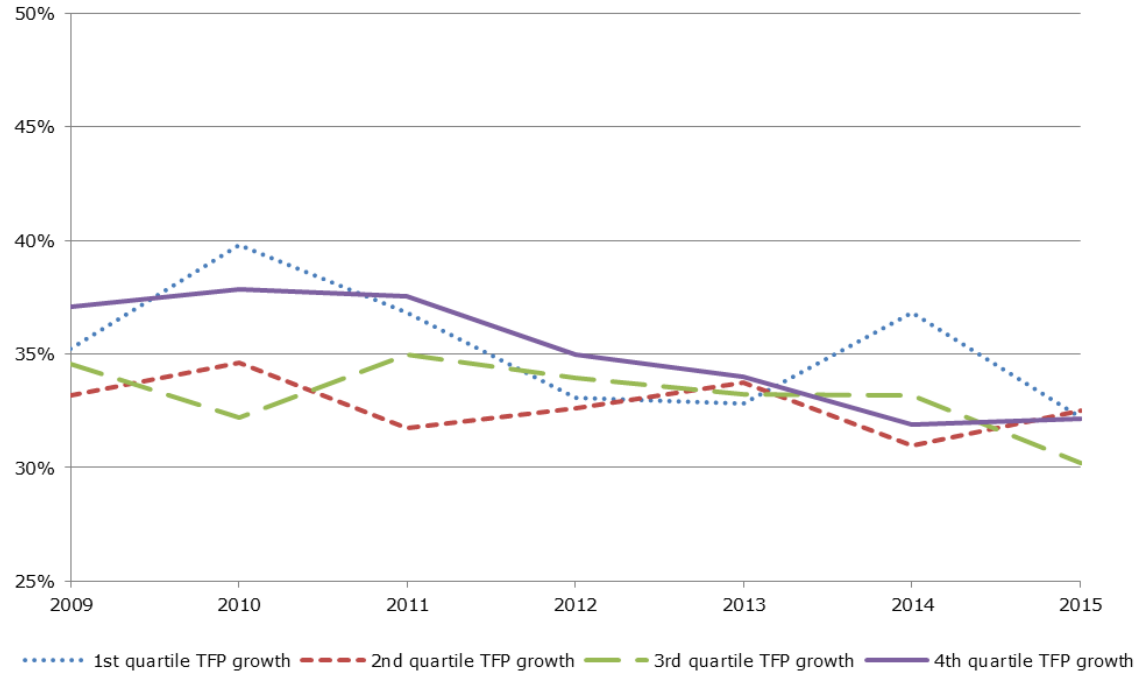
If we look at the relationship between the evolution of the debt ratio by firms and productivity, the message is clearer (Figure 3.26). The percentage of firms that increased their debt during the crisis and in the recovery since 2012 is inversely related to the quartiles of productivity and also to the quartiles of productivity growth. 37.8% of firms in the first quartile of productivity increased debt in 2015 compared to 34.9% of the group of firms with higher productivity (fourth quartile). The differences between the quartiles narrowed during the period. In other words, in 2009, the difference between the percentage of firms that increased their debt levels between the first and fourth quartile was almost nine percentage points. The difference was caused basically by the higher proportion of less productive firms that increased their debt, as the percentage of more productive firms that increased their debt remained stable. If we analyse the same information for growth instead of productivity for the groups of firms, the differences are even larger. The percentage of firms that increased their debt in the group of firms with lower productivity growth was 43.4%, 10.8 percentage points higher than in the case of the percentile of firms with higher productivity growth. In this case, the differences between the percentiles of productivity remained stable. Therefore, although this figure does not allow inferring causality from one variable to the other, it suggests that the misallocation of capital in Spain might be relevant.

There is also a clear relationship between productivity and the percentage of firms at risk (Figure 3.27). In 2015, 27% of the group of least productive firms and 20.7% of the firms with lower productivity growth were at risk. These percentages are significantly higher than the percentages of firms at risk in the fourth quartile (4.2% and 10.2%, respectively). The percentage of debt at risk in the quartile of less productive firms is higher than in terms of firms. 49.0% (38.2%) of debt is at risk in the first quartile of productivity (of productivity growth). From 2012, with the reduction of the percentage of debt and firms at risk already described, the differences between the second, third and fourth quartiles fell to converge around the average levels. However, the differences with respect to the first quartile have remained large. This means that financial fragility in the less productive firms (which also have lower productivity growth) is more persistent than in the case of the other quartiles, which is more cyclical.

Figure 3.25. Average debt ratio (Interest bearing debt / Total assets) by productivity quartiles. 2008–2015. Percentages

a) By TFP quartiles

By TFP growth quartiles



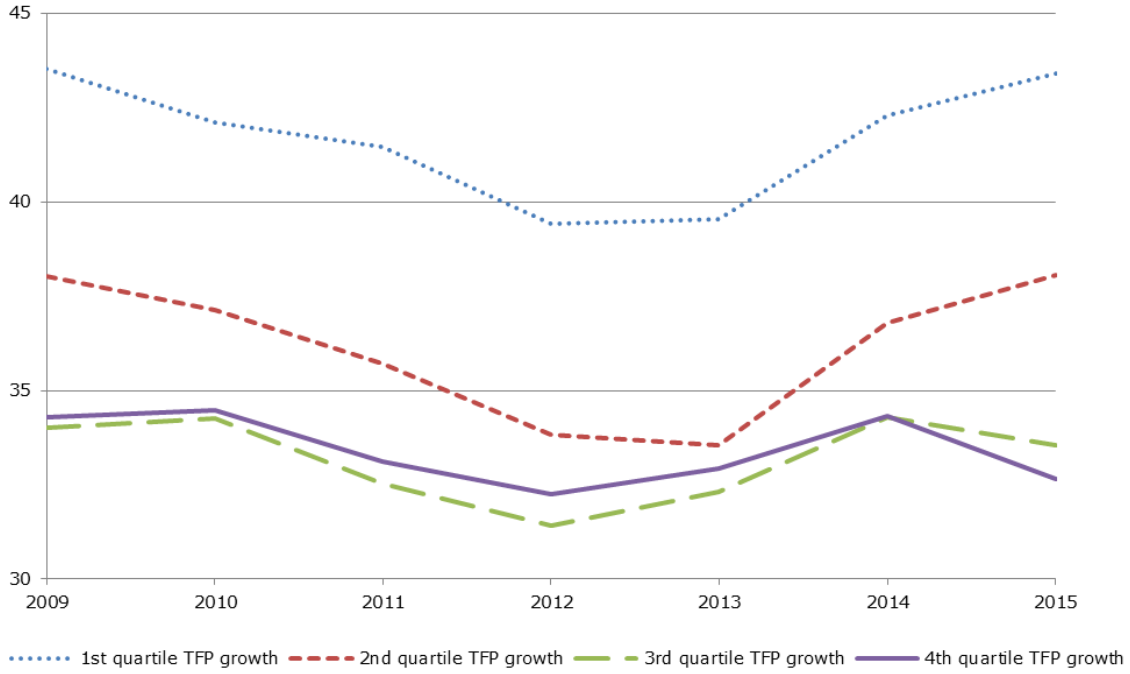
Note: The figure shows the average debt ratio of those firms grouped in the quartile

Source: SABI (Bureau Van Dijk) and own elaboration

Figure 3.26. Percentage of firms with positive growth of debt by productivity quartiles. 2009–2015

a) By TFP quartiles

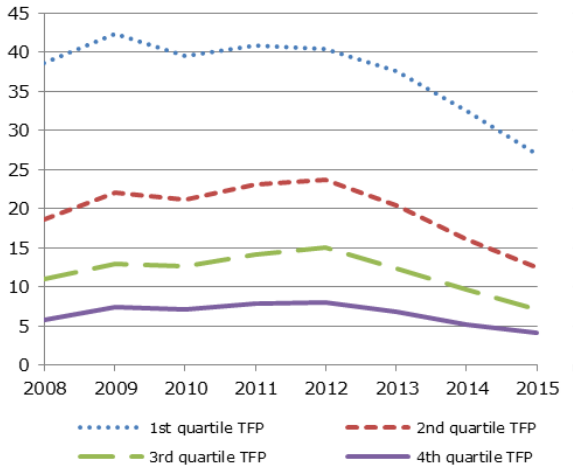
b) By TFP growth quartiles



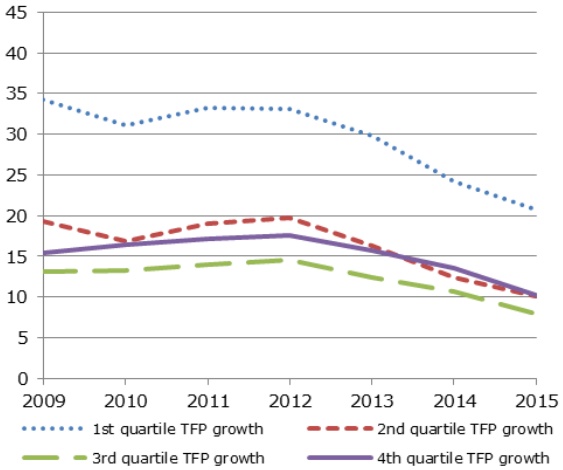
Source: SABI (Bureau Van Dijk) and own elaboration

Figure 3.27. Firms at risk by productivity quartiles. 2008–2015

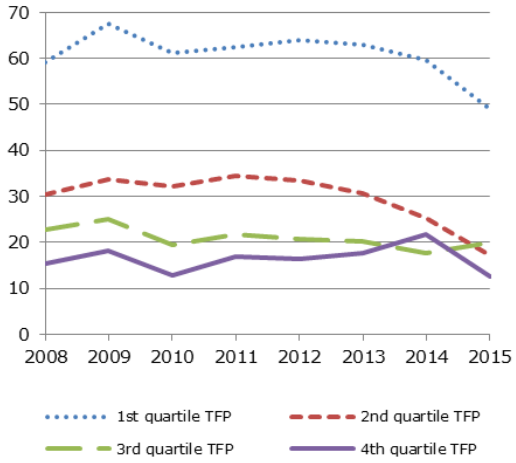
a) Percentage of firms by TFP quartiles



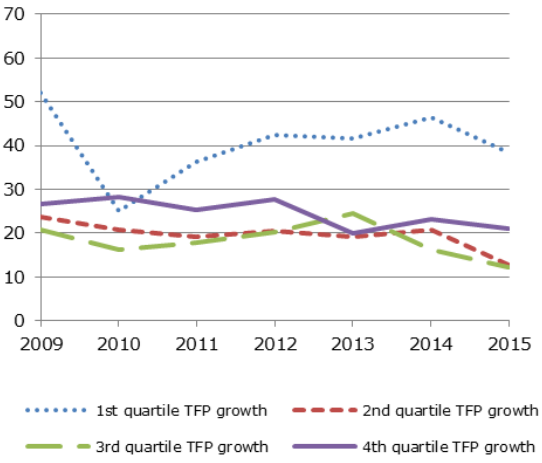
b) Percentage of firms by TFP growth quartiles



c) Percentage of debt by TFP quartiles



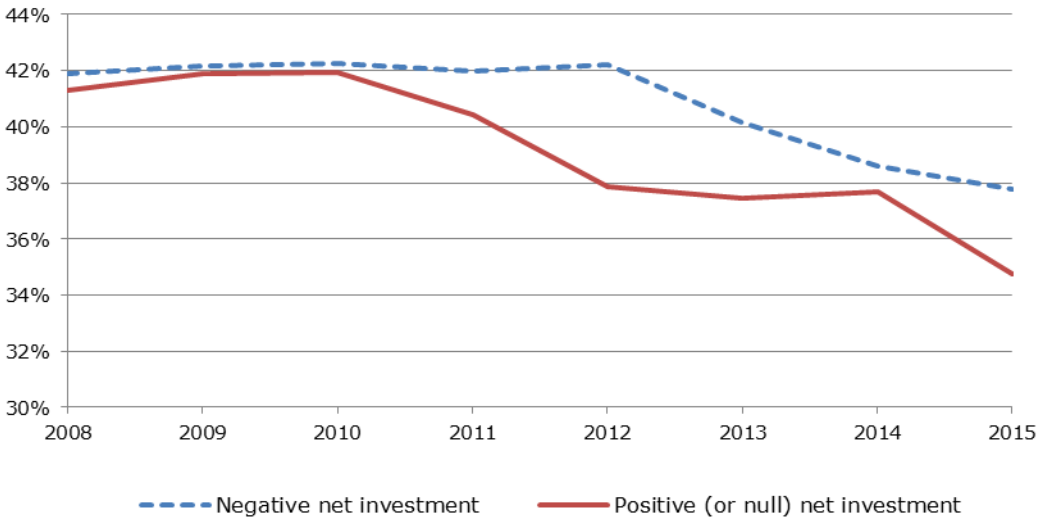
d) Percentage of debt by TFP growth quartiles



Source: SABI (Bureau Van Dijk) and own elaborations

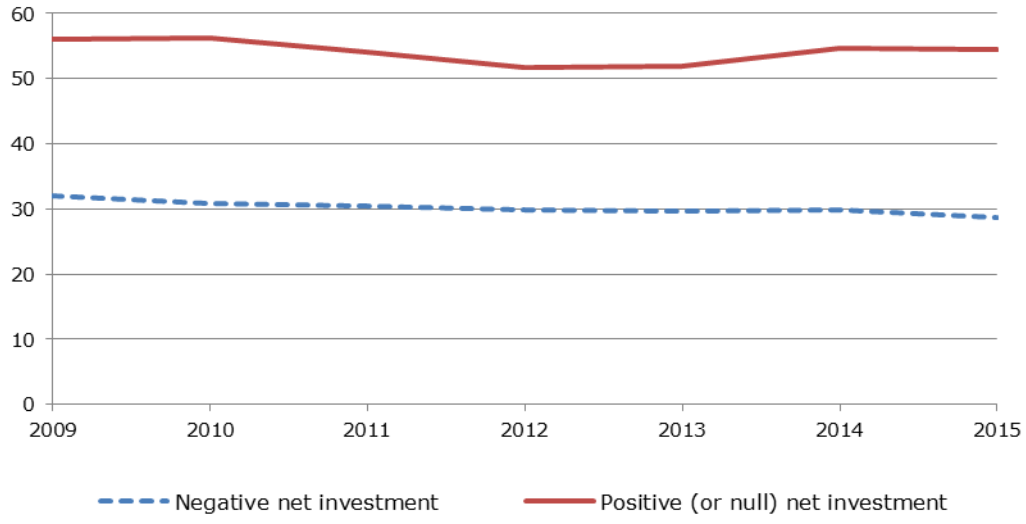
Figure 3.28 shows the relationship between net investment and the debt ratio. The figure shows that before the crisis there were small differences in debt levels depending on whether the firm showed positive or negative net investment. In the crisis, the debt ratio fell more rapidly in firms that increased their net investment than in firms that did not invest. Thus, firms invested relying to a greater extent on funds generated internally than on external finance as the overall debt ratio dropped. On the other hand, firms that did not increase their stock of capital maintained a constant debt level on average up to 2012. Only then, with the recovery of the economy, did these firms reduce their indebtedness. Therefore, it does not appear that the increase in investment from 2008 and 2015 was mainly owing to the allocation of financial funds from the financial markets.

Figure 3.28. Debt ratio (Interest bearing debt / Total assets) by net investment. Percentages



Source: SABI (Bureau Van Dijk) and own elaboration

Figure 3.29. Percentage of enterprises with positive growth of debt by net investment. Percentages



Source: SABI (Bureau Van Dijk) and own elaboration

Finally, Figure 2.29 shows the relationship between investment and growth of debt. On average, only 54.5% of Spanish firms that invested saw their debt increase in 2015, which means that almost half Spanish firms in 2015 increased their capital stocks with internally generated funds. They were not accessing external finance. On the other hand, about 30% of firms in which capital stocks fell saw debt increase. Therefore, these latter firms were reducing their productive capacity and increasing the proportion of debt in their liabilities. The increased debt in these firms was probably driven by debt restructuring owing to financial vulnerabilities or by high losses that lowered their equity.

Therefore, although the results do not allow us to offer a robust inference in causal terms, we can put forward the reasonable hypothesis that the misallocation of capital is an important factor in Spain and that the financial system was, at least up to 2015, still correcting for the excesses of the credit boom.

3.7. Conclusions

For most of the last decade, Spain suffered the consequences of an overinvestment cycle associated to a credit-fuelled construction boom, abundant liquidity, low interest rates and high corporate debt in a context of low productivity growth. Once the crisis began, the bursting of the real estate bubble combined with a global downturn, the restructuring of the banking sector and the credit crunch saw the weaknesses of the corporate sector come to light. Therefore, the excessive debt burden called for the purging of the excesses of the previous period.

In this context, the intensity of recovery and long-term sustainable growth depend, among other factors, on the capacity of the corporate sector to strengthen the balance sheet of viable firms to reduce both debt and its burden so that investment opportunities can be seized. The role of the financial sector is therefore relevant as it can contribute to business churn by funding more productive incumbents or emerging firms and favouring the exit of the non-viable firms.

Section 3 of this report analysed the deleveraging process of Spanish firms. We focused on measuring the financial strength of the non-financial business sector of the economy during the period 2008–2015. This section also gave insights into the role of the financial sector in the reallocation of capital across firms. To accomplish this, we examined more than 848,000 Spanish firms obtained from the SABI database (INFORMA) on several dimensions (liquidity, indebtedness, debt burden and profitability) to assess the percentage of firms, debt and employment at risk in Spain and how these indicators would be affected by an upsurge in interest rates or the forecasted GDP growth.

The evidence indicates that the aggregated corporate sector's rapid debt growth prior to the economic and financial crisis gave way to a deleveraging process, which recovered some of the ground lost in the years of the boom. For example, on average, the equity-to-debt and the debt-to-operating surplus ratios in 2016 were similar to in the early 2000s. However, despite lower debt indicators, Spanish firms are still fragile. This fragility is driven not so much by average debt levels but by debt burden and, more precisely, by the difficulties of the corporate sector to regain sufficient profitability to meet their financial commitments. For example, small firms in Spain have, on average, higher equity ratios than in other countries but lower profitability, making them more vulnerable financially. However, this weakness does not stem only from cyclical factors. It appears to be a structural problem as a significant fraction of firms shows systematically negative profitability levels despite improvements in the economy.

The picture painted by the aggregated financial ratios is complemented with firm-level information from SABI for the period 2008–2015. This information confirms that a significant percentage of Spanish firms are still fragile. Some common trends emerged in the analyses. First, the fragility of Spanish firms fell after 2012 thanks to the momentum generated by the recovery of activity in terms of GDP growth. Regardless of the indicator, fragility fell after 2012. For example, on average, liquidity increased from 2012, as the credit period dropped by 7%, to 77.3 days in 2015. Although this is still far higher (29%) than the upper limit established in the Spanish legislation on late payments (60 days). In the same vein, indebtedness, 37% in 2015, had fallen 10% since 2012 and 15% since 2008 according to the debt-to-assets ratio, and profitability (4.2% in 2015) increased 47% from the minimum values of 2012. The low interest rates, the reduction in debt and the improvement in profitability contributed to reducing the average fragility of firms. In 2015, firms obtained profits that tripled (by a factor of 3.2) the financial costs of debt servicing. Three years before, the factor was only 1.61 on average.

Therefore, the improvement of the indicators after 2012 clearly shows that, on average (and even in median terms), the financial situation of Spanish firms improved. However, the issue of financial fragility is more related to the part of the distribution of weak firms rather than the average. If we focus on these firms, the Spanish corporate sector was still vulnerable. For the 25% most vulnerable firms, the credit period was over 124 days (almost the double the median value), and debt-to-assets was 55%. In terms of profitability, the improvement already described in the previous paragraph was not sufficient to return to pre-crisis levels (5% on average in 2008), and the profitability of 25% of firms was still below -0.7%. Finally, if we consider firms unable to pay their financial expenses out of current profits, an ICR below 1, 32% of Spanish firms could have been considered at risk in 2015.

In 2015, 17% of firms and 11% of the employment were at risk according to the criteria adopted (debt ratio above the median of the industry and an ICR below 1 or negative profits). In the worse scenario estimated in this report, the percentage of debt at risk (36%) is twice the percentage of firms at risk and three times employment at risk. This means that debt is concentrated in fragile firms, i.e., fragile firms accumulate more debt than they should according to their proportion in terms of number or employees. This may put the stability of the corporate sector and even the financial sector at risk if the tailwinds currently pushing the Spanish economy along subside. On the other hand, since 2015, the last year available in this report, the financial fragility of Spanish firms will have fallen as economic growth is still robust and interest rates are still low. By size class, the problem of fragility most greatly affects microenterprises. 44% of the total debt of such firms is at risk. In contrast, only 30% of the debt held by large firms is at risk. In the same vein, there is a high proportion of debt at risk in construction and real estate, 51%. Therefore, the legacy of the past is still burdening the construction and real estate sector, which is yet to return to normal.

One challenge facing the Spanish economy is to continue to reduce corporate sector fragility in the current favourable macroeconomic environment. However, the GDP forecast for Spain predicts a slight reduction in GDP growth from the 3.4% of 2015 (last year analysed in this report). However, the expected reduction in economic activity should have a limited impact on the fragility of firms. If, instead of the observed growth in 2015, GDP in Spain had grown according to the European Commission Winter 2018 forecasts for 2018 and 2019 (2.6% and 2.1%, respectively), the financial fragility of Spanish firms would have been higher. More precisely, employment at risk would have increased 0.86 and 1.35 percentage points, up to 12.0% or 12.5% of total employment if GDP growth had been as predicted for 2018 or 2019, respectively. The percentage of debt (number of firms) at risk would have been 37.1% (17.9%) and 37.8% (18.4%), respectively, which represents an increase of 1.2 (0.8) and 1.9 (1.3) percentage points. The brunt of the impact (increased vulnerability) would be felt by small and medium enterprises and by the manufacturing and industry sectors, although a higher percentage of debt would be observed in construction and real estate, with 52.6% of debt at risk if GDP growth had been as predicted for 2019.

However, the biggest threat to the corporate sector is a possible increase in interest rates. According to our simulations, an increase in the cost of external funding by 100 basis points would increase the number of firms, debt and employment at risk by 2.2, 2.8 and 1.4 percentage points, respectively. In other words, 19.2% of firms, 38.6% of debt and 12.5% of employment would be compromised. Further increases of up to 300 basis points would mean that 22.4% of firms, 43.4% of debt and 14.8% of employment could be classified as risky. In terms of debt at risk, our results indicate that an increase of 100 basis points would reverse 33% of the observed reduction in debt at risk since 2012. For an increase of 300 basis points in the interest rates, 87% of the reduction of debt at risk since 2012 would be reversed. The tightening of monetary policy would also have a bigger impact on microenterprises and small firms than on medium-sized and, in particular, large firms. Additionally, the construction and real estate industry would be the sector most affected by an increase in interest rates.

Therefore, despite clear improvement since 2012, the Spanish economy still faces the legacy of the debt overhang from the last credit boom and the consequences of its debt

burden. At this stage, two main weaknesses still affect a large proportion of firms: excessive debt and reduced profitability, which in 2015, on average, had still not returned to the pre-crisis level. The two threats to corporate stability are, as shown, the possibility of a slowdown in economic activity and a rise in interest rates. However, since 2015, the last year available in this report, the Spanish economy has maintained robust economic growth above 3%. Furthermore, the quarterly information from the *Central de Balances* of the Bank of Spain indicates that profitability has kept rising: ordinary return on net assets of Spanish firms in the fourth quarter of 2017 was 6.3%, which is above the 5.0% for the fourth quarter of 2015. Therefore, the estimations presented here are a snapshot of the financial vulnerability of Spanish firms in 2015. This vulnerability is sure to have been reduced since then. The overall picture is relatively consistent with the information that the International Monetary Fund has recently provided for Spain in the Global Stability Report (IMF, 2018). Using the indicator developed by the IMF, the results for Spain indicate a sharp drop in the risk of credit allocation in Spain since 2013 (Figure 2.5.3, page 64) that continued in 2016 but had still not rebounded to pre-crisis levels.

Some additional questions addressed in this section concern the relationship between corporate health and the financial sector, particularly the banking industry. More precisely, we provided information that hints to the role of the financial sector as an efficient capital allocator from the beginning of the crisis. Did the financial sector fund more productive firms in the market, or did it worsen capital misallocation? This issue is particularly relevant for the Spanish economy, traditionally characterised by low productivity. Firm fragility in Spain is associated to a great extent to a lack of profitability. In the long run, higher profitability in competitive markets can only be achieved by increasing productivity. As the results of the determinants of the probability of being at risk indicate, in addition to other factors (such as industry, age, size and the presence of collateral), productivity is key to reducing the chances of being financially at risk.

The scarce information available shows that after the outbreak of the crisis in 2007, the volume of refinanced loans soared, probably to disguise non-performing loans on bank balance sheets. The Bank of Spain forced banks to be more transparent and rigorous with their accounting standards and the criteria for classifying assets by risk. The objective was to prevent banks from using loan refinancing to hide delinquent loans. As a result, of the 182,435 million euros in refinanced/restructured loans, the proportion of doubtful loans increased to 50.9% and sub-standard loans to 22.6%. Consequently, standard-risk loans fell to 26.6% of the total. Additionally, refinanced credit was concentrated in real estate activities. According to the European Banking Authority (EBA), in September 2017, Spain was the eighth-highest ranked EU country in terms of forbearance ratio and number one in terms of volume of refinanced loans: 21.8% of the EU total. However, although the level is still high (it represents 21% of the total in the EU and 8.6% of the volume of credit to individuals in Spain), there has been a considerable reduction since 2015.

Therefore, up until recently, banks had refinanced past loans, in some cases to non-viable companies, to avoid the cost of risk. As a result, the allocation of capital during the crisis was probably biased in that funds did not flow towards the most productive industries. However, the measures adopted by the Bank of Spain, which clarified the refinancing classification criteria, have reduced the forbearance ratio, although it remains high in the European context, which is a matter of concern from the point of view of the efficient allocation of financing.

We showed further partial evidence of the capital misallocation by examining the funding that was directed towards unproductive companies. We found that there is an inverse relationship between TFP levels and debt ratios. Thus, the lower the productivity, the higher the debt ratio, although this relationship is not observed for TFP growth. There is also a clear negative relationship between productivity and the percentage of firms at risk. The financial fragility of less productive firms (and firms with lower productivity growth) is more persistent than in the other quartiles, in which it is more cyclical. The proportion of firms investing with internally-generated funds rose. Additionally, there was a significant percentage of firms with negative net investment but increasing debt levels. Therefore,

although the results do not permit making a robust inference in causal terms, we can put forward the reasonable hypothesis that the misallocation of capital is an important factor in Spain and that the financial system was, at least up to 2015, still correcting for the excesses of the credit boom.

Furthermore, to what extent does Spain need to continue the deleveraging process that began in 2008? Intense deleveraging in the corporate sector saw a 35 percentage point reduction in terms of GDP. In addition, the private debt-to-GDP ratio has come into line with the EU average. Although the debt-to-equity ratio in 2008 was 20 percentage points higher than the EU average, at present it is below the average. Spain has also brought its debt burden into line, as the debt-to-operating surplus ratio in Spain is equal to the EU average. According to the BIS, the debt-to-service ratio (financial expenses plus repayment of principal as a proportion of gross income) fell from a high of 72% in 2007 to 35% in the third quarter of 2017. In 2017, Spain's debt-to-service ratio was comparable to the UK's (36%) and below the Netherlands' (39%), the US's (41%) and France's (53%).

In this context, the average indebtedness of Spain's corporate sector does not appear excessive. Therefore, further deleveraging is not necessary since this would probably reduce investment levels. However, as shown in this report, disguised among the average values are a large percentage of financially fragile companies, most of them in the construction and real estate sectors. Therefore, although deleveraging is not necessary overall, some deleveraging is needed in the case of these firms to continue to reduce their indebtedness, lessen their debt service and improve their medium- and long-term viability. The high percentage of debt at risk in the construction and real estate sectors explains why at the end of 2017 a large amount (47%) of delinquent loans in Spanish banks were concentrated in these two sectors. Therefore, reducing the vulnerability of these companies is key to alleviating the still high amount of problematic assets.

Finally, the information available at the micro level forced us to carry out our analysis only until 2015. Thus, we had to exclude the subsequent years of consolidation of the economic recovery (with GDP growth rates above 3% until the end of 2017) and of continuous improvements in the conditions of access to finance. Therefore, it is foreseeable that at present the percentage of debt at risk is lower than that estimated for 2015. In any case, given that 2015 starts with a high percentage of debt at risk, the effect of a potential rise in interest rates or a slowdown in economic growth remains a concern, especially given that 21% of all refinanced loans across the EU are on the balance sheets of Spanish banks.

Appendix 3.1. SABI database and sample selection criteria

The main database we used in Sections 3 and 4 was SABI (*Sistema de Análisis de Datos Ibéricos*), the Spanish partner of Bureau van Dijk's ORBIS. This database contains financial information on more than one million Spanish firms. It also includes the company's activity sector, status (active, in bankruptcy proceedings, etc.), legal form, age, etc. As each edition (DVD) of SABI includes information from the last ten years and is incomplete for both the initial period and, depending on the month of the update, the most recent year, different editions were used to get a complete picture. Specifically, we used the DVDs dated March and July 2009, June and October 2010, June 2016 and February and July 2017.

The period covered is 2008–2015[42]. We discarded data prior to 2008 due to a break in the data caused by a change in the accounting standards in 2007. This change prevents the calculation of a homogenous series of interest bearing debt for years prior to 2008.

From the total sample in SABI, we excluded firms as follows:

- We considered only firms with unconsolidated financial statements. The use of consolidated financial statements would cause the industry definition to be less precise as they may include firms operating in different sectors.
- We excluded firms that did not have NACE (4-digits) activity information. We discarded firms in the NACE Rev. 2 sections K, O, T and U (financial sector, public administration and defence, compulsory social security, activities of households as employers, and activities of extraterritorial organisations and bodies). Table A.3.1.1 includes the industry classification used in this report.
- We considered only commercial companies or civil law partnerships and only private-sector companies, i.e., we discarded public entities.
- We excluded firms for which there was not a complete record of all the necessary information to carry out the analysis.
- We discarded companies that were not economically active (including those in bankruptcy proceedings).[43]
- We also considered only firms present in the sample for at least three consecutive years.

Additionally, we applied the following reliability criteria:

- Total assets must be greater than zero.
- The net profit for the year on the income statement must be equal to that in the shareholders' funds.
- We excluded firms in which the sum of capital, reserves, share premium, interest dividends and other equity instruments was zero or negative.

[42] In general, the companies included in SABI have as their closing date December 31st of the corresponding year. In this case, it is assumed that the annual accounts correspond to that year. When the closing date is not December 31st, we assumed that the annual accounts refer to year *t-1* if the closing date is earlier than or equal to *31/06/t*, or that they refer to year *t* if the closing is after *31/06/t*.

[43] Given that in SABI firm status is not an annualised variable (only the current status of the firm appears, not the historical changes) and that the time series is not provided, up to 18 DVDs have been used between January of 2004 and February of 2017 to obtain a time series that covers the entire period.

- The sum of current liabilities and non-current liabilities must be equal to total liabilities (we allowed only differences of below 2% caused by rounding).

- We ruled out firms in which the sum of the operating income, net financial revenue and other financial results was different to the pre-tax result (we allowed only differences are below 2% caused by rounding).

- Interest bearing debt must be positive. We ruled out firms with interest-bearing debt above the 99^{th} percentile of the distribution.

- Financial expenses must be positive.

Table A. 3.1. 1. Industry classification

Sector	Description	CNAE rev. 2
Primary sector	Agriculture, forestry and fishing	A
Energy	Mining and quarrying	B
	Electricity, gas, steam and air conditioning supply	D
	Water supply; sewerage, waste management and remediation activities	E
Manufacturing	Food products, beverages and tobacco	C10_C12
	Textiles, wearing apparel, leather and related products	C13_C15
	Wood and paper products; printing and reproduction of recorded media	C16_C18
	Coke and refined petroleum products	C19
	Chemicals and chemical products excl. pharmaceuticals	C20
	Basic pharmaceutical products and pharmaceutical preparations	C21
	Rubber and plastics products, and other non-metallic mineral products	C22_C23
	Basic metals and fabricated metal products, except machinery and equipment	C24_C25
	Computer, electronic and optical products	C26
	Electrical equipment	C27
	Machinery and equipment n.e.c.	C28
	Transport equipment	C29_C30
	Other manufacturing; repair and installation of machinery and equipment	C31_C33
Construction	Construction	F
	Real estate activities	L
Services	Wholesale and retail trade and repair of motor vehicles and motorcycles	G45
	Wholesale trade, except of motor vehicles and motorcycles	G46
	Retail trade, except of motor vehicles and motorcycles	G47
	Transport and storage	H49_H52
	Postal and courier activities	H53
	Accommodation and food service activities	I
	Publishing, audiovisual and broadcasting activities	J58_J60
	Telecommunications	J61
	IT and other information services	J62_J63
	Professional, scientific, technical, administrative and support service activities	M_N
	Education	P
	Health and social work	Q
	Arts, entertainment and recreation	R
	Other service activities	S

Source: SABI (Bureau Van Dijk) and own elaboration.

Table A. 3.1. 2. Sample cleaning. 2008–2015

	SABI	Sample used in this report
Observations	5,984,870	4,263,427
Firms	1,184,916	848,460

Source: SABI (Bureau Van Dijk) and own elaboration.

Appendix 3.2

Table A. 3.2. 1. Descriptives of the sample

a) Total firms

			2008	2009	2010	2011	2012	2013	2014	2015
Liquidity ratios										
	Current Ratio (current assets / current liabilities)	mean	1.31	1.30	1.32	1.30	1.27	1.27	1.28	1.31
		median	1.27	1.32	1.34	1.34	1.35	1.37	1.42	1.48
		p25	0.78	0.77	0.77	0.76	0.75	0.75	0.78	0.83
	Liquidity Ratio ((current assets-stocks) / current liabilities)	mean	0.77	0.79	0.82	0.81	0.81	0.82	0.85	0.87
		median	0.73	0.74	0.75	0.73	0.73	0.75	0.79	0.84
		p25	0.28	0.28	0.28	0.26	0.25	0.26	0.28	0.31
	Credit Period (creditors / operating revenue *360)	mean	87.92	96.31	93.24	86.70	82.81	80.36	79.57	77.26
		median	65.75	71.12	71.49	69.71	70.47	70.93	67.51	63.77
		p75	126.51	141.66	142.73	143.09	146.72	146.95	136.32	124.05
Financial structure (in which total debt=long term debt + loans)										
	Debt Ratio (interest bearing debt / total assets)	mean	43.79%	44.31%	43.38%	42.35%	41.59%	40.14%	39.04%	37.39%
		median	33.76%	32.94%	32.09%	30.87%	28.85%	27.06%	25.93%	24.53%
		p75	65.31%	65.52%	64.61%	63.64%	61.69%	60.00%	57.72%	55.44%
	Gearing (interest bearing debt / shareholders' funds)	mean	125.59%	123.59%	118.50%	110.26%	106.10%	98.40%	93.34%	86.81%
		median	40.91%	34.51%	32.38%	28.24%	23.97%	21.90%	22.60%	23.09%
		p75	228.57%	203.96%	190.00%	173.94%	156.66%	146.30%	140.00%	134.44%
Debt burden										
	Debt to EBITDA Ratio (interest bearing debt / (EBITDA+ financial income))	mean	6.43	8.04	7.48	7.93	8.30	7.77	6.47	5.94
		median	2.58	2.47	2.54	2.34	2.15	2.21	2.40	2.43
		p75	7.51	7.89	8.29	8.19	7.92	7.97	7.95	7.62
	Interest Coverage Ratio ((EBITDA+ financial income) / interest expenses)	mean	3.43	3.41	4.14	3.51	3.27	3.59	4.39	5.32
		median	3.62	3.37	4.05	3.49	3.18	3.86	4.95	6.59
		p25	0.95	0.27	0.33	-0.19	-0.61	-0.11	1.02	1.80
	Interest Coverage Ratio ((EBIT+financial income) / interest expenses)	mean	2.11	1.82	2.27	1.78	1.61	1.83	2.52	3.17
		median	1.57	1.33	1.43	1.22	1.13	1.35	1.84	2.70
		p25	-0.77	-2.14	-2.67	-3.48	-4.32	-3.92	-2.13	-0.65
	Cash flow to Debt ratio (cash flow / total debt)	mean	7.77%	7.09%	8.07%	6.98%	4.67%	6.70%	9.26%	10.86%
		median	8.50%	6.52%	6.53%	5.37%	4.81%	5.80%	7.99%	10.38%
		p25	-1.39%	-3.31%	-2.87%	-4.53%	-5.97%	-4.22%	-1.48%	0.10%
Profitability										
	Profit Margin (P or L for the period / Operating revenue)	mean	2.04%	2.15%	2.63%	1.70%	0.19%	1.36%	2.66%	3.29%
		median	1.00%	0.69%	0.67%	0.44%	0.34%	0.55%	0.97%	1.46%
		p25	-3.30%	-6.39%	-6.04%	-7.80%	-9.04%	-7.60%	-4.50%	-1.82%
	EBITDA / Sales ((EBITDA+financial income) / Operating revenue)	mean	9.97%	9.86%	10.00%	9.00%	8.46%	8.52%	9.73%	9.68%
		median	6.20%	5.67%	5.37%	4.84%	4.54%	4.85%	5.63%	6.25%
		p25	1.57%	0.55%	0.51%	-0.49%	-1.42%	-0.43%	0.98%	1.66%
	ROA ((EBIT + financial income) / average total assets)	mean	5.05%	3.28%	3.72%	3.18%	2.86%	3.05%	3.93%	4.20%
		median	3.23%	2.00%	1.75%	1.36%	1.12%	1.34%	1.94%	2.57%
		p25	-0.99%	-2.78%	-2.72%	-3.56%	-4.24%	-3.23%	-1.77%	-0.67%

b) Micro firms

			2008	2009	2010	2011	2012	2013	2014	2015
Liquidity ratios										
	Current Ratio (current assets / current liabilities)	mean	1.62	1.62	1.60	1.67	1.70	1.68	1.61	1.68
		median	1.23	1.28	1.30	1.31	1.31	1.33	1.39	1.46
		p25	0.72	0.71	0.71	0.70	0.69	0.70	0.72	0.76
	Liquidity Ratio ((current assets-stocks) / current liabilities)	mean	0.72	0.70	0.70	0.70	0.76	0.77	0.76	0.85
		median	0.64	0.65	0.65	0.64	0.63	0.65	0.69	0.73
		p25	0.22	0.22	0.22	0.21	0.20	0.21	0.22	0.23
	Credit Period (creditors / operating revenue *360)	mean	113.69	125.86	124.83	119.76	118.30	119.18	111.85	104.34
		median	66.11	72.00	72.48	71.46	72.87	73.55	69.58	65.45
		p75	138.46	156.43	157.66	159.68	164.57	165.00	153.13	140.28
Financial structure										
	Debt Ratio (interest bearing debt / total assets)	mean	44.64%	44.20%	43.48%	41.97%	39.09%	36.48%	36.25%	33.85%
		median	35.60%	34.83%	34.00%	32.65%	30.42%	28.39%	27.09%	25.50%
		p75	69.57%	69.46%	68.62%	67.60%	65.46%	63.64%	61.49%	59.18%
	Gearing (interest bearing debt / shareholders' funds)	mean	109.14%	105.58%	102.04%	93.61%	80.92%	71.52%	70.84%	62.49%
		median	33.16%	27.90%	26.54%	22.68%	19.10%	17.32%	18.10%	18.75%
		p75	231.94%	207.69%	193.75%	176.59%	158.33%	147.81%	140.37%	134.18%
Debt burden										
	Debt to EBITDA Ratio (interest bearing debt / (EBITDA+ financial income))	mean	10.29	14.41	17.07	17.53	19.58	16.73	12.84	9.80
		median	2.59	2.46	2.49	2.26	2.05	2.13	2.36	2.46
		p75	8.08	8.41	8.83	8.74	8.41	8.55	8.57	8.24
	Interest Coverage Ratio ((EBITDA+ financial income) / interest expenses)	mean	2.53	2.02	2.09	1.89	1.60	2.14	2.94	4.38
		median	3.34	3.05	3.65	3.14	2.87	3.51	4.56	6.05
		p25	0.53	-0.19	-0.27	-0.88	-1.38	-0.86	0.34	1.36
	Interest Coverage Ratio ((EBIT+financial income) / interest expenses)	mean	1.31	0.79	0.56	0.39	0.02	0.34	1.03	2.10
		median	1.42	1.19	1.26	1.06	0.92	1.17	1.60	2.32
		p25	-1.41	-2.98	-3.74	-4.76	-5.73	-5.39	-3.45	-1.76
	Cash flow to Debt ratio (cash flow / total debt)	mean	4.00%	2.67%	1.72%	0.83%	-0.25%	0.99%	3.23%	6.16%
		median	6.63%	5.00%	5.00%	3.93%	3.45%	4.29%	6.21%	8.16%
		p25	-2.80%	-4.68%	-4.28%	-6.17%	-7.71%	-5.88%	-2.82%	-0.91%
Profitability										
	Profit Margin (P or L for the period / Operating revenue)	mean	1.56%	0.20%	-1.10%	-2.15%	-3.43%	-1.89%	0.66%	3.42%
		median	0.87%	0.57%	0.55%	0.32%	0.21%	0.43%	0.84%	1.31%
		p25	-5.20%	-8.69%	-8.39%	-10.43%	-11.68%	-10.09%	-6.71%	-3.60%
	EBITDA / Sales ((EBITDA+financial income) / Operating revenue)	mean	11.79%	9.93%	8.38%	8.22%	7.33%	7.99%	9.43%	10.94%
		median	6.15%	5.62%	5.31%	4.76%	4.44%	4.80%	5.70%	6.39%
		p25	1.06%	-0.37%	-0.49%	-1.91%	-2.97%	-1.86%	0.37%	1.25%
	ROA ((EBIT + financial income) / average total assets)	mean	3.07%	1.78%	1.08%	0.84%	0.30%	0.64%	1.44%	2.26%
		median	2.67%	1.60%	1.37%	0.98%	0.77%	0.98%	1.53%	2.10%
		p25	-1.95%	-3.74%	-3.66%	-4.59%	-5.24%	-4.13%	-2.54%	-1.31%

c) Small firms

			2008	2009	2010	2011	2012	2013	2014	2015
Liquidity ratios										
	Current Ratio (current assets / current liabilities)	mean	1.56	1.69	1.69	1.63	1.53	1.55	1.60	1.65
		median	1.36	1.45	1.47	1.48	1.50	1.52	1.54	1.58
		p25	0.94	0.96	0.96	0.95	0.95	0.97	0.99	1.02
	Liquidity Ratio ((current assets-stocks) / current liabilities)	mean	0.86	0.94	0.95	0.94	0.92	0.94	0.99	1.03
		median	0.89	0.95	0.96	0.95	0.97	1.00	1.02	1.06
		p25	0.45	0.48	0.49	0.47	0.48	0.50	0.53	0.56
	Credit Period (creditors / operating revenue *360)	mean	88.36	94.25	93.24	87.80	85.17	82.97	80.27	75.25
		median	65.42	69.43	69.74	66.25	65.84	65.52	63.55	60.84
		p75	104.63	112.33	112.17	107.03	105.95	104.18	99.82	93.39
Financial structure										
	Debt Ratio (interest bearing debt / total assets)	mean	44.19%	42.63%	43.06%	42.15%	41.49%	39.32%	36.65%	35.22%
		median	29.49%	28.04%	26.72%	25.85%	24.14%	22.76%	22.14%	21.45%
		p75	54.26%	53.31%	51.52%	50.42%	48.43%	46.79%	45.58%	44.33%
	Gearing (interest bearing debt / shareholders' funds)	mean	121.07%	107.18%	108.23%	101.40%	97.73%	88.27%	77.00%	72.42%
		median	57.83%	50.44%	46.45%	42.70%	37.61%	34.77%	34.79%	35.26%
		p75	220.68%	192.84%	177.49%	163.93%	148.27%	138.41%	135.37%	131.34%
Debt burden										
	Debt to EBITDA Ratio (interest bearing debt / (EBITDA+ financial income))	mean	7.54	9.36	9.77	10.44	11.84	10.29	7.79	5.59
		median	2.54	2.49	2.61	2.47	2.33	2.41	2.46	2.37
		p75	6.33	6.65	7.01	6.87	6.74	6.64	6.52	6.34
	Interest Coverage Ratio ((EBITDA+ financial income) / interest expenses)	mean	2.84	2.69	2.89	2.50	2.11	2.60	3.51	5.47
		median	4.18	4.13	4.99	4.30	3.92	4.71	5.85	7.86
		p25	1.61	1.30	1.53	1.18	0.90	1.43	2.00	2.69
	Interest Coverage Ratio ((EBIT+financial income) / interest expenses)	mean	1.60	1.15	1.31	1.00	0.71	0.98	1.69	3.52
		median	1.93	1.68	1.90	1.65	1.51	1.86	2.52	3.69
		p25	0.44	-0.45	-0.47	-0.92	-1.46	-0.77	0.45	1.21
	Cash flow to Debt ratio (cash flow / total debt)	mean	6.29%	4.87%	5.26%	3.84%	2.35%	4.31%	6.94%	11.82%
		median	14.77%	12.24%	12.55%	11.28%	10.48%	12.43%	15.58%	19.24%
		p25	1.70%	0.21%	0.66%	-0.25%	-0.92%	0.40%	2.61%	4.50%
Profitability										
	Profit Margin (P or L for the period / Operating revenue)	mean	1.55%	0.55%	1.05%	0.07%	-1.03%	0.37%	1.75%	3.91%
		median	1.28%	0.97%	0.96%	0.74%	0.64%	0.88%	1.30%	1.76%
		p25	-0.10%	-1.64%	-1.23%	-2.04%	-2.53%	-1.32%	0.06%	0.32%
	EBITDA / Sales ((EBITDA+financial income) / Operating revenue)	mean	8.84%	8.24%	8.11%	7.49%	6.53%	6.98%	8.24%	9.83%
		median	6.20%	5.68%	5.31%	4.82%	4.55%	4.78%	5.30%	5.80%
		p25	2.51%	1.81%	1.72%	1.29%	0.93%	1.39%	2.02%	2.48%
	ROA ((EBIT + financial income) / average total assets)	mean	4.16%	2.46%	2.42%	2.00%	1.43%	1.88%	2.77%	4.58%
		median	4.39%	3.06%	2.78%	2.46%	2.24%	2.54%	3.27%	4.00%
		p25	0.77%	-0.47%	-0.40%	-0.95%	-1.47%	-0.62%	0.25%	0.94%

d) Medium-sized firms

			2008	2009	2010	2011	2012	2013	2014	2015
Liquidity ratios										
	Current Ratio (current assets / current liabilities)	mean	1.48	1.35	1.40	1.41	1.39	1.33	1.34	1.40
		median	1.33	1.37	1.38	1.40	1.41	1.40	1.42	1.46
		p25	0.97	0.97	0.99	0.98	0.98	0.98	0.99	1.02
	Liquidity Ratio ((current assets-stocks) / current liabilities)	mean	0.85	0.88	0.87	0.89	0.91	0.87	0.96	0.97
		median	0.93	0.98	1.00	0.99	1.00	1.02	1.02	1.06
		p25	0.54	0.58	0.60	0.59	0.60	0.60	0.63	0.64
	Credit Period (creditors / operating revenue *360)	mean	83.96	88.55	87.80	80.42	78.47	76.63	74.62	70.18
		median	63.28	67.14	67.35	62.68	62.26	61.99	60.29	57.86
		p75	97.52	102.39	101.72	95.80	93.22	93.30	89.37	85.52
Financial structure										
	Debt Ratio (interest bearing debt / total assets)	mean	44.85%	47.86%	46.38%	46.03%	46.78%	48.19%	44.39%	43.38%
		median	31.29%	29.64%	28.73%	27.86%	26.47%	25.90%	24.92%	23.92%
		p75	54.25%	53.00%	51.61%	50.41%	48.64%	47.66%	46.86%	45.82%
	Gearing (interest bearing debt / shareholders' funds)	mean	128.67%	141.24%	131.18%	124.41%	130.14%	139.76%	116.23%	108.24%
		median	70.28%	61.42%	58.43%	53.53%	47.85%	46.63%	46.06%	44.42%
		p75	222.21%	197.54%	186.78%	175.81%	158.82%	155.90%	151.61%	147.65%
Debt burden										
	Debt to EBITDA Ratio (interest bearing debt / (EBITDA+ financial income))	mean	6.69	9.61	9.42	9.23	11.89	11.32	7.91	6.71
		median	2.73	2.56	2.72	2.66	2.54	2.52	2.60	2.43
		p75	6.61	6.89	7.21	7.03	6.65	6.55	6.51	6.26
	Interest Coverage Ratio ((EBITDA+ financial income) / interest expenses)	mean	3.04	2.83	3.26	2.95	2.12	2.34	3.50	4.58
		median	4.19	4.59	6.02	5.08	4.70	5.23	6.41	8.87
		p25	1.67	1.45	1.97	1.76	1.58	1.76	2.36	3.17
	Interest Coverage Ratio ((EBIT+financial income) / interest expenses)	mean	1.87	1.33	1.44	1.31	0.72	0.95	1.94	2.78
		median	2.07	1.96	2.51	2.18	2.02	2.28	3.11	4.73
		p25	0.61	-0.03	0.36	0.19	-0.12	0.11	1.01	1.40
	Cash flow to Debt ratio (cash flow / total debt)	mean	7.78%	5.23%	5.45%	4.76%	2.15%	3.37%	7.04%	9.81%
		median	14.27%	13.44%	15.07%	13.92%	13.88%	15.23%	18.28%	22.29%
		p25	1.55%	0.72%	2.37%	1.80%	1.29%	2.24%	4.42%	6.16%
Profitability										
	Profit Margin (P or L for the period / Operating revenue)	mean	2.21%	0.92%	1.14%	0.84%	-1.24%	-0.02%	1.76%	3.40%
		median	1.60%	1.36%	1.50%	1.28%	1.17%	1.37%	1.81%	2.36%
		p25	0.07%	-0.75%	0.02%	-0.37%	-0.83%	-0.22%	0.19%	0.47%
	EBITDA / Sales ((EBITDA+financial income) / Operating revenue)	mean	9.77%	8.83%	8.84%	8.91%	7.02%	7.78%	9.13%	9.87%
		median	6.91%	6.30%	6.33%	5.95%	5.72%	5.76%	6.27%	6.71%
		p25	2.91%	2.26%	2.47%	2.25%	1.95%	2.16%	2.68%	2.93%
	ROA ((EBIT + financial income) / average total assets)	mean	4.78%	2.87%	2.72%	2.71%	1.68%	2.24%	3.47%	4.50%
		median	4.64%	3.41%	3.51%	3.37%	3.19%	3.41%	4.12%	4.89%
		p25	1.11%	-0.01%	0.40%	0.18%	-0.07%	0.15%	0.96%	1.58%

e) Large firms

			2008	2009	2010	2011	2012	2013	2014	2015
Liquidity ratios										
	Current Ratio (current assets / current liabilities)	mean	1.05	1.06	1.08	1.07	1.03	1.04	1.07	1.09
		median	1.20	1.21	1.23	1.21	1.25	1.26	1.28	1.30
		p25	0.89	0.89	0.92	0.90	0.92	0.91	0.94	0.95
	Liquidity Ratio ((current assets-stocks) / current liabilities)	mean	0.72	0.74	0.79	0.78	0.75	0.78	0.80	0.81
		median	0.92	0.95	0.97	0.96	0.97	1.00	1.00	1.02
		p25	0.53	0.54	0.58	0.58	0.59	0.62	0.62	0.64
	Credit Period (creditors / operating revenue *360)	mean	83.66	93.70	89.10	82.63	77.35	74.38	75.55	75.79
		median	64.55	69.03	67.99	65.02	63.04	62.15	61.54	60.10
		p75	98.30	105.96	103.95	95.37	92.22	91.08	90.15	86.65
Financial structure										
	Debt Ratio (interest bearing debt / total assets)	mean	42.77%	43.61%	42.23%	41.11%	40.53%	38.58%	38.87%	37.09%
		median	32.82%	31.55%	30.58%	29.81%	28.07%	26.40%	26.32%	25.59%
		p75	56.08%	54.53%	52.29%	50.58%	48.86%	46.85%	46.52%	45.57%
	Gearing (interest bearing debt / shareholders' funds)	mean	135.83%	133.31%	126.18%	116.43%	114.03%	102.02%	103.34%	96.23%
		median	84.25%	72.79%	70.69%	69.32%	63.37%	58.01%	57.44%	56.77%
		p75	246.10%	222.14%	205.53%	199.71%	181.41%	167.92%	171.70%	168.11%
Debt burden										
	Debt to EBITDA Ratio (interest bearing debt / (EBITDA+ financial income))	mean	5.11	6.17	5.27	5.79	5.58	5.30	4.92	5.15
		median	2.73	2.44	2.73	2.63	2.49	2.46	2.49	2.38
		p75	6.73	6.50	6.69	6.47	6.10	6.06	6.05	5.92
	Interest Coverage Ratio ((EBITDA+ financial income) / interest expenses)	mean	4.16	4.33	5.53	4.54	4.56	4.79	5.30	5.74
		median	4.37	5.48	6.97	5.69	5.75	6.51	7.70	9.90
		p25	1.58	1.37	2.23	1.92	1.82	2.09	2.57	3.15
	Interest Coverage Ratio ((EBIT+financial income) / interest expenses)	mean	2.74	2.65	3.56	2.69	2.77	2.91	3.37	3.45
		median	2.18	2.46	3.24	2.80	2.83	3.29	4.11	5.55
		p25	0.47	0.00	0.58	0.53	0.39	0.74	1.07	1.40
	Cash flow to Debt ratio (cash flow / total debt)	mean	10.20%	10.54%	13.01%	11.61%	8.70%	11.62%	13.18%	12.49%
		median	14.15%	14.41%	16.34%	15.80%	15.94%	18.91%	20.86%	23.09%
		p25	0.81%	0.20%	2.58%	2.24%	2.03%	3.33%	4.72%	6.12%
Profitability										
	Profit Margin (P or L for the period / Operating revenue)	mean	2.28%	3.50%	4.29%	3.09%	1.60%	2.58%	3.54%	3.07%
		median	1.90%	1.74%	1.98%	1.66%	1.48%	1.67%	1.97%	2.37%
		p25	0.00%	-0.42%	0.12%	0.01%	-0.29%	0.01%	0.17%	0.36%
	EBITDA / Sales ((EBITDA+financial income) / Operating revenue)	mean	10.10%	10.74%	11.21%	9.57%	9.60%	9.24%	10.37%	9.41%
		median	6.75%	6.39%	6.44%	6.18%	5.97%	6.12%	6.42%	6.52%
		p25	2.83%	2.14%	2.63%	2.35%	2.21%	2.30%	2.62%	2.89%
	ROA ((EBIT + financial income) / average total assets)	mean	6.34%	4.53%	5.68%	4.74%	4.86%	4.83%	5.49%	4.63%
		median	4.75%	3.64%	4.14%	4.08%	3.99%	4.14%	4.62%	5.15%
		p25	0.89%	0.00%	0.63%	0.68%	0.49%	0.72%	1.31%	1.64%

f) Primary sector

			2008	2009	2010	2011	2012	2013	2014	2015
Liquidity ratios										
	Current Ratio (current assets / current liabilities)	mean	1.20	1.24	1.26	1.27	1.28	1.31	1.35	1.43
		median	1.14	1.21	1.27	1.30	1.32	1.34	1.40	1.48
		p25	0.61	0.63	0.65	0.67	0.67	0.69	0.72	0.77
	Liquidity Ratio ((current assets-stocks) / current liabilities)	mean	0.82	0.85	0.84	0.82	0.82	0.83	0.87	0.89
		median	0.66	0.69	0.74	0.74	0.77	0.79	0.84	0.87
		p25	0.26	0.27	0.29	0.30	0.31	0.32	0.35	0.37
	Credit Period (creditors / operating revenue *360)	mean	95.88	102.53	94.76	90.44	84.50	82.09	80.65	76.86
		median	71.57	72.00	72.00	72.56	74.58	72.35	68.33	67.19
		p75	152.88	161.50	153.21	155.51	158.07	154.04	143.44	138.24
Financial structure										
	Debt Ratio (interest bearing debt / total assets)	mean	37.44%	35.92%	35.91%	34.62%	33.31%	31.79%	30.99%	30.11%
		median	37.83%	35.67%	34.11%	31.12%	29.57%	27.81%	26.87%	26.38%
		p75	66.67%	65.38%	63.66%	61.28%	59.72%	58.37%	56.96%	56.03%
	Gearing (interest bearing debt / shareholders' funds)	mean	84.73%	77.76%	76.51%	71.27%	66.30%	60.91%	58.05%	54.82%
		median	49.33%	43.75%	43.16%	36.11%	33.65%	30.38%	29.60%	30.39%
		p75	242.25%	215.29%	205.78%	183.66%	170.33%	161.73%	152.88%	146.21%
Debt burden										
	Debt to EBITDA Ratio (interest bearing debt / (EBITDA+ financial income))	mean	7.81	6.83	6.52	6.92	6.55	6.05	5.46	5.22
		median	2.92	3.04	3.23	2.89	2.77	2.78	2.67	2.73
		p75	7.92	8.17	8.53	7.98	7.60	7.56	7.46	7.44
	Interest Coverage Ratio ((EBITDA+ financial income) / interest expenses)	mean	2.94	3.99	5.27	4.29	4.39	4.72	5.29	6.60
		median	3.66	4.04	5.12	4.89	4.89	5.66	6.23	7.09
		p25	0.60	0.90	1.37	1.19	1.14	1.50	1.68	2.01
	Interest Coverage Ratio ((EBIT+financial income) / interest expenses)	mean	1.30	1.98	2.67	2.06	2.20	2.43	2.92	3.69
		median	1.37	1.47	1.73	1.64	1.70	2.05	2.32	2.71
		p25	-1.65	-1.52	-1.49	-1.62	-1.72	-1.18	-0.70	-0.60
	Cash flow to Debt ratio (cash flow / total debt)	mean	7.62%	9.74%	10.28%	9.44%	8.60%	9.69%	12.55%	14.00%
		median	8.53%	8.87%	9.39%	9.09%	9.60%	10.60%	11.70%	12.19%
		p25	-1.76%	-0.96%	-0.05%	-0.64%	-0.79%	0.01%	0.62%	0.97%
Profitability										
	Profit Margin (P or L for the period / Operating revenue)	mean	1.23%	2.82%	2.63%	2.03%	1.03%	1.69%	3.00%	3.61%
		median	0.94%	1.03%	1.14%	1.01%	1.19%	1.56%	1.85%	2.15%
		p25	-7.40%	-7.95%	-6.20%	-6.44%	-7.09%	-4.98%	-3.78%	-2.76%
	EBITDA / Sales ((EBITDA+financial income) / Operating revenue)	mean	8.54%	10.52%	10.39%	9.14%	9.14%	9.17%	9.89%	9.89%
		median	10.00%	10.33%	10.25%	9.69%	10.08%	10.50%	10.91%	11.21%
		p25	1.71%	1.99%	2.22%	1.80%	1.73%	2.31%	2.69%	2.85%
	ROA ((EBIT + financial income) / average total assets)	mean	2.74%	3.00%	3.09%	2.69%	2.74%	2.87%	3.41%	3.49%
		median	2.47%	2.14%	1.98%	1.91%	2.00%	2.17%	2.41%	2.54%
		p25	-2.04%	-1.83%	-1.46%	-1.54%	-1.57%	-1.13%	-0.82%	-0.67%

g) Energy sector

			2008	2009	2010	2011	2012	2013	2014	2015
Liquidity ratios										
	Current Ratio (current assets / current liabilities)	mean	0.92	0.93	0.97	0.98	0.90	0.96	0.95	1.03
		median	1.11	1.19	1.21	1.26	1.20	1.12	1.16	1.24
		p25	0.54	0.54	0.53	0.55	0.46	0.43	0.48	0.58
	Liquidity Ratio ((current assets-stocks) / current liabilities)	mean	0.90	0.86	0.94	0.96	0.85	0.81	0.87	0.99
		median	0.93	1.01	1.03	1.01	1.06	1.03	1.03	1.15
		p25	0.44	0.46	0.47	0.43	0.45	0.43	0.43	0.51
	Credit Period (creditors / operating revenue *360)	mean	101.00	103.01	92.26	81.32	75.28	74.47	95.32	79.45
		median	69.56	56.53	51.18	46.42	50.22	48.08	56.03	46.11
		p75	152.73	133.29	113.88	109.09	114.61	108.38	120.00	97.41
Financial structure										
	Debt Ratio (interest bearing debt / total assets)	mean	44.44%	47.65%	47.11%	47.08%	47.64%	45.85%	47.25%	44.75%
		median	51.03%	55.01%	52.76%	59.83%	57.43%	58.29%	57.16%	57.59%
		p75	87.31%	89.46%	89.41%	89.57%	90.52%	90.55%	90.07%	86.56%
	Gearing (interest bearing debt / shareholders' funds)	mean	137.13%	138.56%	136.54%	138.21%	154.15%	143.26%	153.87%	138.79%
		median	58.44%	71.97%	55.01%	70.77%	65.28%	38.87%	48.88%	61.62%
		p75	440.11%	496.43%	406.24%	394.84%	372.38%	322.40%	328.86%	365.55%
Debt burden										
	Debt to EBITDA Ratio (interest bearing debt / (EBITDA+ financial income))	mean	4.73	5.99	6.14	6.32	5.00	5.34	6.10	5.55
		median	4.66	6.24	6.34	6.65	6.55	6.69	7.15	5.14
		p75	13.71	9.39	9.61	10.11	9.96	10.30	11.19	8.33
	Interest Coverage Ratio ((EBITDA+ financial income) / interest expenses)	mean	4.93	4.68	4.72	4.07	4.85	4.60	4.14	4.72
		median	2.62	3.20	4.20	3.88	3.75	4.25	4.48	6.86
		p25	0.96	1.91	2.03	1.91	1.87	1.92	2.00	2.95
	Interest Coverage Ratio ((EBIT+financial income) / interest expenses)	mean	3.45	3.23	2.91	2.26	3.08	2.57	2.11	2.65
		median	0.93	1.18	1.19	1.02	0.99	0.82	0.74	2.15
		p25	-0.41	0.02	-0.10	-0.19	-0.37	-1.07	-1.51	0.62
	Cash flow to Debt ratio (cash flow / total debt)	mean	13.93%	12.01%	11.74%	9.83%	11.90%	10.39%	10.28%	9.58%
		median	6.40%	8.39%	9.62%	8.00%	8.33%	8.37%	8.39%	13.07%
		p25	-0.38%	2.31%	3.35%	2.28%	2.12%	2.23%	2.81%	5.83%
Profitability										
	Profit Margin (P or L for the period / Operating revenue)	mean	8.69%	12.37%	10.71%	5.15%	4.73%	3.14%	3.77%	6.13%
		median	1.53%	2.06%	2.52%	0.69%	0.17%	-0.49%	-0.27%	4.29%
		p25	-13.83%	-8.56%	-7.73%	-12.53%	-14.71%	-18.51%	-22.73%	-2.80%
	EBITDA / Sales ((EBITDA+financial income) / Operating revenue)	mean	24.80%	30.42%	28.27%	21.40%	22.30%	19.52%	25.64%	23.92%
		median	24.96%	39.69%	54.74%	59.20%	65.30%	59.28%	60.19%	63.58%
		p25	8.31%	11.18%	11.96%	11.94%	12.19%	10.82%	12.51%	14.84%
	ROA ((EBIT + financial income) / average total assets)	mean	7.78%	5.65%	5.10%	4.49%	6.29%	5.25%	4.18%	4.62%
		median	3.24%	3.03%	3.03%	2.33%	2.10%	1.57%	1.36%	3.79%
		p25	-0.69%	-0.80%	-0.46%	-1.01%	-1.61%	-2.57%	-2.42%	0.59%

h) Manufacturing sector

			2008	2009	2010	2011	2012	2013	2014	2015
Liquidity ratios										
	Current Ratio (current assets / current liabilities)	mean	1.21	1.17	1.26	1.29	1.32	1.29	1.32	1.35
		median	1.29	1.36	1.38	1.40	1.42	1.45	1.50	1.56
		p25	0.89	0.89	0.90	0.90	0.90	0.92	0.95	0.99
	Liquidity Ratio ((current assets-stocks) / current liabilities)	mean	0.84	0.83	0.89	0.89	0.92	0.90	0.92	0.94
		median	0.83	0.85	0.85	0.84	0.84	0.87	0.92	0.97
		p25	0.41	0.40	0.40	0.38	0.38	0.40	0.42	0.45
	Credit Period (creditors / operating revenue *360)	mean	72.22	86.44	82.75	75.39	74.04	72.12	72.86	72.41
		median	70.84	80.72	82.86	79.13	80.47	81.04	76.68	73.01
		p75	117.64	139.68	143.09	142.63	149.54	149.12	137.74	125.58
Financial structure										
	Debt Ratio (interest bearing debt / total assets)	mean	37.08%	36.78%	35.05%	34.83%	34.50%	32.98%	32.51%	31.22%
		median	31.40%	30.65%	29.70%	29.02%	27.61%	26.04%	25.08%	23.99%
		p75	55.65%	56.17%	54.97%	54.15%	52.93%	51.24%	49.80%	48.20%
	Gearing (interest bearing debt / shareholders' funds)	mean	95.86%	95.79%	88.22%	84.71%	83.27%	76.32%	75.27%	70.28%
		median	54.04%	45.02%	42.10%	37.98%	33.54%	31.42%	32.20%	32.00%
		p75	215.63%	192.77%	181.18%	167.40%	155.42%	146.58%	141.33%	134.10%
Debt burden										
	Debt to EBITDA Ratio (interest bearing debt / (EBITDA+ financial income))	mean	4.56	6.10	4.72	4.85	5.33	4.89	4.27	3.68
		median	2.60	2.38	2.51	2.34	2.19	2.33	2.49	2.52
		p75	6.07	6.47	6.74	6.71	6.55	6.65	6.58	6.61
	Interest Coverage Ratio ((EBITDA+ financial income) / interest expenses)	mean	4.17	3.86	5.59	5.21	4.71	5.04	6.12	7.90
		median	4.03	3.47	4.22	3.64	3.25	3.99	5.19	6.89
		p25	1.57	0.13	0.58	0.02	-0.60	0.46	1.66	2.28
	Interest Coverage Ratio ((EBIT+financial income) / interest expenses)	mean	2.34	1.63	3.05	2.90	2.42	2.64	3.59	4.98
		median	1.68	1.30	1.45	1.29	1.21	1.47	2.04	2.89
		p25	-0.40	-3.16	-3.03	-3.70	-4.63	-3.17	-0.73	0.84
	Cash flow to Debt ratio (cash flow / total debt)	mean	12.11%	9.68%	14.17%	13.16%	10.80%	12.76%	15.83%	16.73%
		median	13.10%	8.86%	9.51%	7.97%	6.87%	8.58%	11.68%	14.24%
		p25	1.21%	-4.14%	-2.44%	-4.85%	-6.64%	-3.25%	0.49%	2.12%
Profitability										
	Profit Margin (P or L for the period / Operating revenue)	mean	1.51%	0.41%	2.36%	1.69%	0.91%	1.58%	2.55%	2.60%
		median	0.97%	0.52%	0.60%	0.44%	0.34%	0.60%	1.05%	1.46%
		p25	-2.11%	-6.72%	-5.24%	-6.44%	-7.72%	-5.38%	-2.12%	-0.14%
	EBITDA / Sales ((EBITDA+financial income) / Operating revenue)	mean	8.09%	7.14%	8.22%	7.49%	6.67%	6.87%	7.63%	8.38%
		median	6.46%	5.58%	5.45%	4.89%	4.54%	5.01%	5.74%	6.23%
		p25	2.30%	0.05%	0.63%	-0.28%	-1.34%	0.28%	1.80%	2.44%
	ROA ((EBIT + financial income) / average total assets)	mean	4.99%	2.84%	4.45%	4.34%	3.50%	3.88%	4.79%	5.71%
		median	3.64%	1.96%	1.91%	1.60%	1.33%	1.79%	2.63%	3.19%
		p25	-0.60%	-4.70%	-3.68%	-4.57%	-5.31%	-3.53%	-1.08%	0.19%

i) Construction sector

			2008	2009	2010	2011	2012	2013	2014	2015
Liquidity ratios										
	Current Ratio (current assets / current liabilities)	mean	1.65	1.63	1.69	1.60	1.47	1.43	1.49	1.48
		median	1.45	1.51	1.53	1.53	1.55	1.55	1.59	1.66
		p25	0.81	0.78	0.76	0.72	0.71	0.70	0.71	0.75
	Liquidity Ratio ((current assets-stocks) / current liabilities)	mean	0.59	0.59	0.63	0.59	0.57	0.57	0.63	0.64
		median	0.71	0.72	0.73	0.70	0.71	0.72	0.76	0.83
		p25	0.26	0.24	0.24	0.22	0.22	0.21	0.23	0.26
	Credit Period (creditors / operating revenue *360)	mean	175.01	192.27	197.14	188.82	182.19	179.87	166.88	157.41
		median	77.41	85.87	86.67	85.22	84.57	85.42	80.00	72.97
		p75	170.25	202.98	208.42	215.22	218.45	221.92	201.41	175.71
Financial structure										
	Debt Ratio (interest bearing debt / total assets)	mean	51.55%	53.03%	52.63%	52.40%	51.25%	49.03%	46.18%	44.41%
		median	39.53%	38.96%	38.01%	36.30%	32.83%	29.97%	27.74%	25.48%
		p75	72.45%	73.18%	72.53%	71.56%	68.65%	66.54%	63.32%	60.13%
	Gearing (interest bearing debt / shareholders' funds)	mean	163.92%	164.34%	156.80%	149.26%	138.04%	122.85%	107.42%	98.64%
		median	50.64%	41.31%	37.74%	31.65%	25.75%	22.67%	22.03%	21.39%
		p75	286.17%	247.88%	222.58%	194.70%	166.82%	151.52%	139.92%	129.41%
Debt burden										
	Debt to EBITDA Ratio (interest bearing debt / (EBITDA+ financial income))	mean	13.52	19.59	23.85	30.63	132.83	54.99	23.70	16.53
		median	3.17	3.09	3.17	2.89	2.56	2.63	2.87	2.94
		p75	10.56	11.24	11.99	12.06	11.55	11.76	11.55	11.06
	Interest Coverage Ratio ((EBITDA+ financial income) / interest expenses)	mean	1.80	1.54	1.48	1.01	0.13	0.51	1.38	2.30
		median	2.63	2.40	2.86	2.46	2.43	3.01	4.04	5.50
		p25	0.56	0.01	-0.14	-0.55	-0.76	-0.52	0.20	1.03
	Interest Coverage Ratio ((EBIT+financial income) / interest expenses)	mean	1.27	0.89	0.70	0.31	-0.46	-0.18	0.63	1.41
		median	1.29	1.06	1.07	0.73	0.64	0.85	1.36	2.04
		p25	-0.57	-1.44	-2.25	-3.10	-3.83	-4.08	-3.01	-1.74
	Cash flow to Debt ratio (cash flow / total debt)	mean	0.29%	0.73%	0.05%	-1.09%	-5.78%	-2.41%	0.32%	2.97%
		median	3.71%	2.47%	2.43%	1.59%	1.62%	2.24%	3.75%	5.33%
		p25	-2.53%	-3.63%	-3.48%	-4.82%	-5.51%	-4.08%	-2.39%	-1.20%
Profitability										
	Profit Margin (P or L for the period / Operating revenue)	mean	-1.18%	0.06%	-2.31%	-3.88%	-17.13%	-8.88%	-2.44%	3.26%
		median	1.26%	0.78%	0.63%	0.18%	0.11%	0.42%	1.08%	1.76%
		p25	-6.19%	-12.59%	-13.96%	-19.07%	-20.67%	-18.67%	-12.91%	-7.28%
	EBITDA / Sales ((EBITDA+financial income) / Operating revenue)	mean	13.35%	12.58%	11.14%	10.28%	5.03%	7.60%	12.74%	15.47%
		median	8.14%	7.85%	7.24%	6.50%	6.63%	7.07%	8.22%	9.06%
		p25	1.97%	0.29%	-0.68%	-3.39%	-4.64%	-3.32%	0.36%	1.66%
	ROA ((EBIT + financial income) / average total assets)	mean	3.38%	1.80%	1.28%	0.68%	-0.53%	-0.12%	0.94%	1.83%
		median	2.60%	1.36%	0.98%	0.59%	0.43%	0.45%	0.84%	1.26%
		p25	-0.86%	-1.81%	-2.03%	-2.59%	-2.90%	-2.27%	-1.50%	-0.93%

j) Services sector

			2008	2009	2010	2011	2012	2013	2014	2015
Liquidity ratios										
	Current Ratio (current assets / current liabilities)	mean	1.16	1.19	1.18	1.19	1.20	1.23	1.22	1.24
		median	1.21	1.26	1.28	1.28	1.29	1.31	1.36	1.43
		p25	0.75	0.75	0.76	0.75	0.74	0.75	0.78	0.83
	Liquidity Ratio ((current assets-stocks) / current liabilities)	mean	0.87	0.93	0.89	0.89	0.89	0.93	0.92	0.93
		median	0.70	0.72	0.72	0.70	0.70	0.72	0.75	0.80
		p25	0.26	0.26	0.25	0.24	0.23	0.24	0.25	0.28
	Credit Period (creditors / operating revenue *360)	mean	71.77	79.07	79.71	77.16	75.42	74.42	72.04	71.00
		median	60.19	64.56	65.03	64.11	65.28	66.10	62.86	59.64
		p75	112.57	123.93	124.92	125.39	129.50	131.28	121.76	112.57
Financial structure										
	Debt Ratio (interest bearing debt / total assets)	mean	40.20%	39.65%	39.02%	37.40%	37.07%	36.56%	36.06%	34.59%
		median	30.93%	30.06%	29.34%	28.33%	26.79%	25.33%	24.58%	23.40%
		p75	62.69%	62.39%	61.55%	60.59%	59.26%	57.64%	55.84%	53.78%
	Gearing (interest bearing debt / shareholders' funds)	mean	110.67%	104.89%	103.01%	92.31%	89.76%	86.77%	84.12%	78.99%
		median	32.65%	27.69%	26.25%	23.19%	19.86%	18.59%	19.84%	20.84%
		p75	200.00%	180.00%	171.43%	159.33%	146.47%	139.13%	135.00%	130.64%
Debt burden										
	Debt to EBITDA Ratio (interest bearing debt / (EBITDA+ financial income))	mean	4.86	5.81	5.37	5.79	5.94	5.86	4.97	5.03
		median	2.30	2.17	2.22	2.03	1.84	1.90	2.09	2.14
		p75	6.61	6.86	7.22	7.06	6.90	6.89	6.87	6.76
	Interest Coverage Ratio ((EBITDA+ financial income) / interest expenses)	mean	4.34	4.49	5.50	4.64	4.44	4.73	5.61	6.20
		median	4.15	3.96	4.69	3.93	3.42	4.11	5.27	6.95
		p25	1.14	0.38	0.51	-0.22	-0.89	-0.26	1.08	1.89
	Interest Coverage Ratio ((EBIT+financial income) / interest expenses)	mean	2.60	2.35	3.07	2.40	2.35	2.64	3.43	3.66
		median	1.77	1.53	1.66	1.40	1.24	1.50	2.08	2.99
		p25	-1.01	-2.59	-3.12	-4.02	-5.03	-4.46	-2.18	-0.51
	Cash flow to Debt ratio (cash flow / total debt)	mean	12.70%	11.10%	12.49%	11.25%	9.14%	10.62%	12.76%	14.39%
		median	10.86%	8.65%	8.48%	7.08%	5.96%	7.01%	9.61%	12.14%
		p25	-0.80%	-3.26%	-2.83%	-4.94%	-7.04%	-5.24%	-1.56%	0.51%
Profitability										
	Profit Margin (P or L for the period / Operating revenue)	mean	2.51%	2.26%	2.72%	2.10%	1.40%	2.11%	3.14%	3.32%
		median	0.93%	0.69%	0.67%	0.48%	0.36%	0.55%	0.93%	1.34%
		p25	-2.61%	-4.74%	-4.39%	-5.61%	-6.81%	-5.66%	-3.16%	-1.25%
	EBITDA / Sales ((EBITDA+financial income) / Operating revenue)	mean	8.68%	8.39%	8.74%	7.96%	7.97%	7.98%	9.03%	8.24%
		median	5.30%	4.80%	4.55%	4.11%	3.75%	4.00%	4.71%	5.29%
		p25	1.27%	0.50%	0.49%	-0.32%	-1.26%	-0.48%	0.77%	1.40%
	ROA ((EBIT + financial income) / average total assets)	mean	5.97%	4.18%	4.87%	4.09%	3.91%	4.12%	5.22%	4.78%
		median	3.54%	2.37%	2.12%	1.72%	1.42%	1.71%	2.43%	3.10%
		p25	-1.17%	-3.39%	-3.31%	-4.31%	-5.19%	-4.08%	-2.21%	-0.70%

4. PUBLIC PROCUREMENT

4.1 Introduction

A significant part of public expenditure —in Spain, over 22%— is made via public contracts for goods and services, infrastructure projects or public services (e.g., health, education, sports and cultural activities, etc.) by means of agreements with private companies. Public procurement refers to the process by which public authorities purchase work, goods or services from companies or other private institutions.

A range of problems are frequently identified in public procurement in Spain. These relate to the lack of coordination between governments (at the same or different levels) with respect to public procurement policies; conflicts between regional governments and the central government with respect to powers; cost overruns in investment projects; a lack of transparency in contracting and multiple cases of corruption. Spain's anti-trust regulator (the CNMC), in a report on its analysis of public procurement in Spain[44], stresses that public procurement is:

> … a market propitious to irregular practices from the standpoint of competition as a result of high barriers to entry (the investment required and the economic/information/legal costs of participating in public tenders), an abundance of contracting authorities with heterogeneous procedures and rules, and problems intrinsic to information asymmetry and chained agency relationships.

All these issues can generate inefficiencies in the functioning of governments, to the extent of needlessly increasing the costs of acquiring inputs or reducing service provision standards. A proper assessment of the scope of these problems requires adequate data. This data is still not readily available in Spain. In fact, the data available tends to be inconsistent and sometimes anecdotal.

Public procurement problems are often considered more commonplace in local and regional governments since these governments represent the biggest proportion of public procurement expenditure. Thus, it is sometimes claimed that the recentralisation of some decisions would lead to better results. However, there is little evidence to support this and generalising is risky. Why? First, because bad and inefficient practices (cost overruns, corruption, lack of coordination) similarly affect the central government. Second, because the practices of local and regional governments are not necessarily worse the central government's. In fact, some subnational governments are setting standards worth emulating. Third, because coordination problems owing to both a lack of cooperation between central and regional authorities and bad governance are usually attributable to both levels of government in Spain. Fourth, because the importance of each category of public procurement depends on the area or function of public service expenditure in question. Expenditures differ at every level of government (central, regional or local) as a result of the different functions assumed by each. Additionally, the various governments — regional and central — may differ in how they prefer to provide their public services (publicly or privately) and in their attitudes towards public–private partnerships or collaborations.

Any analysis of the structural reforms required in public procurement in Spain needs to take these problems into account to avoid the risk of designing or implementing policies in the absence of a reliable diagnosis. To avoid this risk, we propose undertaking an in-depth analysis of the basic indicators of public procurement in Spain and evaluating the existing problems on the basis of the information available.

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[44] See Spain's anti-trust authority (CNMC, 2015)

In our analysis, we consider differences in public procurement expenditure by level of government and by expenditure function based on the OECD's criteria. Assessing the differences in expenditure across the different levels of government in Spain requires considering several aspects: the decentralised structure of the Spanish public sector; the differences in the services provided at each level of government; how public services are provided (publicly, privately or by subsidisation) and the characteristics of each region (demographic, geographic, cost of living, etc.) that can influence the cost of the services acquired.

Our analysis entails three steps:

1) We assess the differences in public procurement expenditure by agent (central or regional government) and government expenditure function (health, education, infrastructure, etc.). This allows us to focus the analysis on the more significant areas of expenditure.

2) We identify the determinants of public procurement expenditure. The differences in regional government expenditure stem not only from the prices paid for goods and services, but also from the differences in the services supplied, how the public service is provided (publicly, privately or by subsidisation), the characteristics of each region (demographic, geographic, etc.), and the differences in their resources.

3) We examine the differences in the intensity of competition and efficiency of public contracts awarded by the different governments (type of procedure, type of contract, number of bids, savings, duration of procedure, etc.). Unfortunately, information on prices is not broadly available in Spain, which means we cannot compare homogeneous services. Therefore, a systematic comparative analysis is not possible.

For these steps, we use a mix of quantitative methodologies (review of statistical information, construction of indicators and, where appropriate, econometric analysis) and qualitative analysis (document reviews).

4.2 Dimensions of public procurement in Spain

The public sector can purchase goods and services from the private sector (enterprises or other institutions) via three methods: (i) purchase of goods and services that are used in the process of providing public services; (ii) expenditure on gross fixed capital formation (investment); and (iii) agreements with non-profit enterprises and institutions for the private provision of public services[45].

This section reviews the statistics gleaned from the public accounts[46] to evaluate the dimensions of public procurement in Spain in the three areas mentioned above from the following perspectives: internationally; over time; by level of government and by government expenditure function. The analysis of this information will enable us to identify, from the point of view of expenditure volumes, what areas should be emphasised in analysing the efficiency of public procurement in Spain.

4.2.1 International comparison

The incidence of public procurement expenditure on goods and services produced by the private sector in Spain is below the EU-28 average and lower than in most of the neighbouring large economies in relation to both GDP and overall public expenditure. Specifically, public procurement expenditure accounted for 9.6% of GDP in Spain in 2016,

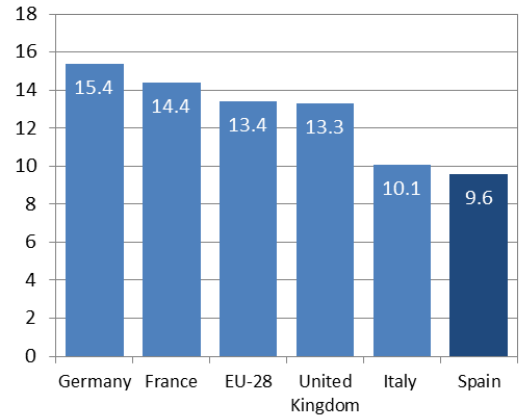
[45] See Government at a Glance (OECD, 2017c)

[46] The General State Comptroller (which reports to Spain's Ministry of Finance and Civil Service) and Eurostat

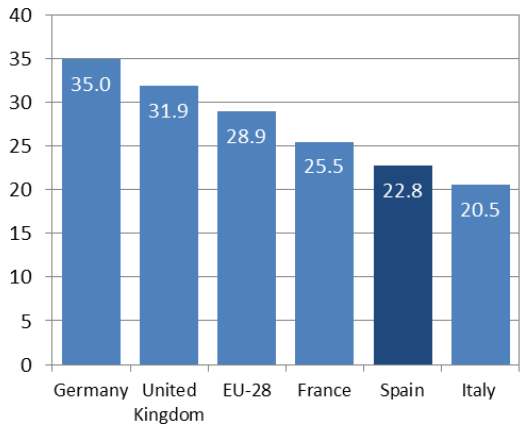
compared to 13.4% in the EU-28, which is significantly below France (14.4%) and Germany (15.4%) (Figure 4.1, Panel a). These figures may be influenced by the different proportions of public expenditure in the various countries. However, Panel b) of Figure 4.1 reveals that at 22.8%, public procurement expenditure accounts for 6 percentage points less total public expenditure than in the EU-28. The data shows that governments in Spain are less inclined to resort to public procurement for the provision of the services they provide. By the same token, the reduced proportion of public procurement should not be deemed an indicator of relative efficiency but rather one of preference with respect to the organisation of public services. Vice versa, a higher proportion should not be construed as an indicator of inefficiency per se.

Figure 4.1. Percentage of general government procurement expenditure. 2016

a) As a percentage of GDP



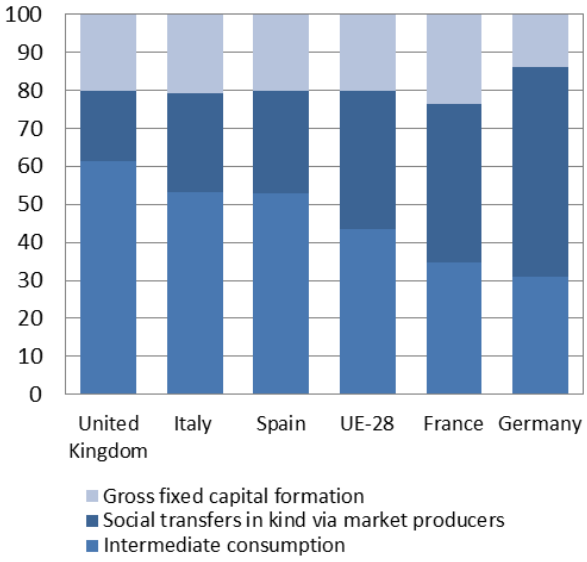
b) As a percentage of general government total expenditure



Source: Eurostat (2018)

The extent to which the different public procurement methods are used varies from one country to the next. In Spain, intermediate consumption accounts for the largest component (over 50% of expenditure). Intermediate consumption is the purchase of private inputs for the direct production of public services by the government. In contrast, in other countries that resort more extensively to private inputs for the provision of public services, a higher percentage of public procurement takes the form of social transfers in kind via market producers. In Germany, this type of procurement, where the private sector produces the services that the public sector finances, represents over 50% of total public procurement expenditure. The third type of procurement entails the public sector commissioning gross fixed capital formation in infrastructure from the private sector. Its proportion in public procurement expenditure is similar across the various countries.

Figure 4.2. Components of general government procurement expenditure. 2016 (percentage)

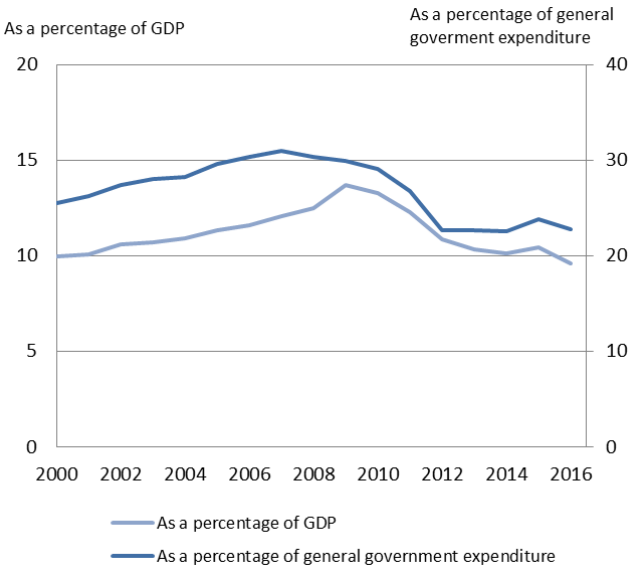


Source: Eurostat (2018)

4.2.2 Trend over time and comparison across the various levels of governments

Analysis of the trend in general government procurement expenditure over time in Spain reveals a pro-cyclical pattern both for GDP and overall government expenditure. The trend line depicts, first, the fall in public expenditure in the wake of the crisis as a result of the sharp drop in tax revenue. The drop in public procurement expenditure was more pronounced than the drop in other items of expenditure. Thus, its proportion of total government expenditure fell to below 2000 levels.

Figure 4.3. Percentage of general government procurement expenditure in Spain. 2000-2016 (percentage)

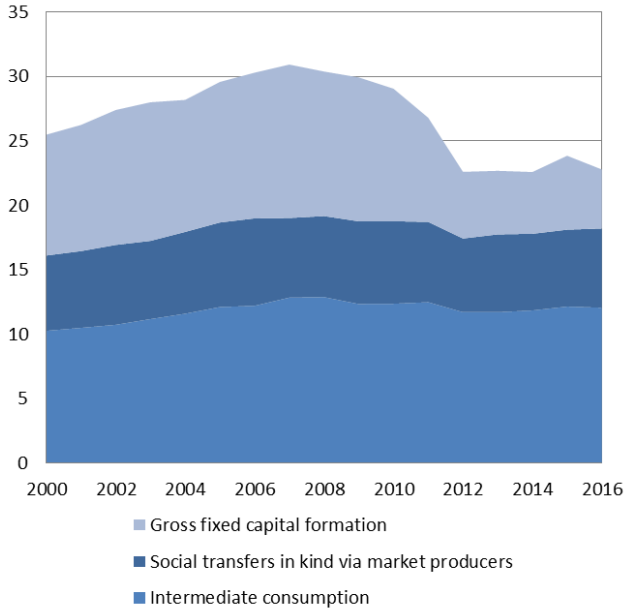


Source: IGAE (2018a)

The sharper fall in public procurement expenditure reflects the relative rigidity of the other components of government expenditure, particularly cash transfers, some of which are pro-cyclical (pensions, jobless claims), and the remuneration of public sector employees. These areas of expenditure were also pared back but to a lesser degree than certain areas of procurement from the private sector.

Figure 4.4 shows that the biggest drop occurred in gross fixed capital formation, which was slashed. Public investment, most of which is contracted from private enterprises, was more than halved, to the point that gross fixed capital formation no longer covers depreciation of the capital stock[47]. The proportion of the other two key areas of public procurement in relation to total general government expenditure did not vary significantly — the fall in public procurement expenditure is broadly in line with overall expenditure.

Figure 4.4. Components of general government procurement expenditure in Spain. 2000-2016 (as a percentage of total general government expenditure)



Source: IGAE (2018a)

In Spain, there are four levels of government (in addition to the EU) and each presents significant differences in terms of expenditure volumes, functions performed and the proportion of public procurement expenditure. In terms of public procurement as a percentage of GDP, the regional governments are the biggest spenders, accounting for nearly half all procurement. The next biggest spenders are local governments. As a percentage of total government expenditure of each level of government, procurement commands the highest proportions at the local (50%) and regional (40%) government levels. In general, the proportion of public procurement expenditure has fallen across the board since the crisis, with all levels of government reporting lower proportions.

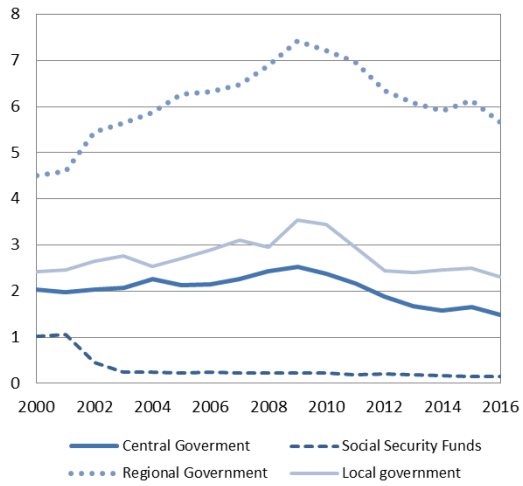
The significant concentration of public procurement expenditure at the regional and local levels of government is relevant to this study. These subnational governments engage in a variety of practices that provide both examples worth benchmarking and others worth avoiding. We should also highlight that in a country as decentralised as Spain, the different levels of government specialise in providing specific functions. Health, education and social service account for the bulk of the regional government expenditure, although they also invest in economic and social development (infrastructure, housing). Proximity services

[47] Serrano, L., Pérez, F., Mas, M. and Uriel, E. (2017).

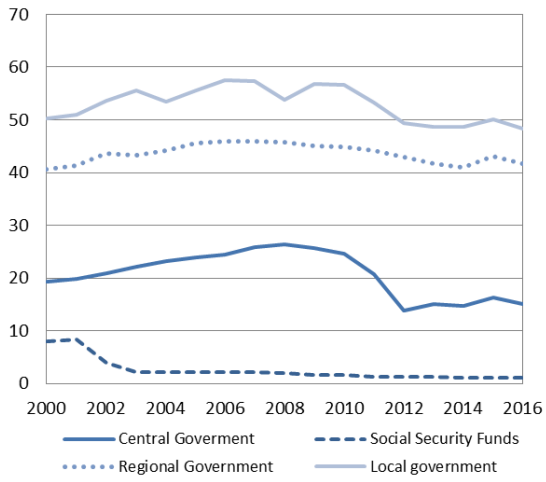
(transportation, social services and cultural activities) and urban infrastructure account for most of the local government expenditure.

Figure 4.5. Importance of public procurement expenditure in Spain, by level of government. 2000–2016

a) As a percentage of GDP



b) As a percentage of total expenditure of each level of government[1]

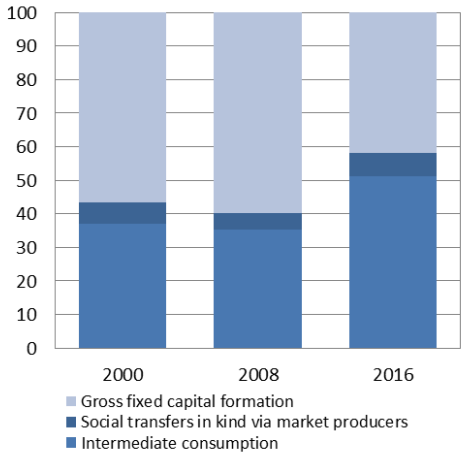


[1] Net of transfers between the various governments
Source: IGAE (2018a)

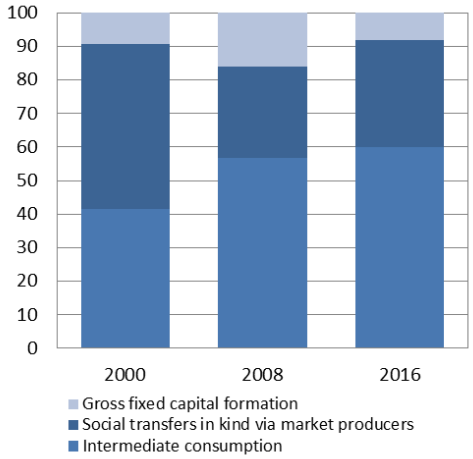
This functional specialisation at the different levels of government shapes their use of the various types of public procurement. Intermediate consumption — the purchase of goods and services for the operation of governmental bureaucracies and public services — plays a role at all levels of government but it is the local governments and the social security funds that most use this type of procurement. The social security funds and also the regional governments make more use of contracting in the form of social transfers in kind via market producers. Lastly, contracting associated with gross fixed capital formation is relatively higher at the central and local levels of government, although it has dropped at all levels since the crisis.

Figure 4.6. Components of government procurement expenditure, by level of government. 2000-2016 (percentage)

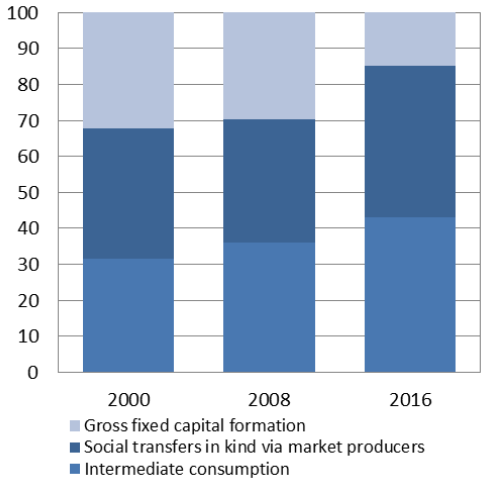
a) Central government



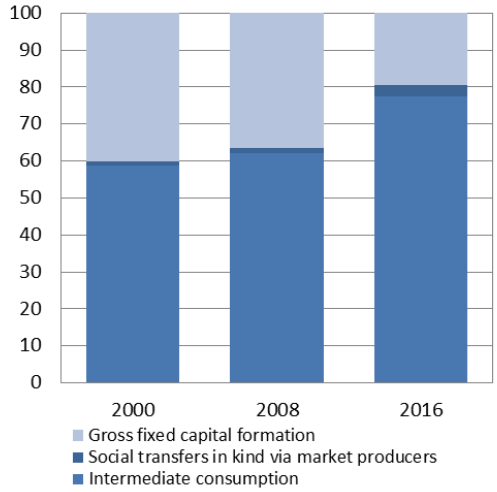
b) Social security funds



c) Regional government



d) Local government

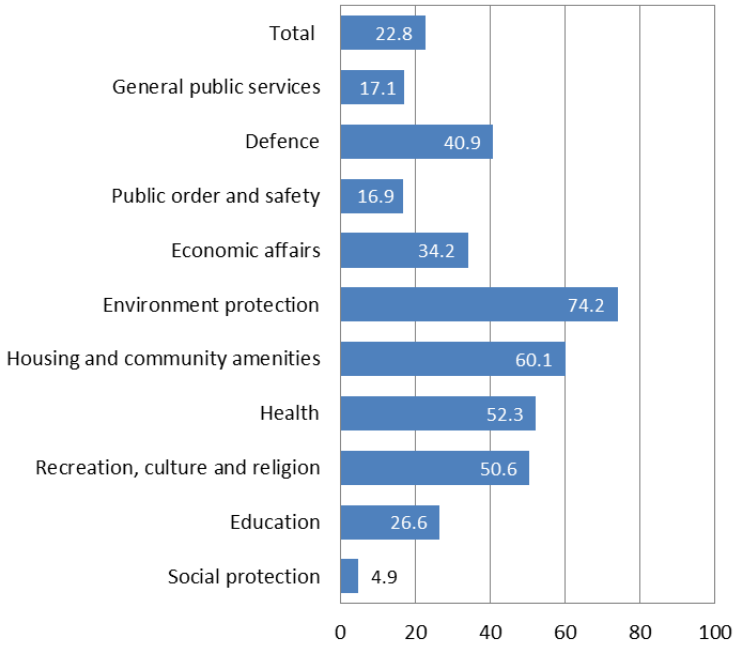


Source: IGAE (2018a)

4.2.3 Analysis by government expenditure function

The differences in the proportion of public procurement expenditure by level of government are shaped by the proportion of procurement in the various expenditure functions and the governments' functional specialisation. In 2016, public procurement expenditure accounted for over 20% of total expenditure in defence (by the central government); health and education (functions delegated to the regional governments); economic affairs; environmental protection; housing and community amenities; and recreation, culture and religion (shared by several levels).

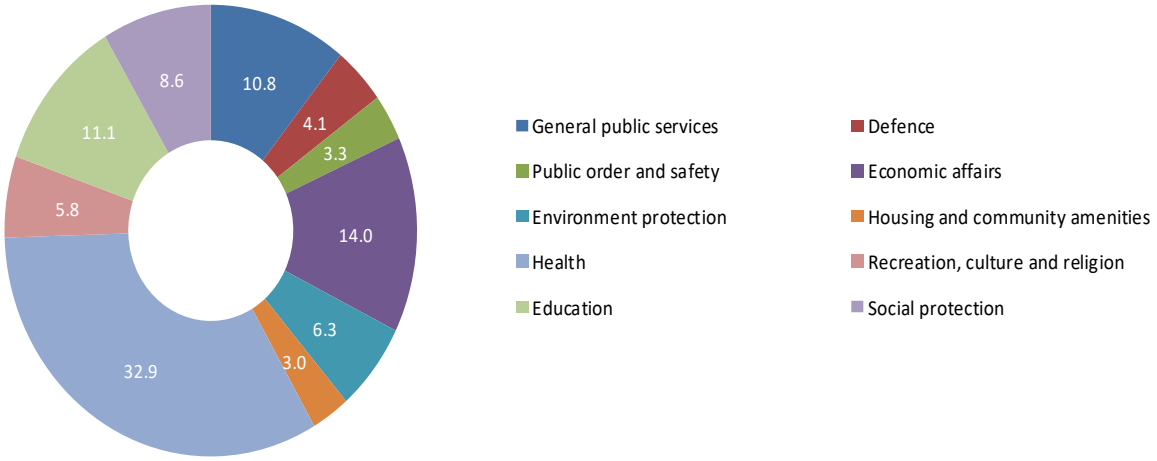
Figure 4.7. Importance of general government procurement expenditure by expenditure function. 2016
(as a percentage of general government total expenditure)



Source: IGAE (2018b)

Four expenditure functions accounted for 69% of public procurement expenditure in 2016: health (32.9% of total public procurement expenditure); economic affairs (14%); education (11.1%) and general public services (10.8%). The concentration of health and education at the regional governments makes this level of government particularly relevant to the analysis of public procurement.

Figure 4.8. Breakdown of general government procurement expenditure by function. 2016 (percentage)



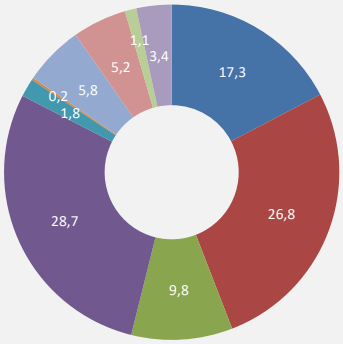
Source: IGAE (2018b)

Box 4.1: Government functional specialisation in public procurement

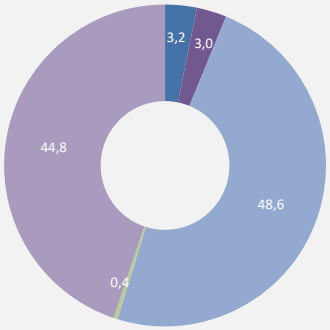
- Spain is a decentralised country with a functional specialisation that varies across the different level of governments. Consequently, public procurement takes the form of different expenditure functions depending on the level of government.

Figure B4.1. Breakdown of government procurement expenditure by function. 2016 (percentage)

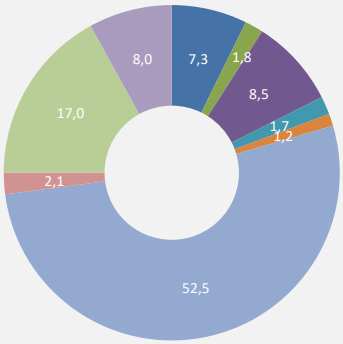
a) Central government



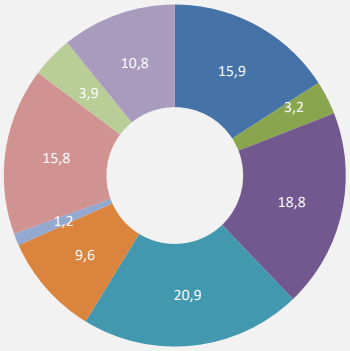
b) Social security funds



c) Regional government



d) Local government

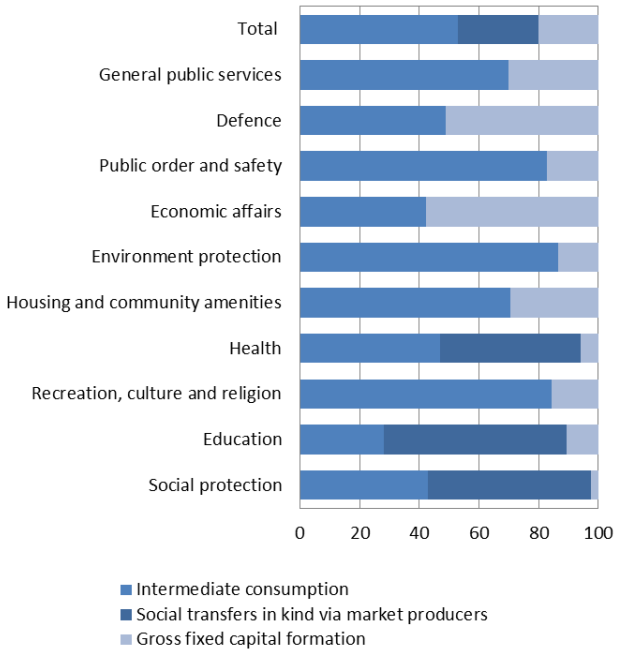


Fuente: IGAE (2018c, 2018d, 2018e, 2018f)

- Public procurement expenditure at the central government level focuses on economic affairs (28.7%), defense (26.8%), general public services (17.3%), and public order and safety (9.8%).
- Social security funds' public procurement spending is mostly committed to health and social protection although it represents only 2% of the total public procurement expenditure in Spain.
- Health and education are the predominant expenditure functions of the regional governments (public procurement in health and education represent 52.5% and 17%, respectively, of total public procurement spending).
- Public procurement expenditure in local governments goes to environment protection (20.9%); economic affairs (18.8%); general public services (15.9%); and recreation, culture and religion (15.8%).

The proportion of intermediate consumption in public procurement expenditure is significant across all functions, while expenditure on the other two areas of procurement is more concentrated in some functions than others. For instance, gross fixed capital formation is more relevant in defence and economic affairs, while social transfers in kind via market producers occurs more frequently in health, education and social protection.

Figure 4.9. Composition of general government procurement expenditure by function. 2016 (percentage)



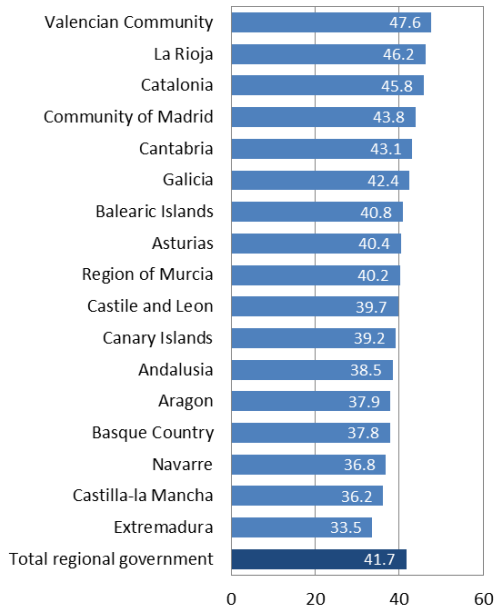
Source: IGAE (2018b)

4.2.4 Regional analysis

We decided to focus on the public procurement profiles of Spain's regional governments and their efficiency or lack thereof because these governments account for 59% of total public procurement expenditure and offer an interesting diversity of practices. These governments devote 41.7% of their total expenditure (net of transfers between the various governments) to procurements from the private sector via different mechanisms. Local governments resort even more to public procurement, devoting 48% of their expenditure to these purchases. However, they spend much less than the regional governments in absolute terms.

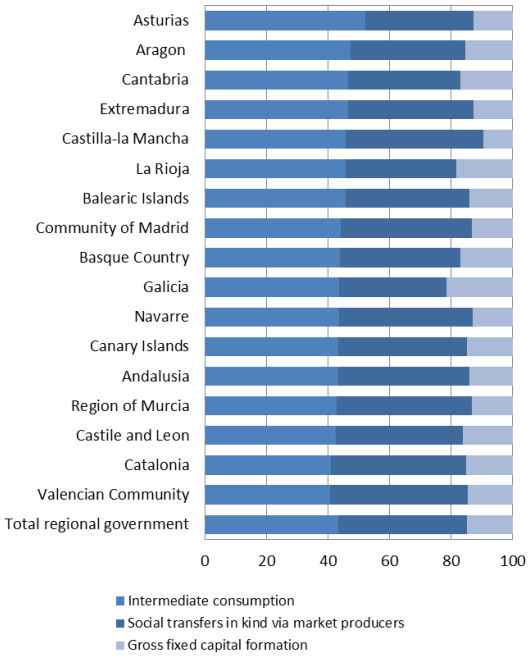
The autonomy of the regional governments for deciding where to spend and the methods to use (drawing a picture of their preferences in the use of private instruments), along with the big differences in size, resources and total expenditure across the various regions, cannot be ignored in assessing the varying proportion of public procurement, which ranges from 33.5% to 47.6% (Figure 4.10). Only a portion of these differences can be associated with varying levels of efficiency of public procurement management. Thus, it is important to identify the possible causes of this variability and their explanatory power.

Figure 4.10. Public procurement expenditure by regional government (as a percentage of total expenditure of each government[1])



[1] Net of transfers between the various governments
Source: IGAE (2018c)

Figure 4.11. Composition of public procurement expenditure by regional government. 2016 (percentage)



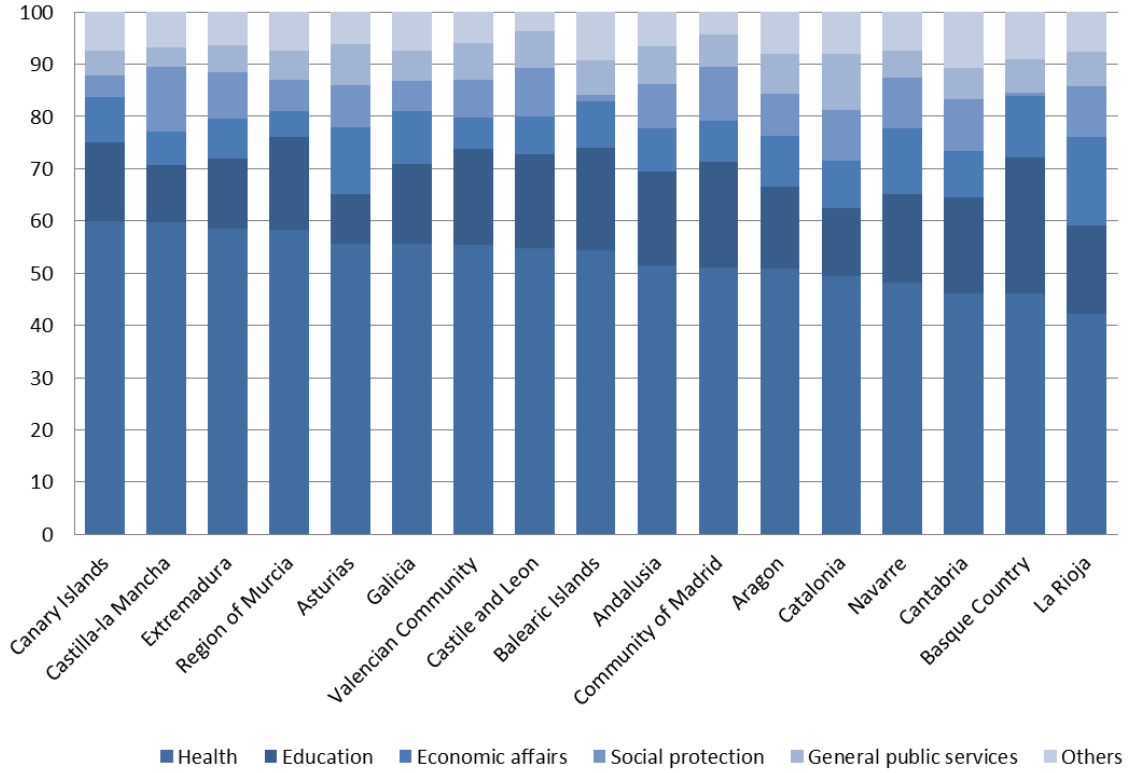
Source: IGAE (2018c)

Although the proportion of the three areas of public procurement spending varies from one region to the next (Figure 4.11), the two main areas in all instances are intermediate consumption and social transfers in kind via market producers, each accounting for over 40% on average. The gross fixed capital formation accounts for less than 20%, but this share was affected by the fall in public investment after the economic and fiscal crisis of the last decade.

Regional government functional specialisation, predominantly in health, education and social protection, underpins the importance of social transfers in kind via market producers, which consists of striking agreements with the private sector for the provision of services to the public free of charge. Use of this procurement method varies by region depending on government preferences.

Health accounts for at least 40% of public procurement expenditure in all regions and for as much as 60% in some (Figure 4.12). The second most significant function is education, followed by social protection and general public services. On average, these four expenditure functions account for nearly 90% of public procurement expenditure.

Figure 4.12. Breakdown of public procurement expenditure by function and regional government. 2016 (percentage)

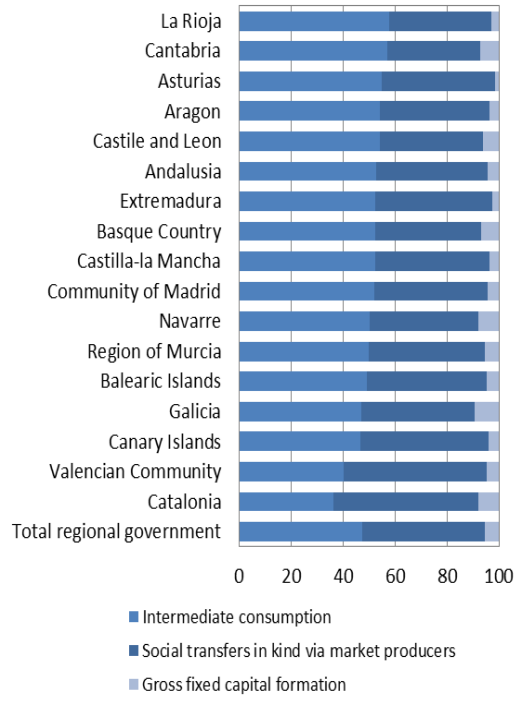


Source: IGAE (2018c)

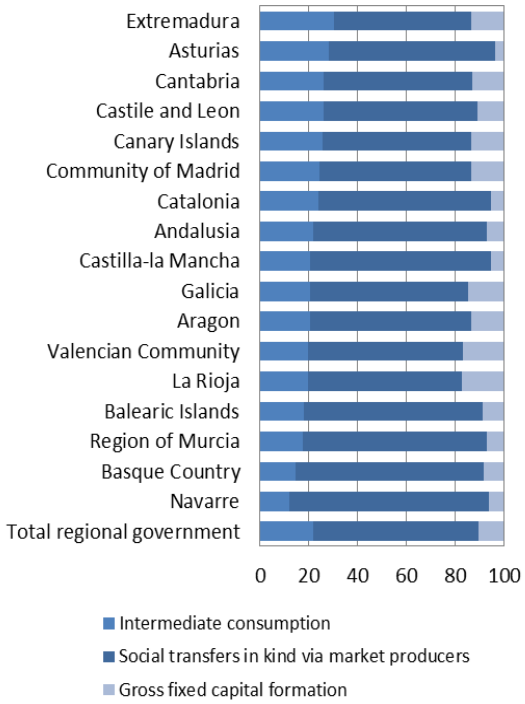
There are similarities and differences in the use of the public procurement methods within each expenditure function. In health, the regional governments use intermediate consumption and social transfers in kind via market producers in equal parts on average, but the mix between the two varies by region. In education and social protection, the use of social transfers in kind via market producers is predominant, although in some regions the use of intermediate consumption in the provision of social protection is significant[48]. In economic affairs, the main procurement formula used is gross fixed capital formation, albeit with significant differences by region; in some regions, intermediate consumption is the most widely used instrument. In general public services, intermediate consumption predominates, but gross fixed capital formation also plays a significant role and again there are sizeable differences in the use of the two types from one region to another.

Figure 4.13. Composition of government procurement expenditure by regional government and function. 2016 (percentage)

a) Health



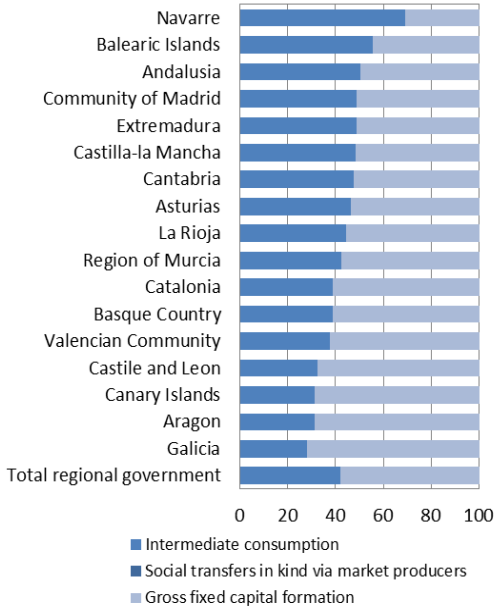
b) Education



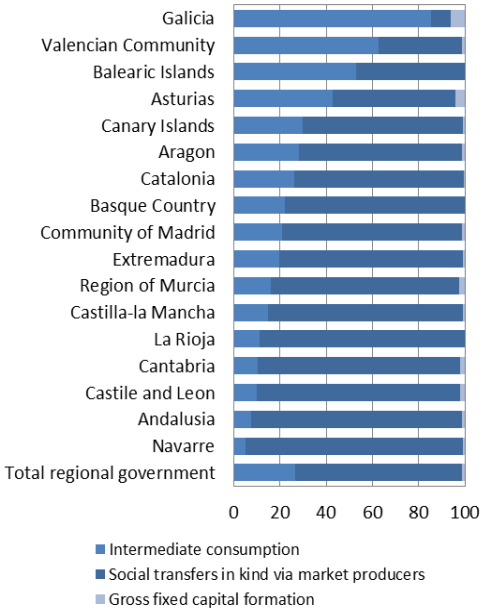
[48] These differences by region in the manner in which social protection services are procured may be influenced by the portfolio of services provided, which varies significantly, and the varying level of involvement by local governments in the management of the social services falling within the regional governments' powers, among other factors.

Figure 4.13. Composition of government procurement expenditure by regional government and function. 2016 (percentage) (cont.)

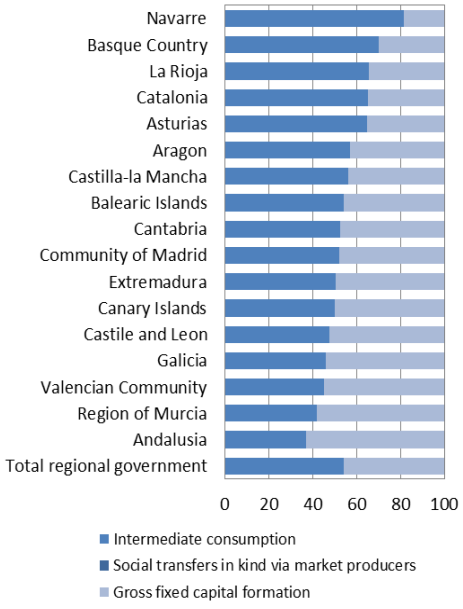
c) Economic affairs



d) Social protection



e) General public services



Source: IGAE (2018c)

4.3 Determinants of regional government public procurement expenditure on health and education

Public procurement expenditure on a specific function depends on multiple factors: service provision volumes and levels; service characteristics and standards; the organisational alternatives selected in configuring the service and, especially, whether the service is provided publicly or privately; the unit costs of the goods and services used as inputs for service provision; and how efficiently the resources used are managed. Efficient contracting is a part of efficient service management and helps to minimise costs and shape expenditure in several ways. However, expenditure also depends on the other variables mentioned, which are often not within the manager's control but are rather a 'given'. Distinguishing between these factors allows determining which of the differences in expenditure can be attributed to differing procurement practices and thus are susceptible to improvement.

This section explore ways to delimit the scope of procurement efficiency problems so we do not attribute the differences observed in expenditure on the provision of public services in Spain to inefficiencies that may derive from other factors. We focus on health and education services provided by the regional governments for several reasons. First, they are major universal public services that account for almost half the public procurement expenditure in Spain. Second, as these services have been largely delegated to regional governments, they provide a variety of experiences that enriches the analysis. Third, the nature of the services means that, despite their complexity, relatively like-for-like comparisons can be made. Lastly, there are more statistics on these services than other areas of public expenditure.

Our study of the differences in expenditure on health and education at the regional government level is based on the analysis of sundry indicators that take into account aspects that differentiate the regions such as population size, service needs per inhabitant, geo-demographic characteristics, cost of living considerations, function specialisation, etc.[49]. Examining these expense drivers allows us to assess the importance of each on a standardised basis as well as their ability on aggregate to explain expenditure differences not associated with procurement efficiency but rather other variables.

4.3.1 Differences in regional public procurement expenditure

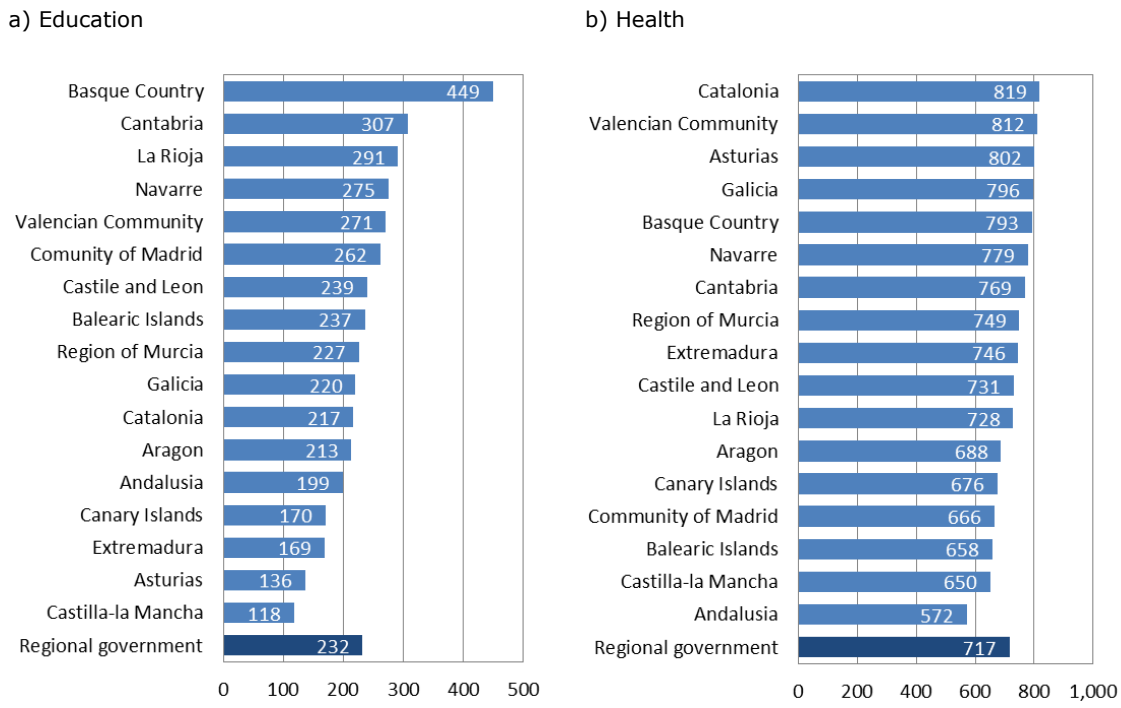
Education and health services are designed to meet the population's needs. Against this backdrop, it is worth noting that Spain's regions vary significantly in population size, ranging from 8.4 million in Andalusia to 0.3 million in La Rioja. Population size is the first determinant of regional government total expenditure on health and education. However, expenditure on these services per capita also varies widely (there is a range of over 30%). This may reflect the fact that the regions have different financial resources, priorities and unit costs of service provision. In addition, some of these cost differences are attributable to service management efficiency or inefficiency, particularly to public procurement efficiency. Distinguishing between the two functions is also relevant.

Public procurement expenditure on education and health per capita varies by region. In health, the range is wide (Catalonia and Valencia spend over 40% more than Andalusia). In education, it is even wider, with the Basque Country spending over twice as much as

[49] To analyse these factors, we use various Spanish data sources, including the national statistics office (INE); the Ministry of Finance and Civil Service ; the Ministry of Health, Social Services and Equality; the Ministry of Education, Culture and Sports; the Spanish public university confederation (CRUE); and other databases kept by specialist institutions such as Fedea and Ivie.

nine other regions, and Cantabria, La Rioja, Navarre and Valencia spending twice as much as Asturias and Castilla-la Mancha.

Figure 4.14. Public procurement expenditure per capita. 2016 (Euros)

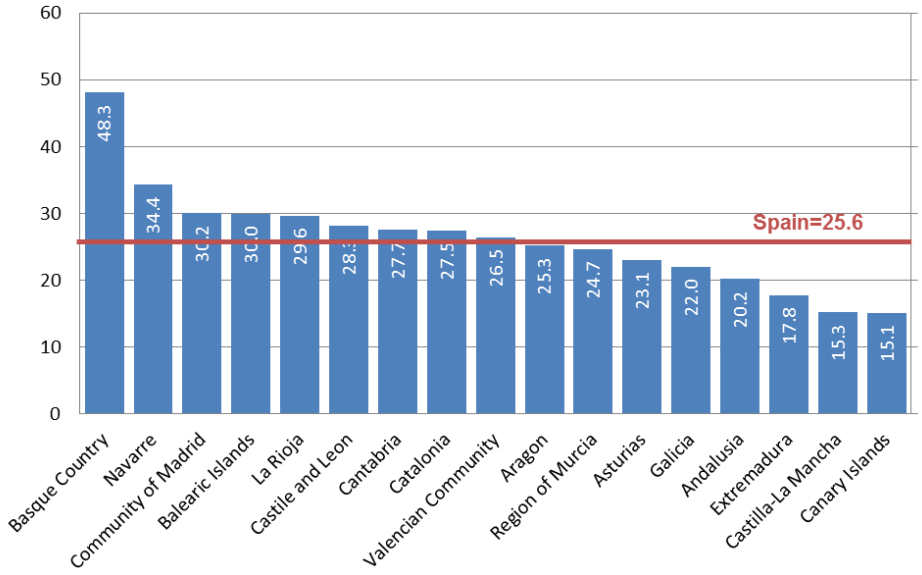


Source: IGAE (2018c), INE (2018a)

Several factors underlie these differences. In education and health, the organisational alternatives selected in configuring the service and, in particular, whether the service is provided publicly or privately, is a factor that can influence the level of public procurement expenditure per inhabitant. In the case of education, an indicator of a more or less pronounced preference for providing the services publicly versus privately is the proportion of students enrolled in semi-private schools (Figure 4.15). The use of financing agreements with the private sector (a formula used only up to university-level education in Spain) varies substantially by region. Whereas in the Basque Country and Navarre, 48.3% and 34.4%, respectively, of students in non-university schools are enrolled in private schools financed with public funds, only 15% are in Castilla-la Mancha and the Canary Islands.

In health, although public funding of private facilities is clearly lower (somewhat under 10% of total expenditure[50]), the differences between regions are once again eye-opening (Figure 4.16). Catalonia stands out (25%) owing to its large network of private hospitals for public usage. These differences may be key in explaining higher or lower levels of public procurement expenditure that do not necessarily imply lower or higher efficiency.

Figure 4.15. Students enrolled in subsidised private schools (non-university education). Academic year 2015/2016
(as a percentage of total students enrolled in non-university education)

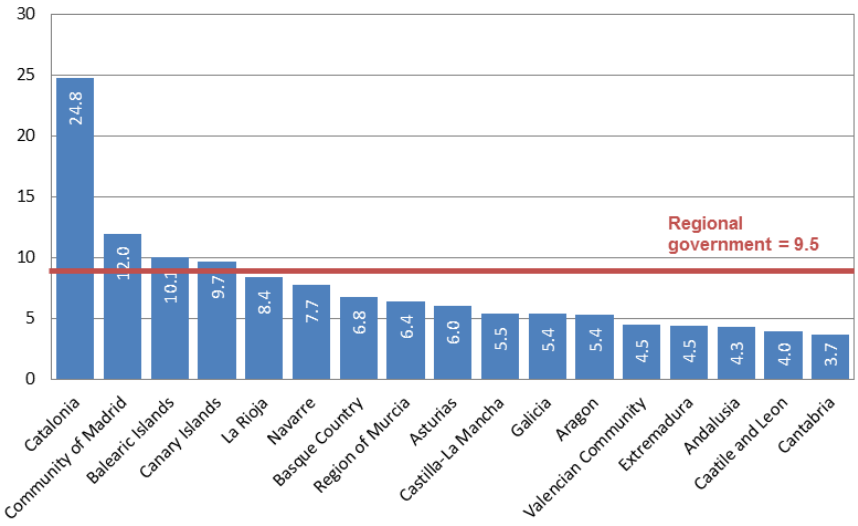


Source: Spanish Ministry of Education (2018a) and own elaboration.

A second class of expenditure drivers relates to demographic circumstances that can increase the need for health or education services. Thus, the proportion of young people influences the number of students and educational requirements per capita. Figure 4.17 reveals differences of up to 40 percentage points in this respect. By the same token, the older the population, the more health services needed per capita. According to this metric, there is a range of over 20 percentage points across the regions. In general, regions with older populations (Asturias, Galicia, Castile and Leon, Cantabria, Basque Country, Aragon and La Rioja) need more health services and less education services and vice versa.

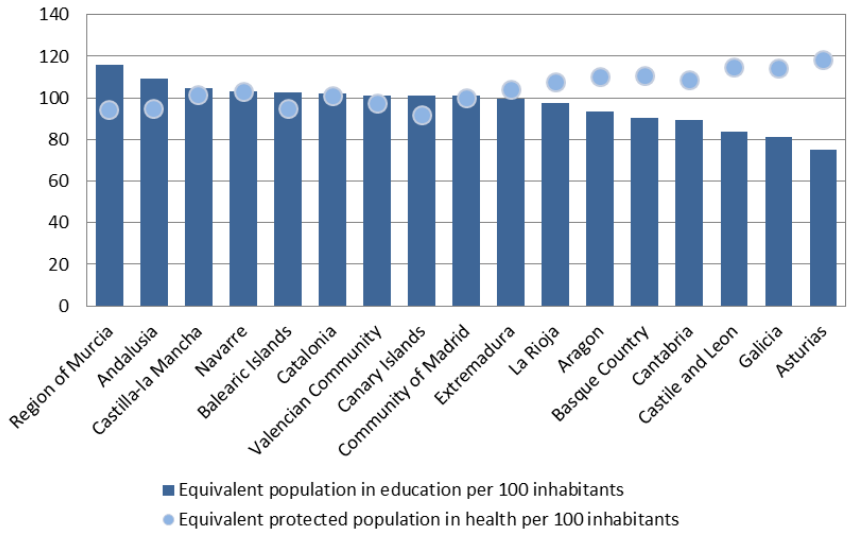
[50] The Ministry of Health, Social Services and Equality publishes the Public Healthcare Expenditure Statistics with information on the public expenditure on health services provided by the private sector. This is defined as the spending on market production associated with primary care services, hospital and specialised care, and the transfer of patients.

Figure 4.16. Public expenditure on health services provided by the private sector[1]. 2015 (as a percentage of total public expenditure on health)



[1] Public expenditure on health services provided by the private sector is defined as the spending on market production associated with primary care services, hospital and specialised care, and the transfer of patients.
Source: Spanish Ministry of Health (2018) and own elaboration.

Figure 4.17. Equivalent population per 100 inhabitants[1]. 2016

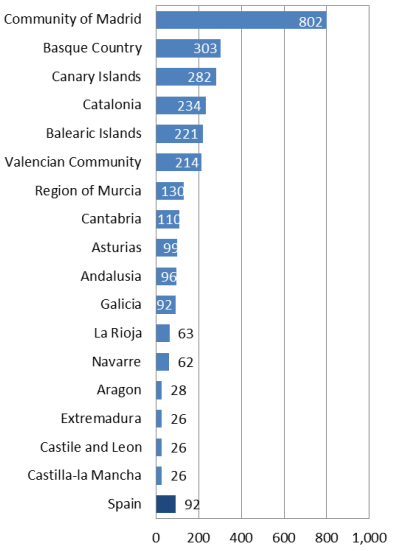


[1] The equivalent population in education is calculated using the methodology prescribed by Pérez, F. and Cucarella, V. (2015), which divides the population by age groups and proportions each group by its educational requirements. The equivalent protected population in health was taken directly from the Spanish Ministry of Finance and Civil Service.
Source: INE (2018a), Ministry of Education (2018a), Ministry of Finance and Civil Service (2018a), Pérez, F. and Cucarella, V. (2015) and own elaboration.

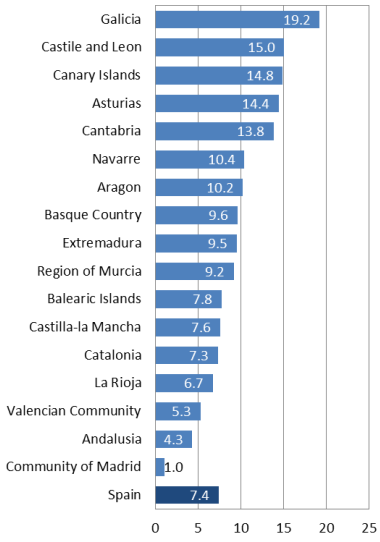
A third set of factors that can influence expenditure on health and education per inhabitant are geo-demographic factors related to the uneven physical distribution of the population. Low population density or population dispersion in small towns creates problems related to access to education and health services as some of the population lives in towns that do not have certain services. Figure 4.18 provides indicators of such differences between regions that may be relevant in assessing the costs associated with the provision of these services.

Figure 4.18. Geo-demographic factors. 2015

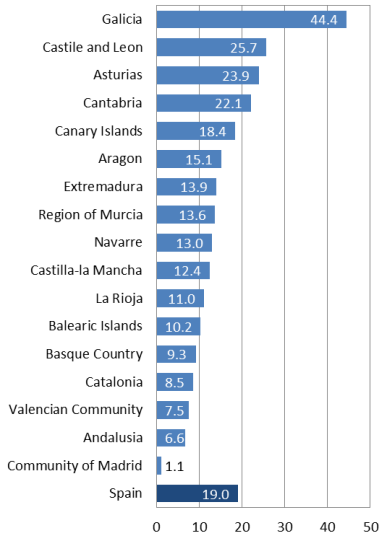
a) Population density (inhabitants per km^2)



b) Education: Percentage of population 3-17 years old living in towns with fewer than 1,000 inhabitants.



c) Health: Percentage of total population living in towns with fewer than 1,000 inhabitants

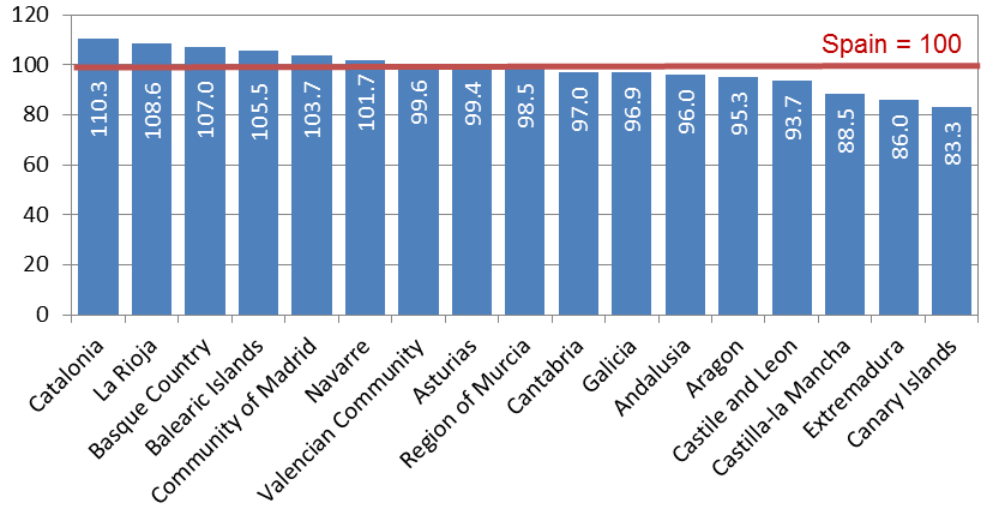


Source: INE (2018a), Ministry of Health (2018a) and own elaboration.

These differences may result in necessarily higher service provision costs owing to having to provide either basic services in small towns, which entails diseconomies of scale, or transportation to facilitate access to these services. Both imply a higher level of public spending to provide the services and in some instances higher public procurement expenditure.

A fourth set of factors that can influence expenditure levels relates to the cost of living. There are no official estimates in this respect and the unofficial figures point in different directions. However, they all point to there being significant ranges for cost of living, with differences of over 25% (Figure 4.19). This may explain substantial differences in the prices of procuring services, particularly those procured from the market (this factor is less relevant in explaining differences in the purchase of merchandise). As a result, this factor has potentially greater explanatory power in services such as education and health for which governments finance the provision of services by the private sector and in which wages and salaries are a very significant component of production costs.

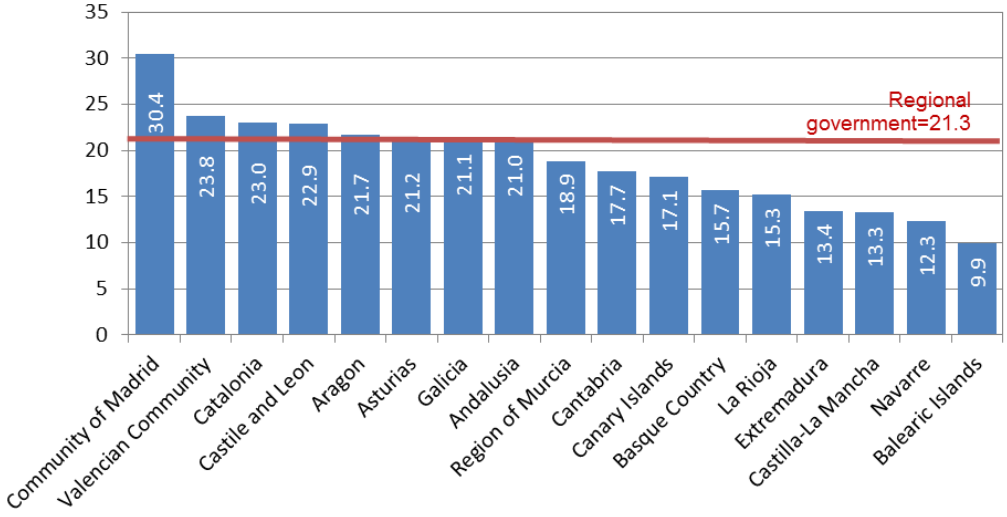
Figure 4.19. Differences in general price levels by region. 2016 (Spain=100)



Source: INE (2018b), FUNCAS (2011) and own elaboration

The last factor that can influence spending per inhabitant in general and public procurement spending in particular in each region is the degree of specialisation. For example, if one region is more specialised in university education, which costs more per student than the other levels of education, this can impact average expenditure. Panel a) of Figure 4.20 shows how university education as a percentage of regional expenditure on education varies substantially.

Figure 4.20. Public expenditure on university education. 2016 (as a percentage of total expenditure on education)



Source: Spanish Ministry of Education (2018a) and own elaboration

4.3.2 Determinants of the differences in regional public procurement expenditure

To hone in on the potential impact of inefficiencies in health and education public procurement expenditure at regional government level, we must evaluate the explanatory power of the characteristics listed in the last section for the differences in public procurement expenditure per inhabitant shown in Figure 4.14. If these characteristics can be shown to have a significant impact on spending and are not a reflection of different levels of efficiency per se, the extent of any inefficiency is limited, at most, to the part not explained by these factors.

The multivariate analysis undertaken in this section contemplates the influence of all the above-listed variables simultaneously to the extent that appropriate proxies can be identified for each. We have conducted multivariate regression analysis (fixed effects model) for 2012–2015, the years for which we have data for all the variables, for both health and education. The analysis confirms that some of the variables contemplated do have explanatory power, while others do not[51]. Overall, the variables that are statistically significant explain 47–51% of the variability in education spending per inhabitant and 57% of the variability in health spending.

In education, the model (4.1) is formulated as follows:

$$PPE_{it} = \alpha_i + \beta_1\, PE_{it} + \beta_2\, DispE_{it} + \beta_3\, Prices_{it} + \beta_4\, StudPriv_{it} + \beta_5\, Univ_{it} + \beta_6 Rev_{it} + \beta_7\, Trans_{it} + \varepsilon_{it} \quad (4.1)$$

Where PPE_{it} is public procurement expenditure on education per capita in region i in year t. PE_{it} is the equivalent population in education per 100 inhabitants, the proxy used to estimate the influence of the demographic structure on service needs. $DispE_{it}$ is the percentage of the population aged between 3 and 17 living in towns with fewer than 1,000 inhabitants (the proxy for the effect of population dispersion on costs) and $Prices_{it}$ is the price index. To capture the influence of the methods used by the various governments in terms of private–public agreements for the provision of services, $StudPriv_{it}$ is the percentage of students enrolled in semi-private schools as a percentage of all students in non-university education. To estimate the effect of service specialisation within education, the proxy used is $Univ_{it}$, which is the proportion of spending on university education. To factor in the substantial differences in regional resources, Rev_{it} is total regional government revenues per inhabitant of region i in year t. Lastly, $Trans_{it}$ is a transparency indicator compiled by Transparency International Spain (INCAU)[52] for the region, a factor potentially related to efficiency.

In education spending, the results of Table 4.1 suggest that two factors influence public procurement expenditure: (i) the preference for providing education services privately and (ii) regional government revenue per inhabitant. In the first instance, the coefficient is positive, indicating that a higher proportion of students in semi-private schools — a lower proportion of public education options — leads to higher funding of services provided by private schools and higher public procurement expenditure levels. Elsewhere, the level of resources or funding of regional governments is positively correlated to public procurement expenditure per capita in education. Transparency, which has notably increased in recent years, is not statistically significant although it improves the goodness of fit of the regression. The other factors modelled as potentially influencing the level of education spending per capita by shaping service needs or unit costs (demographic structure, cost of living in the region or the significance of university education in the regional education

[51] The reduced time period and the small variation of some structural factors considered could lead to coefficients that are not statistically significant although they may have an effect on public procurement expenditure.

[52] The variables Rev_{it} and $Trans_{it}$ are included as control variables to control for the regional level of resources and degree of transparency and accountability. The variable $Trans_{it}$ is a transparency indicator compiled by Transparency International Spain (INCAU) every two years. Consequently, data for 2013 and 2015 has been estimated from the available information.

systems) do not explain public procurement expenditure differences in education per capita.

Table 4.1. Determinants of regional government public procurement expenditure on education[1]. 2012–2015

	Dependent variable: Public procurement expenditure on education per inhabitant	
Equivalent population per 100 inhabitants *(PE)*	-0.807 (3.111)	-0.725 (2.853)
Population 3-17 living in towns with fewer than 1,000 inhabitants (%) *(DispE)*	0.072 (4.826)	0.103 (4.288)
General price level *(Prices)*	3.53 (7.09)	2.704 (6.788)
Students in semi-private schools (%) *(StudPriv)*	13.111* (7.29)	15.496** (6.203)
Public spending on university education (%) *(Univ)*	2.485 (6.523)	2.972 (6.403)
Financial resources per inhabitant *(Rev)*	0.068*** (0.019)	0.066*** (0.018)
Transparency *(Trans)*		-0.455 (0.353)
Constant	-624.786 (607.24)	-582.532 (588.835)
Number of observations	**68**	**68**
R^2	**0,473**	**0,507**
Dummy variable YEAR	**YES**	**YES**
Clustered standard errors	**YES**	**YES**

[1] Table shows coefficients from regressions of public procurement expenditure in education per inhabitant. Robust standard errors are in parentheses. Significance levels indicated by: * (p<0.10), ** (p<0.05), *** (p<0.01).
Source: IGAE (2018c), Spanish Ministry of Education (2018a), INE (2018a, 2018b), FUNCAS (2011), Pérez, F. and Cucarella, V. (2015), Spanish Ministry of Finance (2018b), Transparency International Spain (2018a) and own elaboration

In addition, even within university education, there may be additional specialisation factors that also shape overall expenditure per student and the public procurement expenditure of public universities. Specifically, expenditure on intermediate consumption may be influenced by university specialisation in the more experimental areas of knowledge (health science, engineering, natural science) relative to the less experimental ones (social science, humanities), by the resources needed per student and by the proportion of their research efforts.

Individually, university specialisation and research efforts explain a small fraction of the variance of public procurement expenditure whereas their resources explain 50% of it. Since university resources are by the same token correlated to specialisation (student fees vary significantly by degree programme) and their research efforts, the individual impact of these two factors declines, and even changes sign, when the three variables and the regional impact are considered together (Table 4.2.)

Table 4.2. Determinants of public university procurement expenditure[1]. Pool 2014-2015.

	Dependent variable: Expenditure on purchasing goods and services per student			
Financial resources per inhabitant			0.137*** (0.011)	0.131*** (0.023)
R&D Resources per researcher	0.014*** (0.005)			-0.004 (0.005)
Specialisation (percentage of students enrolled in science, engineering or health science studies)		3.57** (1.744)		-3.932** (1.908)
Constant	939.592*** (64.56)	887.772*** (97.955)	56.017 (73.432)	213.04** (108.97)
Number of observations	**95**	**96**	**96**	**95**
R^2	**0,054**	**0,041**	**0,506**	**0,761**
Dummy variable REGION	**NO**	**NO**	**NO**	**YES**
Dummy variable YEAR	**YES**	**YES**	**YES**	**YES**
Clustered standard errors	**YES**	**YES**	**YES**	**YES**

[1] Table shows coefficients from regressions of public procurement expenditure in education per inhabitant. Robust standard errors are in parentheses. Significance levels indicated by: * (p<0.10), ** (p<0.05), *** (p<0.01). Source: CRUE (2018), Spanish Ministry of Education (2018b) and own elaboration

The formulation of the regression model (4.2) for health reflects similarly conceived proxies:

$$PPH_{it} = \alpha_i + \beta_1 PH_{it} + \beta_2 DispH_{it} + \beta_3 Prices_{it} + \beta_4 ExpPriv_{it} + \beta_5 Rev_{it} + \beta_6 Trans_{it} + \varepsilon_{it} \quad (4.2)$$

Where PPH_{it} is public procurement expenditure on health per inhabitant in region i in year t, PH_{it} is the equivalent protected population in health per 100 inhabitants, $DispH_{it}$ is the percentage of the overall population living in towns with fewer than 1,000 inhabitants, $Prices_{it}$ is the price index, $ExpPriv_{it}$ is the level of expenditure on private health services as a percentage of total expenditure on health, Rev_{it} is total regional government revenues per inhabitant of region i in year t, and $Trans_{it}$ is the transparency indicator compiled by Transparency International Spain (INCAU) for region i in year t.

In terms of health spending, the econometric model suggests that a similar set of factors drive public procurement expenditure: the proxy for regional government revenues per capita — albeit less statistically significant in this instance — and subsidised private services as a proportion of overall expenditure (10%). In contrast, the other variables (degree of healthcare needs per capita as a result of the age structure of the regional population, dispersion of the population, cost of living in the region and regional government transparency standards) do not explain public procurement expenditure differences per capita.

Table 4.3. Determinants of regional government public procurement expenditure on health[1]. 2012–2015

	Dependent variable: Public procurement expenditure on health per inhabitant	
Equivalent protected population per 100 inhabitants *(PH)*	4.308 (3.145)	4.39 (3.066)
Population living in towns with fewer than 1,000 inhabitants (%) *(DispH)*	1.37 (39.096)	2.094 (36.491)
General price level *(Prices)*	1.384 (15.127)	1.436 (15.049)
Expenditure on subsidised private services (%) *(ExpPriv)*	8.031* (4.435)	8.421* (4.349)
Financial resources per inhabitant *(Rev)*	0.1* (0.057)	0.101* (0.055)
Transparency *(Trans)*		0.1 (0.633)
Constant	-254.21 (1,882.54)	-292.219 (1,740.445)
Number of observations	**68**	**68**
R^2	**0,569**	**0,569**
Dummy variable YEAR	**YES**	**YES**
Clustered standard errors	**YES**	**YES**

[1] Table shows coefficients from regressions of public procurement expenditure in education per inhabitant. Robust standard errors are in parentheses. Significance levels indicated by: * (p<0.10), ** (p<0.05), *** (p<0.01).
Source: IGAE (2018c), Spanish Ministry of Health (2018), INE (2018a, 2018b), FUNCAS (2011), Pérez, F. and Cucarella, V. (2015), Spanish Ministry of Finance (2018b), Transparency International Spain (2018a) and own elaboration

4.4 Public procurement efficiency drivers

The preceding analysis of the factors that influence spending leaves a significant part of public procurement expenditure unexplained that may be attributable to a large extent to the quality of service management in general and the efficiency of procurement procedures in particular. This section of the paper analyses this last matter from two perspectives: according to the opinions in government audit reports and in light of the efficiency indicators in contracting constructed from the data available on public procurement.

4.4.1 The problems according to the audit reports

The audit reports published by the various authorities and courts of audit provide public procurement evaluations that give insight into the most common practices used by the public authorities and their most problematic aspects. The reports analysed in this section were issued by the audit bodies of regional and local governments of several regions (courts of audit, audit chambers, audit councils) and comptrollers of the town/city councils that audit the various governments. These reports audit either a single contracting authority within a given government or a group of authorities.

The documents reviewed are audit reports dealing specifically with procurement records based on a very detailed analysis of a small volume of the contracting authorities' contracts. They provide insight into good practices and ad-hoc issues from a qualitative perspective. However, they do not enable general assessments of a quantitative nature such as those we want to make in later sections. These documents do not generally provide objective and quantifiable data regarding contract types and procedures. When they do, they do not apply a uniform criterion. Thus, they cannot be used to compare regions or to make generalisations[53].

Table 4.4 provides a summary of the problems and practices that curtail public procurement efficiency and are flagged, repeatedly, by the courts of audit and the public authorities' oversight bodies. They are grouped into four blocks of issues related to: general contracting procedures; open procedures; contracting procedures without a call for competition and work contracts.

Table 4.4. Most common problems and practices in public procurement in Spain

	MOST COMMON PROBLEMS AND PRACTICES IN PUBLIC PROCUREMENT IN SPAIN
General contracting procedures	Failure to sufficiently substantiate the procurement need
	Incorrect legal classification of the procedure Possible consequences or intentions: 1) to side step red tape; 2) to extend the terms of the contacts; 3) to accelerate the award process
	Lack of substantiation of the award criteria used
	Lack of resasoned reports justifying the estimated value contract
	Lack of specificity regarding the criteria to be applied or the scoring methodology
	Insufficient or inadequate assessment of the economic valuation (use of complex formulae)
	Imposition of different and unspecified classification and solvency criteria for foreign firms
Open procedures	During the crisis, many companies used this type of procedure to obtain contracts through sharp price decreases with the risk of not performing their obligations under the contracts
Contracting procedures without a call for competition	Efficiency shortfalls in terms of attracting and fostering competition: - Contract splitting in favour of a single bidder - Negotiated procedures without prior publication of a call notice for which just one firm presented a bid
	Lack of well substantiated affirmative award decisions
	Absence of communication and arguments regarding the reasons for which a bidder was not awarded the contract
Work contracts	Stipulation of unrealistic execution terms
	Delays as a result of legal and government red tape
	Delays as a result of unanticipated land or building constraints

Source: audit reports and own elaboration

Regarding contracting procedures in general, the audit reports highlight numerous problems. The first group refers to the incorrect starting of procedures: failure to sufficiently substantiate the procurement need and the incorrect legal classification of the procedure in an attempt to side step red tape, extend the terms of the contracts or accelerate the award process (e.g., contracts awarded on an expedited basis without well-founded grounds for the urgency) without this guaranteeing faster execution of the contract.

[53] Consequently, relevant information such as the percentage of contracts analysed or the percentage of errors detected is not available in these audit reports.

The second group of problems mentioned has to do with technical deficiencies of the procedure: the lack of substantiation of the award criteria used; the lack of reasoned reports justifying the estimated contract value and the lack of budget breakdowns and unit prices necessary for its estimation; and the lack of specificity regarding the criteria to be applied or the scoring methodology given that firms submitting bids should know precisely what needs to be submitted and how they are going to be evaluated.

In addition, the audit reports indicate that, in general, contracting procedures are characterised by an insufficient or inadequate assessment of the economic valuation (use of complex methods resulting in a very small range of dispersion among the bids submitted, failure to comply with the lowest price or most economically advantageous principle and the low weighting of the economic criterion relative to other criteria entailing the use of judgement), and the imposition of different and unspecified qualification and standing criteria for foreign firms.

A specific problem with open procedures was raised during the crisis, when many companies faced with significant drops in demand used this type of procedure to obtain contracts through sharp price decreases. The consequence of this unrealistic downward competition was in some cases that the award prices jeopardised the contractor’s ability to cover costs and, thus, perform its obligations under the contract.

Regarding contracting procedures without prior publication of a call notice (non-competitive), the audit reports flag significant efficiency shortfalls in terms of attracting and fostering competition. The reports highlight multiple cases of contract splitting in favour of a single bidder and negotiated procedures without prior publication of a call notice for which just one firm presented a bid. 'Splitting' is when the contracting authority opts to process several public contracting procedures even though they involve similar services that are provided continuously, which could be grouped into a single call for all the individual services. This practice, in addition to violating the principle of good governance (Article 25 of the Consolidated Text of Spain's Law on Public Procurement), may constitute a division of the subject-matter of a contract. In contracting procedures without a call for competition, the reports also highlight the lack of well substantiated affirmative award decisions as well as an absence of communication and arguments regarding the reasons for which a bidder was not awarded the contract.

Lastly, works contracts are often characterised by the stipulation of unrealistic performance terms, which prompt subsequent budget adjustments. The reports also point out the importance of the delays as a result of (i) legal and government red tape when it comes to executing the contracts that ultimately have to be extended, which thus affects the budgets allocated, and (ii) unanticipated land or building constraints.

This wide set of problems reveals numerous deficiencies in public procurement with regard to three aspects: (i) the lack of quality in the formulation of the conditions and characteristics of the goods and services demanded and their assessment by the contracting bodies; (ii) inadequate programming of contracting procedures; and (iii) the use of practices that do not promote competition and take advantage of the opportunities that competition offers for the acquisition of the goods and services contracted at the lowest price and with the best quality. However, the reports have one important limitation. They emphasize the fulfilment of formal and legal requirements in the specific cases analysed, but they do not promote the elaboration of good quality information for quantitatively evaluating the scope of the problems from a general perspective. This, therefore, gives rise to an interesting question. What are the consequences of all these deficiencies on the efficiency of public procurement? This question should be analysed from two perspectives: the duration of the procedure and the prices paid for the goods and services purchased.

4.4.2 Quantitative analysis of contracting efficiency: the approach

This section explores the options for quantitatively assessing the extent of the problems identified in public procurement from the two perspectives indicated in the previous section. To do this, the analysis uses information from databases generated in recent years from the publication of public contracts on different platforms. As we discuss later, these databases have their limitations, but they put us on the path that must be followed more in the future if we wish to adequately analyse the quality of public procurement in Spain.

Our starting hypothesis is that the prices of the goods and services purchased depend on the level of competition in the markets. Intensity of competition is determined by the prevailing level of supply in the market (assuming that a lower number of bidders is the result of barriers to entry and not the relative efficiency of those gaining market share). Greater competition is reflected in the profit margins obtained by the bidders and in the uniformity of prices, provided that price diversity does not reflect heterogeneous product characteristics. Numerous institutions and studies claim that procurement efficiency depends on the quality–price binomial when tendering works, goods and services[54].

An accurate assessment of the conditions that determine the efficiency achieved in public procurement would require much more information than currently provided by the data available on the prices paid by governments when purchasing goods and services and proper public-sector cost accounts to be able to identify price differences in homogeneous products. The current situation is far from ideal for assessing efficiency with such precision, although the detail with which contracts are differentiated by subject-matter may allow for much improvement in the future, when databases are larger and more reliable.

It is not currently possible to compare unit prices of homogeneous products. However, we can approximate the conditions of competition in which the contract is made and the intensity of competition, which represents a big step towards qualitative assessments. In this regard, factors such as the number of firms that bid for a tender, the difference between the initially estimated contract award value and the final award value (i.e., the savings obtained on each contract) or the tender procedure used (open procedure, restricted procedure, competitive dialogue, negotiated procedure) can be used as proxies for the level of competition in public contracting that can enhance value for money and, by extension, public procurement efficiency[55].

4.4.2.a. Indicators

The assessment of the intensity of competition proposed considers the information on public procurement from two perspectives. First, the information available at the contract level is analysed. Second, given that a contract award may comprise several lots with differing characteristics, the information is also analysed by lot.

For the sample of contracts to be analysed, the following indicators were compiled:

a) **Type of procedure**: Adopting the nomenclature prescribed by Transparency International and Spain's Public Procurement Observatory, we distinguish between competitive procedures (open, negotiated with a call for competition and competitive dialogue) and non-competitive procedures (award without prior publication of a contract notice, negotiated without a call for competition, restricted).

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[54] For more information on the intensity of competition indicators, see PWC, London Economics and Ecorys (2011); Transparency International Spain; and Spain's anti-trust authority, the CNMC (2015)

[55] There may be other factors determining the level of public procurement efficiency such as the award criteria, the use of central purchasing, contract splitting or the quality of the goods and services purchased. However, the information available does not allow considering these indicators in our analysis.

b) **Type of contract**: We distinguish between contracts for services, supplies and works, using the classification provided by the database.

c) **Procedure duration**: Calculated as the difference in days between the date of publication of the contract notice and the date of award of the contract. The duration of contracting processes constitutes an indicator of the cost associated with public procurement — both for governments and companies — and therefore it is a parameter of the efficiency with which the services are managed. A shorter procedure implies, all other things being equal, more efficient public procurement.

At the individual award or lot level into which each contract is broken down, four intensity of competition indicators are analysed:

a) **Average number of bidder firms**: The number of bids received is a proxy for the level of competition. In theory, the higher the number of firms offering their services for a tender, the more competitive the price at which the contracting authority can award the contract. The number of bidders is also a proxy for barriers to entry.

b) **Contracts with only one bid**: This indicator is compiled as a percentage of the contracts, or lots, for which there is just one bid. This indicator complements the last one. The higher the average number of bidder firms, the lower the percentage of contracts with only one bid.

c) **Average savings obtained per contract**: This indicator is compiled as the percentage difference between the estimated award value for each contract (before tax) and the value at which it is ultimately awarded (similarly, before tax). This indicator is a proxy for the intensity of competition in public contracting similar to that provided by a margin analysis, based on the assumption that higher competition in public tendering translates into higher savings.

d) **Average savings obtained per contract with only one bid**: This indicator is calculated in the same manner as the previous indicator but only for contracts for which there was only one bid. The hypothesis being tested here is whether supply-side concentration reflects barriers to entry or higher efficiency on the part of the incumbent. If the former is true, all other things being equal, the savings obtained in contracts with only one bid will be lower than in contracts with a higher number of bids. On the contrary, if the latter is true, this will not happen.

These four indicators are calculated, wherever the available information permits, by type of contract and by type of procedure.

4.4.2.b. Data sources

We use various sources of data to provide as complete a picture as possible of public contracting in Spain based on the limited available information. First, to give an overall picture of public procurement, we use the information available in the Public Registry of Contracts. Second, to build the indicators, the analysis performed in this section uses the contracts published in the TED database (the online version of the EU's Supplement to the Official Journal devoted to public procurement in the EU, the European Economic Area and beyond) and in Spain's Public Sector Procurement Platform[56].

[56] For the purposes of this project, the related information has been kindly provided by everis, one of the co-founders of the Public Procurement Observatory and the firm responsible for maintaining the Transparent Public Contracts application. Ivie would like to thank everis for its invaluable contribution to this initiative.

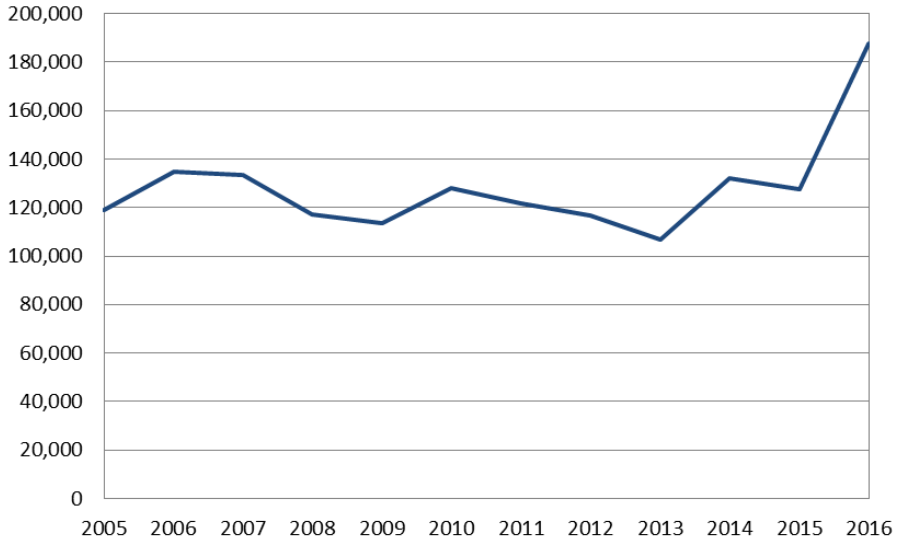
Annex 4.1 describes these data sources and the sample of contracts analysed in each case. We also spell out the limitations of each database that require reading the results with caution.

4.4.3 Quantitative analysis of contracting efficiency: the results

4.4.3.a Public contracts in Spain

According to the Public Registry of Contracts, the number of contracts registered by the different contracting authorities varies between 106,000 and 135,000. In 2016, this figure increased notably — up to 187,830 — as a consequence of the great number of contracts registered that year by regional and local governments.

Figure 4.21. Number of contracts according to the Public Registry of Contracts. 2005–2016



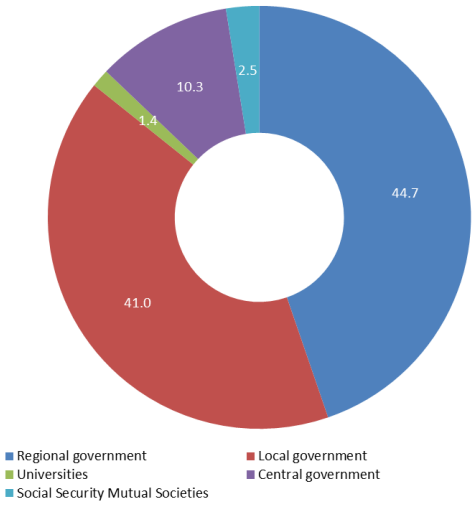
Source: Public Registry of Contracts

Figure 4.22 shows that regional and local government are the contracting authorities responsible for most public procurement (as shown in Section 4.2) by both number of contracts and volume of procurement spending. The central government (General State Administration) represents only 10.3% of the total contracts and 14.7% of the total volume of amounts awarded.

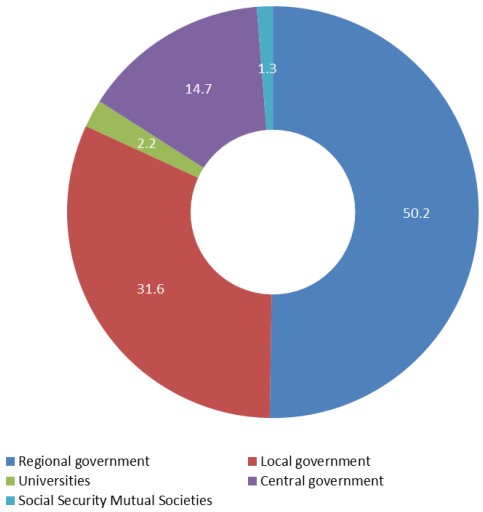
The type of procedure used in public contracts varies among the different contracting authorities. Open procedures, which are the most competitive procedure and that allow any firm to submit a tender, are not used to the same extent by all contracting authorities. Figure 4.23 shows that the central government and universities used open procedures in 40% and 41% of their contracts in 2016, whereas this percentage was around 20% for regional and local governments and social security mutual societies.

Figure 4.22. Breakdown of public contracts and procurement spending by contracting authority. 2016 (percentage)

a) Number of contracts



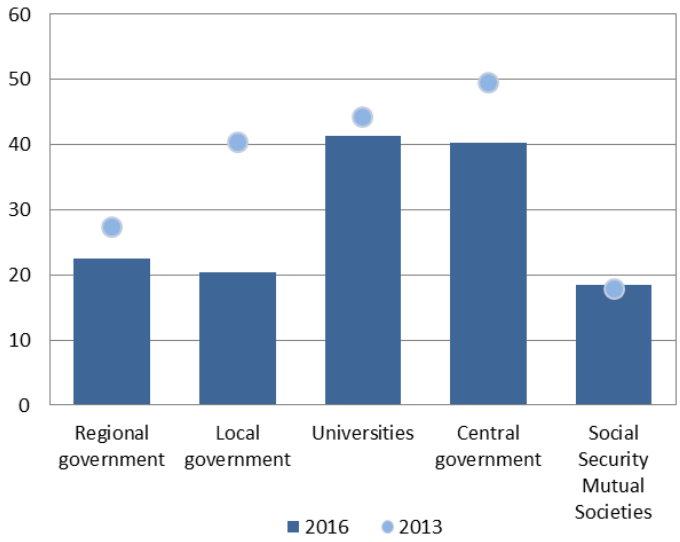
b) Volume of procurement spending



Source: Public Registry of Contracts

In addition, the percentage of contracts with open procedures decreased in 2016 with respect to 2013 for all contracting authorities, regardless of the amount awarded in each contract. This goes against the objectives of the different initiatives in motion to foster good practices in public procurement since it restricts competition.

Figure 4.23. Public contracts with open procedure by contracting authority. 2013-2016 (as percentage of total contracts)

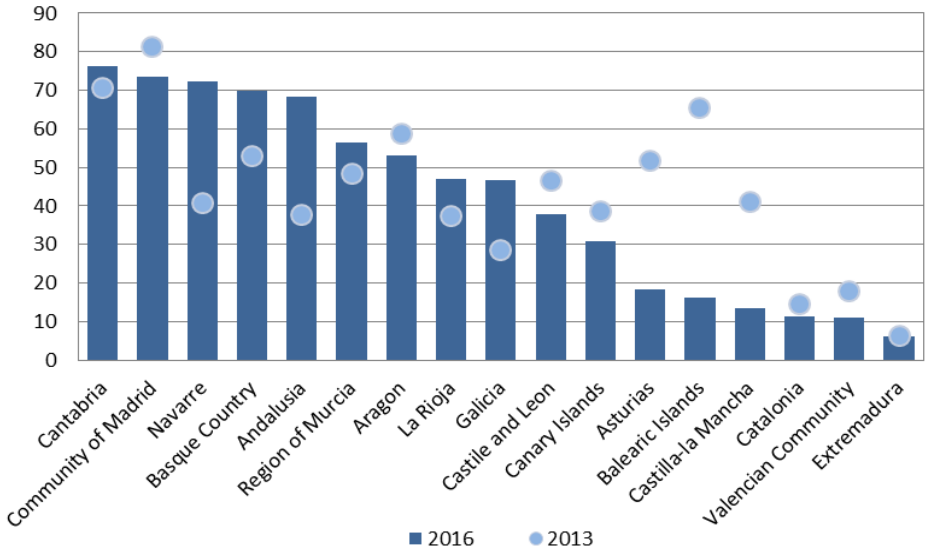


Source: Public Registry of Contracts

Although Figure 4.23 shows that 22% of public contracts for regional government used open procedures, this percentage differs from region to region (Figure 4.24). While the proportion of open procedures was over 70% in Cantabria, the Community of Madrid and

Navarre in 2016, it was less than 15% in Castilla-la Mancha, Catalonia, the Valencian Community and Extremadura. However, the proportion of open procedures has changed for all regions in 2016 with respect to 2013, although the regions at the top and the bottom of the regional ranking remain the same.

Figure 4.24. Public contracts with open procedure by regional government. 2013-2016 (as percentage of total contracts)



Source: Public Registry of Contracts

4.4.3.b Public contracts published in TED

This section analyses public procurement efficiency using the information available in the TED database, which only includes larger contracts. First, the analysis focuses on comparing the indicators described in Section 4.4.2.a across the various public authorities. Second, the same analysis is conducted for the education and health authorities of the regional governments to enable a cross-regional comparison.

Total public authorities

The sample of contracts taken from TED comprises 4,002 contracts, over 41.2% correspond to regional authorities (excluding universities); 24%, to public contracts awarded by local authorities; 17.4%, to agencies from the water, energy, transport and telecommunication sectors; 12.8%, to the central government; and 4.6%, to universities (Figure 4.25, Panel a).

Although contract types vary by type of government, service and supply contracts are predominant (Figure 4.25, Panel b). Service contracts represent over 50% for all authorities. This percentage is higher for local authorities (75.3%) and for the central government (64.8%). Works contracts are more predominant in the water, energy, transport and telecommunications sectors (8%), ranging from between just 0.4% and 1.5% for the other categories of contracting authorities.

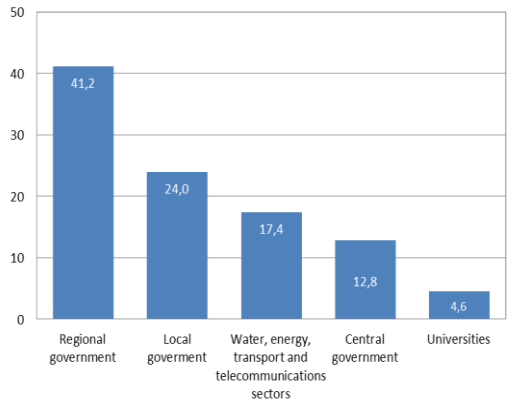
Competitive procedures (open, negotiated with call or competitive dialogue) are the most common among the contracts analysed. However, there are differences between the contracting authorities (Figure 4.25, Panel c). Whereas over 92% of the contracts awarded by local authorities and the central government are competitive, for regional authorities and the water, energy, transport and telecommunications sectors, the percentage dips to 80.9% and 79.3%, respectively.

The duration of procedures influences efficiency in several ways. First, to the extent that it reflects the tasks that the contractual procedure requires, a longer procedure indicates a greater consumption of resources by the authorities and the bidders. Second, it delays the time from when the contracted services become available. Third, a longer procedure implies greater uncertainty for bidding companies, since in many cases they need to know the result of the procedure to make decisions regarding their resources and activity.

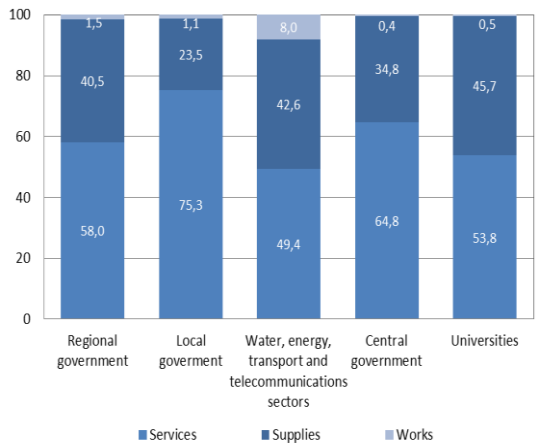
The duration of procedures is determined to a large extent by regulations, which establish the type of processing (urgent, ordinary) and the type of procedure (open, negotiated with advertising, negotiated without advertising, etc.), depending on the size of the contract.

Figure 4.25. Public contracts per type of contracting authority. 2016 (percentage)

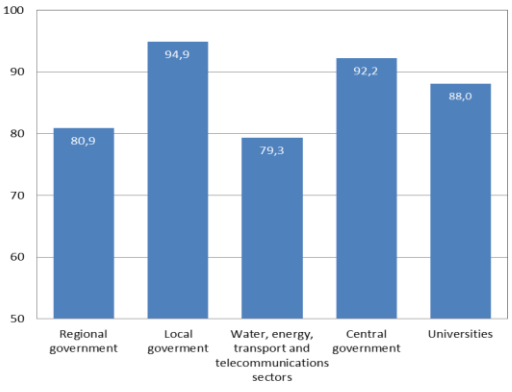
a) Percentage breakdown of the contracts awarded by authority



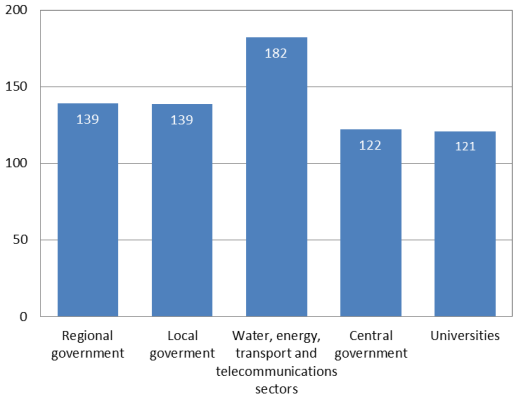
b) Percentage breakdown of the contracts awarded by type



c) Percentage of contracts awarded following a competitive procedure by type of authority



d) Average procedure duration[1]

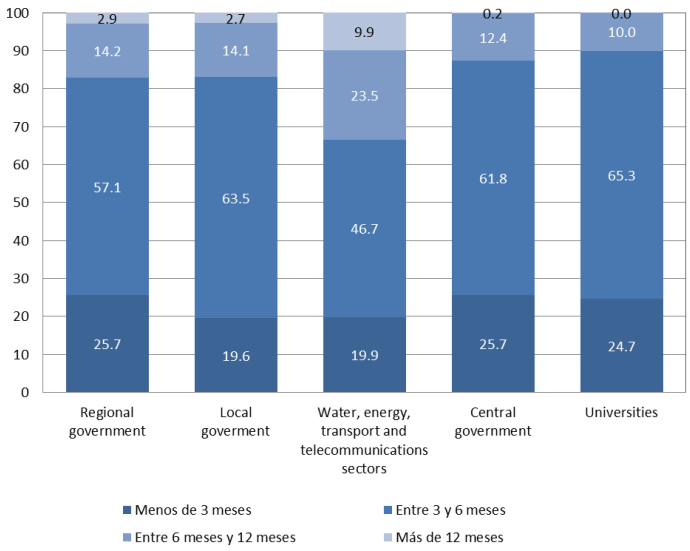


[1] To calculate the average duration, only the contracts in the sample for which information on the date of publication of the call notice and the date of award was available were considered.
Source: TED and own elaboration

The average procedure duration for regional and local authorities is very similar (139 days, respectively), while the central government and universities have a somewhat shorter average duration (122 and 121 days, respectively). The duration of public contracts awarded by authorities belonging to the water, energy, transport and telecommunications sectors, which probably involve more complex contracts, is substantially longer than for all other authorities (at 182 days).

Figure 4.26 breaks down contracts in the sample by duration and the awarding public authority. It reveals that most procedures last between three and six months, although the percentage of contracts with a duration of less than six months is considerably lower in the water, energy, transport and telecommunications sectors in which the proportion of — typically larger — works contracts is highest. For local and regional authorities, procedures lasting more than six months are more prevalent than for the central government and universities.

Figure 4.26. Breakdown of contracts by duration of procedure 2016 (percentage)



Source: TED and own elaboration

A contract may encompass several lots with a different number of bidders and/or award values. The intensity of competition indicators obtained from the information pertaining to each lot or awarded contract (average number of bidder firms, contracts with only one bid, average savings obtained per contract, average savings obtained per contract with only one bid) are provided in Table 4.5.

Panel a) of Table 4.5 provides the indicators of the level of competition for all contracts in the sample. For all contracts, there are no significant differences in the average number of bidder firms by type of contracting authority. In contrast, the differences are considerable in terms of the percentage of contracts receiving just one bid and the average savings obtained, although there is no clear relationship between these two indicators for the total number of contracts. The savings obtained in contracts with just one bid is considerably lower than the average savings obtained on all contracts by all contracting authorities, confirming a positive correlation between the level of competition among firms and management efficiency, indicating that the emergence of just one bidder indicates a barrier to competition.

Table 4.5. Intensity of competition indicators by public authority[1]. 2016

a) Total contracts

	TOTAL CONTRACTS				
	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average savings obtained per contract with only one bid (%)	Sample
Central government	5	11.0	20.9	14.3	1,141
Regional government	5	29.9	29.2	25.0	3,033
Universities	4	25.1	25.9	13.9	251
Local goverment	5	17.8	28.1	19.4	1,309
Water, energy, transport and telecommunications sectors	5	27.2	13.3	5.5	1,175
Total public administrations	**5**	**23.9**	**24.8**	**19.2**	**6,909**

b) By type of contract

	TYPE OF CONTRACT											
	SERVICES				SUPPLIES				WORKS			
	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average savings obtained per contract with only one bid (%)	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average savings obtained per contract with only one bid (%)	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average savings obtained per contract with only one bid (%)
Central government	6	10.1	27.4	19.9	4	11.7	15.9	10.6	5*	50.0*	14.9*	0.0*
Regional government	5	25.9	34.4	31.5	4	35.6	22.8	19.0	21	3.6	17.7	0.0
Universities	4	19.8	39.7	28.7	3	30.5	12.4	4.8	15*	0.0*	55.7*	--
Local goverment	5	19.3	30.2	19.2	4	14.6	22.2	20.2	11	0.0	37.8	--
Water, energy, transport and telecommunications sectors	4	30.3	15.1	5.9	3	26.1	8.8	5.1	18	6.6	23.6	0.6
Total public administrations	**5**	**22.9**	**29.4**	**22.5**	**4**	**19.1**	**18.6**	**15.4**	**18**	**0.2**	**24.5**	**0.4**
Sample	**3,915**	**3,915**	**3,915**	**3,915**	**2,870**	**2,870**	**2,870**	**2,870**	**124**	**124**	**124**	**124**

Table 4.5. Intensity of competition indicators by public authority[1]. 2016 (cont.)

c) By type of procedure

	TYPE OF PROCEDURE							
	CONTRACTS WITH COMPETITIVE PROCEDURE				CONTRACTS WITH NON-COMPETITIVE PROCEDURE			
	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average savings obtained per contract with only one bid (%)	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average savings obtained per contract with only one bid (%)
Central government	5	10.3	21.4	15.4	3	23.2	14.0	6.8
Regional government	5	23.1	29.7	26.0	2	79.1	25.2	22.9
Universities	4	20.5	27.6	15.0	2	72.7	8.5	10.8
Local goverment	5	16.8	28.2	19.2	3	35.8	26.3	20.7
Water, energy, transport and telecommunications sectors	5	24.6	14.6	5.7	3	42.1	5.7	4.8
Total public administrations	**5**	**19.8**	**25.5**	**19.4**	**2**	**60.0**	**18.8**	**18.5**
Sample	**6,204**	**6,204**	**6,204**	**6,204**	**705**	**705**	**705**	**705**

[1] Indicator values marked with an asterisk (*) are calculated from a sample of contracts with fewer than 15 observations.
Source: TED and own elaboration

Panel b) of Table 4.5 repeats the analysis, this time by type of contract: services; supplies and works. However, the results of the analysis on works awards should be read with caution given the reduced number of observations. The average number of bidder firms is higher for service contracts than supply contracts. There are no significant differences by contracting authority. However, this relationship is not so clear for the percentage of contracts that received just one bid. In this instance, the differences between the authorities are substantial for both service contracts (30.3% in the water, energy, transport and telecommunications sectors versus 10.1% for the central government) and for supply contracts (35.6% for regional authorities versus 11.7% for the central government).

There is no clear correlation between savings and strength of competition when distinguishing by contract type, as the regional authorities obtain average savings of over 34% for both contract types despite being one of the contracting authorities with the highest percentages of contracts with just one bid. Nevertheless, the savings obtained in the contracts with just one bid is still lower than that obtained on all contracts by all contracting authorities, confirming once again that calling for bids from several firms reduces barriers to entry and strengthens competition.

The type of procedure used (competitive or non-competitive) does influence the level of competition in public contracting, as shown in Panel c) of Table 4.5. Across all authorities, the choice of a competitive procedure (open, negotiated with a call for competition, competitive dialogue) corresponds to a higher number of bids, a lower percentage of awards receiving just one bid and higher savings in percentage terms.

Regional authorities: education and health

In Section 4.3 we saw that the differences in public procurement expenditure on education and health can be partially explained by the resources available to the regional governments and their differing preferences for service provision methods. However, a proportion of those differences cannot be explained and may derive from different levels of efficiency in the management of public resources, specifically in public procurement.

Based on the contracts published in the TED database that were awarded by regional government education authorities, we can observe how, in general, over 70% of the contracts in this expenditure area use a competitive procedure (open/negotiated with call or competitive dialogue) (Panel a), Figure 4.27)[57]. However, there are differences between the regions. Whereas in the Balearic Islands, Cantabria, Extremadura, Galicia and La Rioja, 100% of the contracts published in TED by the regional government education authorities used a competitive procedure, in Navarre this figure is 72.7%.

For health authorities, the variation between regions is higher (Panel b), Figure 4.27). Whereas in Galicia and Navarre, 100% of the contracts awarded by the regional health authorities use a competitive procedure, in Castile and Leon, the Basque Country and Asturias, less than 50% do.

Nor is the distribution by region uniform when broken down by type of contract. Moreover, there is little relationship with the type of tender procedure used. In education, service contracts (maintenance, cleaning, travel agencies, support services for students with special needs, etc.) account for more than 75% in regions such as Cantabria, Castilla-la Mancha, Andalusia and Catalonia. In contrast, in other regions, such as Navarre, La Rioja and the Basque Country, supply contracts (furniture, computer equipment, etc.) account for over 65% of the sample contracts analysed.

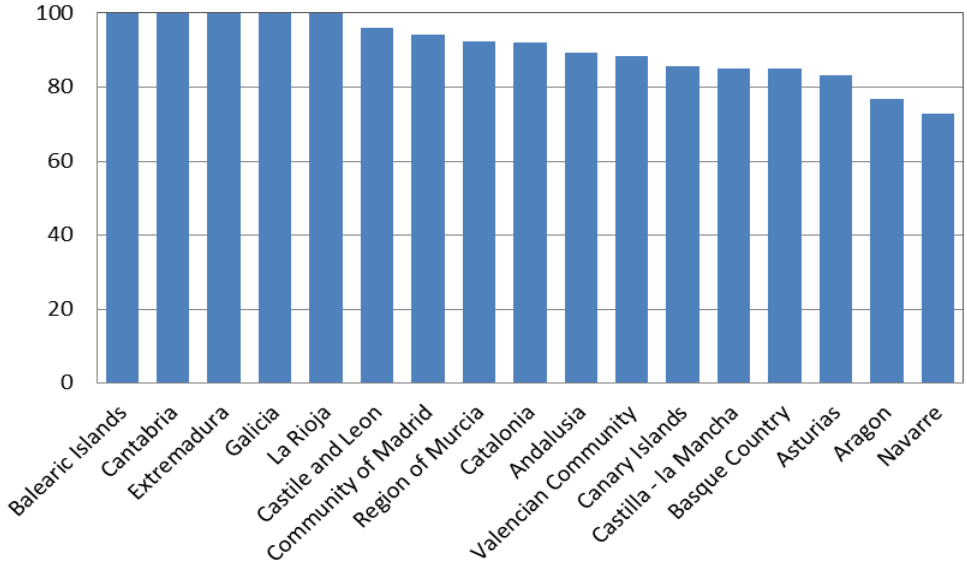
In health, the differences are smaller, as supply contracts (medicines, medical equipment, materials, etc.) represent over 40% of all contracts in most regions. In contrast, in Extremadura, Castilla-la Mancha and La Rioja, supply contracts represent between 20% and 40% of the contracts in the sample analysed, with service contracts (equipment maintenance, cleaning, IT services, etc.) garnering more weight in these regions.

In both education and health, works contracts account for a very small percentage of the overall sample, which is why the analysis below concentrates on service and supply contracts.

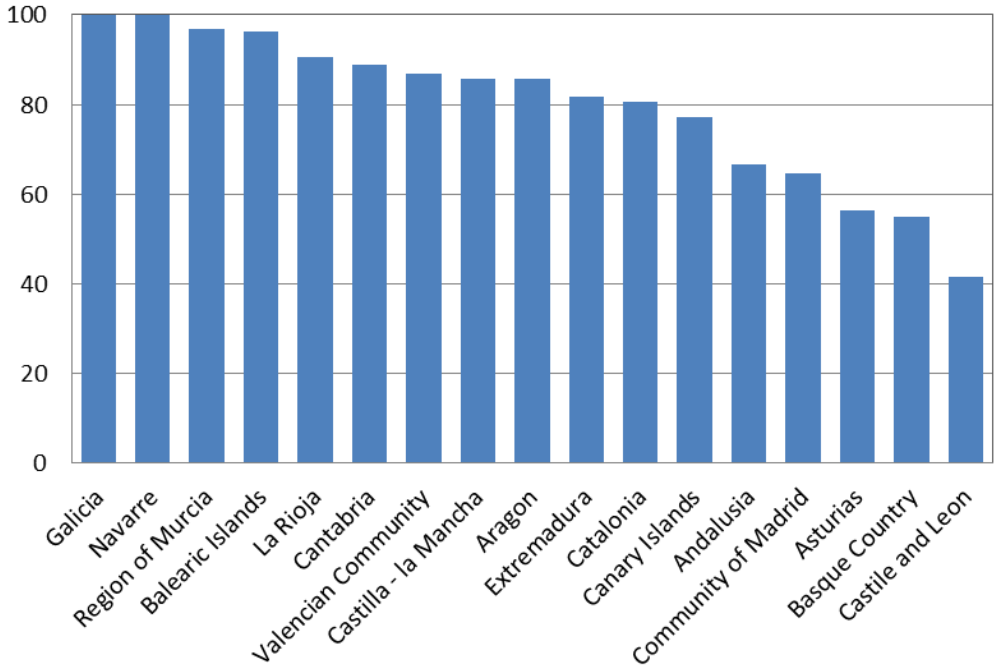
[57] It is important to underscore that the sample of contracts analysed contains fewer than 15 contracts for some regions. In education, the sample is not representative for Asturias, the Balearic Islands, Canary Islands, Cantabria, Extremadura, La Rioja, Galicia, Murcia or Navarre. In health, the sample is not representative for Navarre or Castilla-la Mancha.

Figure 4.27. Percentage breakdown of the contracts analysed by type of procedure[1]. 2016

a) Education



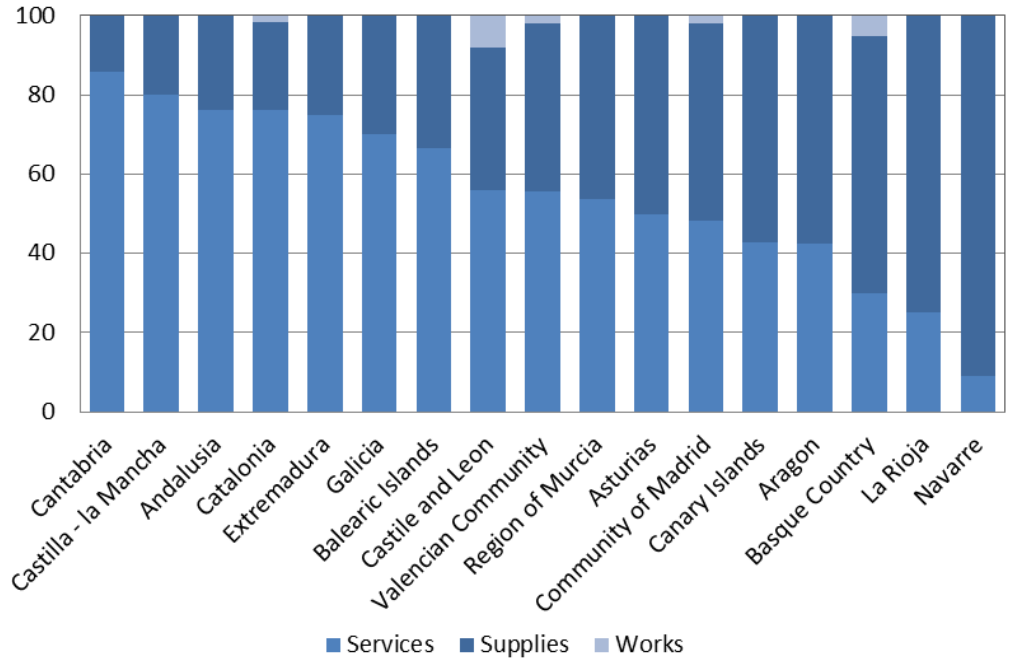
b) Health



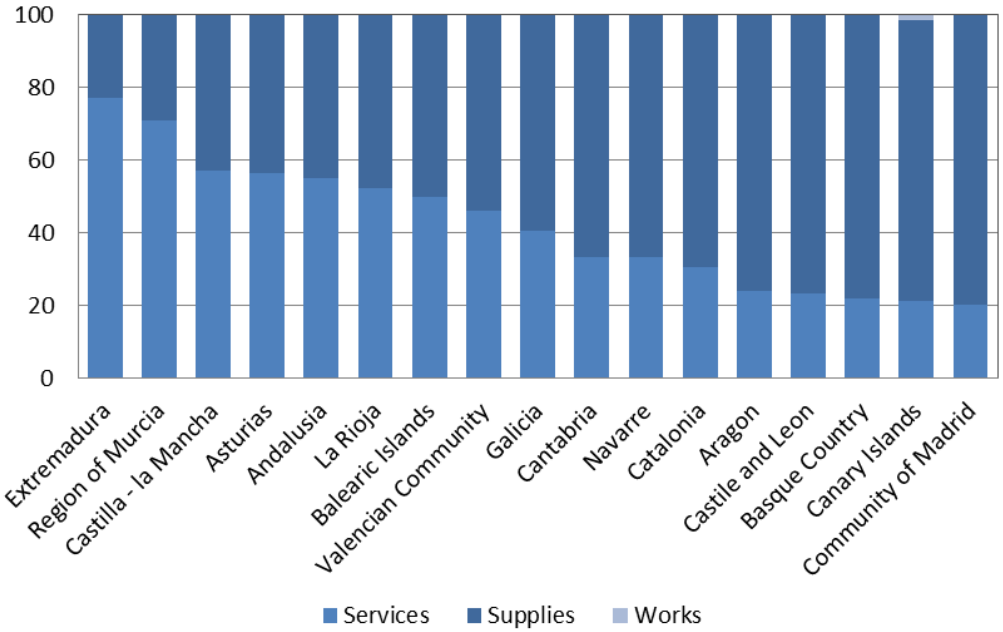
[1] In education, the sample of contracts analysed contains fewer than 15 contracts (not representative) for Asturias, the Balearic Islands, Canary Islands, Cantabria, Extremadura, La Rioja, Galicia, Murcia or Navarre. In health, the sample contains fewer than 15 contracts for Navarre or Castilla-la Mancha.
Source: TED and own elaboration

Figure 4.28. Percentage breakdown of the contracts analysed by type of contract[1]. 2016

a) Education



b) Health



[1] In education, the sample of contracts analysed contains fewer than 15 contracts (not representative) for Asturias, the Balearic Islands, Canary Islands, Cantabria, Extremadura, La Rioja, Galicia, Murcia or Navarre. In health, the sample contains fewer than 15 contracts for Navarre or Castilla-la Mancha.
Source: TED and own elaboration

Figure 4.29 shows the average duration of the contracting procedures for the regional education and health authorities by Spanish region. The differences in the duration of the procedures between the regions are substantial. In education, the Canary Islands and Andalusia are the regions that take the longest to conclude their procurement procedures (162 and 159 days, respectively), whereas the average in Asturias and Navarre is much lower (86 and 83 days, respectively). Note that the duration of the procedures is calculated based on the sample contracts for which there is information regarding the date of publication of the contract notice and the date of publication of the contract award. There are regions for which this sample is very small, and the average duration is calculated based on a very small number of observations. For this reason, the related data should be read with caution. When the sample is so small, the average duration may depend on the type of contract under consideration.

In health, Navarre, the Canary Islands, Galicia and Murcia are the regions that take longest to award contracts (note that the sample for Navarre is scantly representative). In this instance, Andalusia is the region that concludes these procedures the fastest (104 days).

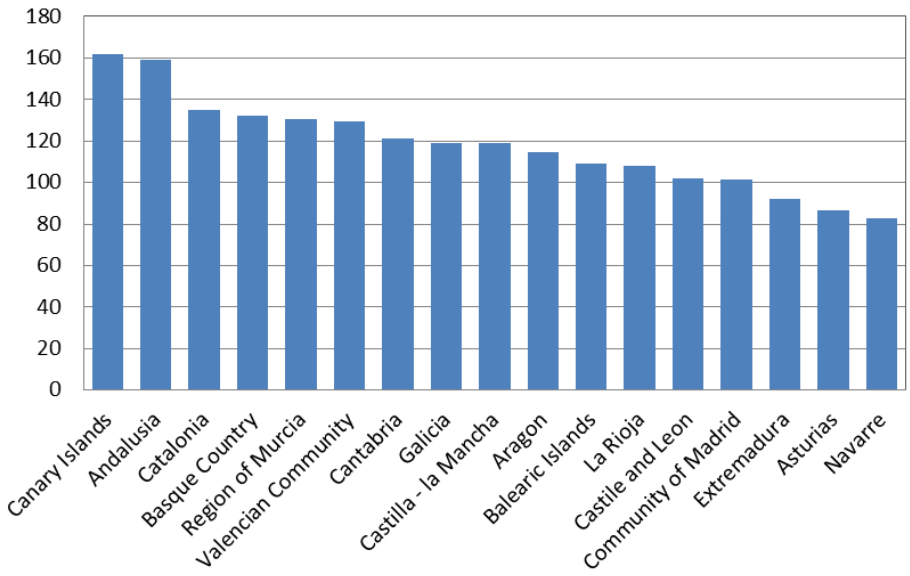
The takeaways from Figure 4.29 are that: 1) the duration of contracting procedures is very uneven from one region to the next in both education and health, with contracting taking twice as long in some regions; 2) there is no clear relationship between the pattern for a given region arising from these two sectors: Andalusia is both at the top and the bottom of the regional rankings, respectively for education and health, for the duration of procurement procedures.

Type of procedure and type of contract can shape the level of competition in the tenders run by the contracting authorities. Note that the analysis of the proxies for the level of competition provided below is conducted at the contract award level.

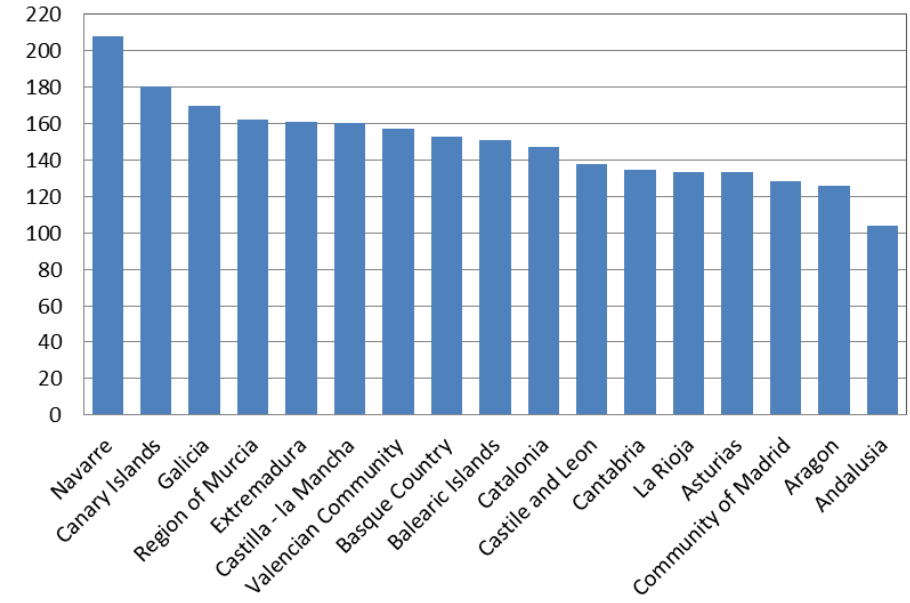
Table 4.6 shows the indicators calculated for the contracts published by the education authorities in the various regional governments. The contract samples analysed for each region differ substantially, not only because of the size of the regions but also because of the educational needs and size of the contracts awarded in each region. The samples are particularly small in Asturias, the Balearic Islands, Cantabria, Navarre and La Rioja, where the number of contracts analysed is under 15. Thus, the results marked with asterisks must be read with caution as they may be the result of a scantly significant sample of contracts.

Figure 4.29. Average duration of contracting procedure [1]. 2016

a) Education



b) Health



[1] To calculate the duration of the contracting procedures, only the contracts in the sample for which the required information was available were used. The resulting sample is not representative in some regions as a result of the very small number of qualifying contracts. Specifically, in education, the sample contains fewer than 15 contracts for Asturias, the Balearic Islands, the Canary Islands, Murcia, Navarre and La Rioja. In health, Navarre, Asturias and Castilla-la Mancha have samples of fewer than 15 contracts.
Source: TED and own elaboration

With regard to the savings indicators, the sample is even smaller as many of the observations did not include the data needed to calculate this indicator or the readings were considered anomalous (See Annex 4.1.2). This indicator is reported only for the overall sample of contracts and by type of contract as the sample of contracts was not representative for all regional authorities[58].

Panel a) of Table 4.6 provides these indicators for the sample of contracts analysed. It reveals the expected negative correlation between the average number of bidder firms and the percentage of contracts with only one bid. The Balearic Islands, Cantabria and Galicia are the regions with the lowest average number of bidder firms per contract (at two) and the highest percentages of contracts receiving bids from just one firm. Castile and Leon, Extremadura, Murcia and La Rioja have the lowest percentages of contracts with just one bid (note, however, that the sample for La Rioja is not representative).

Table 4.6. Intensity of competition indicators in education procurement[1]. 2016

a) Total contracts

	TOTAL CONTRACTS					
	Average number of bidder firms	Contracts with only one bid (%)	Sample	Average savings obtained per contract (%)	Average savings obtained per contract with only one bid(%)	Sample
Andalusia	8	23.5	669	39.5	41.9	308
Aragon	3	30.6	36	20.7	23.8	33
Asturias	3*	14.3*	7	49.1*	--	6
Balearic Islands	2*	50.0*	4	41.7*	0.0*	3
Canary Islands	5	20.0	15	4.7*	0.0*	8
Cantabria	2*	58.3*	12	22.9*	7.3*	10
Castilla-La Mancha	4	30.2	199	36.9*	0.0*	9
Castile and Leon	6	4.0	50	28.7*	--	10
Catalonia	4	32.8	122	41.7	30.6	52
Valencian Community	5	19.0	79	24.9	8.3	67
Extremadura	5	5.0	20	21.7	0.6	18
Galicia	2	56.6	53	30.8*	39.5*	6
Community of Madrid	4	27.9	68	20.5	15.5	35
Region of Murcia	5	3.7	27	16.3	0.0	27
Navarre	4*	50.0*	14	2.5*	--	2
Basque Country	4	19.0	42	10.5*	5.0*	11
La Rioja	7*	0.0*	6	15.5*	--	6
Regional government	**6**	**25.6**	**1,423**	**32.6**	**30.1**	**611**

[58] The sample decreases considerably when broken down by region, type of contract and type of procedure, with no observations whatsoever for certain regions. Thus, it is important to read the savings indicator results with caution on account of (i) the limitations intrinsic to the database and (ii) the fact that there are fewer than 15 observations for some regions (such as Castilla-la Mancha, La Rioja, Navarre, Cantabria and Aragon).

Table 4.6. Intensity of competition indicators in education procurement[1]. 2016 (cont.)

b) By type of contract

	TYPE OF CONTRACT					
	SERVICES CONTRACTS			SUPPLIES CONTRACTS		
	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)
Andalusia	8	23.6	40.6	5	21.7	6.6
Aragon	3*	36.4*	42.4*	3	28.0	11.3
Asturias	3*	0.0*	48.2*	3*	25.0*	50.0*
Balearic Islands	2*	33.3*	41.7*	1*	100.0*	--
Canary Islands	7*	0.0*	18.8*	4*	33.3*	0.0
Cantabria	3*	16.7*	46.3*	1*	100.0*	7.3*
Castilla-La Mancha	4	29.2	45.6*	3*	75.0*	19.4*
Castile and Leon	6*	0.0*	32.5*	5	5.9	25.2*
Catalonia	4	36.6	43.3	4	15.0	26.1*
Valencian Community	5	13.2	38.2	4	25.0	12.9
Extremadura	5	5.6	23.5	7*	0.0*	7.7*
Galicia	4*	25.0*	46.1*	2	62.2	0.0*
Community of Madrid	5	26.9	34.6*	3	30.0	7.8
Region of Murcia	7*	0.0*	31.2*	4	6.3	6.0
Navarre	2*	0.0*	--	4*	53.8*	2.5*
Basque Country	4	10.5	13.2*	4	27.3	5..0*
La Rioja	9*	0.0*	16.8*	7*	0.0*	15.2*
Regional government	**6**	**24.4**	**39.5**	**4**	**30.1**	**11.0**
Sample	**1,084**	**1,084**	**459**	**332**	**332**	**147**

c) By type of procedure

	TYPE OF PROCEDURE			
	CONTRACTS WITH COMPETITIVE PROCEDURE		CONTRACTS WITH NON-COMPETITIVE PROCEDURE	
	Average number of bidder firms	Contracts with only one bid (%)	Average number of bidder firms	Contracts with only one bid (%)
Andalusia	8	22.7	--	--
Aragon	3	33.3	--	--
Asturias	3*	0.0*	--	--
Balearic Islands	2*	50.0*	--	--
Canary Islands	6*	7.7*	--	--
Cantabria	2*	58.3*	--	--
Castilla-La Mancha	4	29.1	--	--
Castile and Leon	6	2.0	--	--
Catalonia	4	31.6	--	--
Valencian Community	5	12.3	--	--
Extremadura	5	5.0	--	--
Galicia	2	56.6	--	--
Community of Madrid	5	24.6	--	--
Region of Murcia	5	0.0	--	--
Navarre	4*	36.4*	--	--
Basque Country	5	12.8	--	--
La Rioja	7*	0.0*	--	--
Regional government	**6**	**23.9**	**2**	**68.5**
Sample	**1,369**	**1,369**	**54**	**54**

[1] Indicator values marked with an asterisk (*) are calculated from a sample of contracts with fewer than 15 observations.
Source: TED and own elaboration

Column 4 of Panel a) of Table 4.6 shows average savings for all contracts analysed. The average savings made by all the education authorities is 32.6%. The Canary Island and

Navarre are the regions with the lowest percentages of savings obtained on their contracts (under 5%), although their samples are not considered representative.

If we compare the results provided in Columns 4 and 5, we see no clear relationship between the two indicators. Although we might expect lower savings relative to the average on all contracts when just one bid is submitted for a given tender, this premise does not hold for all regions. This may be the result of the higher efficiency of the contracts with a single bid, but it may also be the result of the small size of the samples used and the heterogeneity of the contracts analysed relating to education.

Panel b) of Table 4.6 shows the same indicators, this time by contract type. Although this breakdown reduces the heterogeneity, it whittles down the samples for some of the regions even further, curtailing the robustness of the results obtained. In general, the average number of bidding firms is higher for service contracts than for supply contracts, and the percentage of contracts receiving just one bid is lower. As a result, the average savings obtained per contract is also higher for service contracts compared to supply contracts. However, the differences from region to region are substantial.

For education authorities, the indicators are not calculated for non-competitive procedures as the resulting samples would be too small to be considered representative. However, when looking at regional governments as a whole, the intensity of competition in competitive procedures is higher than in non-competitive procedures. The average number of bidding firms in the first instance (6) is higher than in the second (2). The pattern is similar when we look at contracts receiving just one bid. 68.5% of the non-competitive contracts received a bid from just one firm, compared to 23.9% for competitive procedures. This demonstrates that choice of procedure is significant in determining the level of competition achieved in public procurements.

In health, the sample of contracts used is larger, yielding representative samples for a higher number of regions. Panel a) of Table 4.7 shows these indicators for the overall sample of contracts analysed. The differences by region are considerable for all indicators. The average number of bidding firms for all regional governments is nine, although Catalonia and La Rioja report significantly higher readings[59].

The average level of savings obtained in health varies considerably by region. Asturias, Navarre and the Basque Country report low savings levels in comparison with the average (7.8%, 12.5% and 13.4%, respectively), whereas Aragon, Extremadura, Madrid and Murcia report percentage savings in excess of 35%. Elsewhere, as expected, the savings obtained on contracts with just one bid are, in general, lower than the average level of savings obtained on all contracts.

By type of contract (Panel b) of Table 4.7), there is no clear relationship between the average number of bidder firms and the percentage of contracts with only one bid and the type of contract. In contrast, there is some correlation between the average savings obtained on each contract and the contract type: in most regions, savings are higher for service contracts than supply contracts. However, this result may not be robust owing to the number of regions with samples not considered representative for calculating this indicator.

Lastly, the level of competition is higher in contracts awarded using competitive procedures than in non-competitive procedures, albeit with notable differences by region. Whereas

[59] This is the result of the information published in the database. Specifically, the sample of contracts used to calculate the competition indicators for these two regions is populated by contracts made up of multiple lots. Even though, in general, the number of bidders for each lot varies, in these instances, it is the same for all the lots in a given contract award (a high number of firms in this case). In this case, the average is influenced by the fact that each lot in the same contract is considered a unique observation.

Andalusia, Aragon, the Balearic Islands, Extremadura, Madrid and Murcia achieve average savings levels in excess of 30% in contracts awarded after competitive procedures, the savings levels for Asturias, Castile and Leon and Navarre are under 15%. The average level of savings obtained in non-competitive procedures — in which the percentage of contracts receiving one bid is close to or equal to 100% — is, in general, lower than in competitive procedures, although there are some exceptions, which may be the result of the reduced size of the available samples.

Table 4.7. Intensity of competition indicators in health procurement[1]. 2016

a) Total contracts

	TOTAL CONTRACTS					
	Average number of bidder firms	Contracts with only one bid (%)	Sample	Average savings obtained per contract (%)	Average savings obtained per contract with only one bid(%)	Sample
Andalusia	3	42.9	91	37.1	29.2	46
Aragon	8	40.0	25	35.8*	38.6*	14
Asturias	3	57.7	26	7.9	2.7	16
Balearic Islands	3	25.0	28	31.2	23.2	19
Canary Islands	4	33.9	118	24.6	20.4	79
Cantabria	12	11.8	76	20.6*	9.7*	12
Castilla-La Mancha	2*	28.6*	7	22.8*	0.0*	4
Castile and Leon	3	49.3	209	17.3	14.0	91
Catalonia	15	23.4	834	28.7	27.1	272
Valencian Community	3	41.6	137	24.8	21.0	48
Extremadura	5	21.2	33	35.3	18.2	27
Galicia	4	17.2	229	29.5	29.8	35
Community of Madrid	5	39.3	676	39.8	40.4	205
Region of Murcia	4	37.8	45	42.6	46.8	43
Navarre	4	18.2	33	12.5	0.0	18
Basque Country	6	34.8	322	13.4	3.6	210
La Rioja	23	2.3	176	--	--	--
Regional government	**9**	**30.3**	**3,063**	**27.0**	**22.9**	**1,139**

Table 4.7. Intensity of competition indicators in health procurement[1]. 2016 (cont.)

b) By type of contract

	TYPE OF CONTRACT					
	SERVICES CONTRACTS			SUPPLIES CONTRACTS		
	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)
Andalusia	3	28.8	36.7	3	61.5	41.8
Aragon	1*	100.0*	54.0*	10	25.0	25.7*
Asturias	4*	33.3*	10.8*	1*	78.6*	1.5*
Balearic Islands	3*	15.4*	45.2*	3	33.3	12.0*
Canary Islands	4	30.0	55.3*	4	35.1	20.1
Cantabria	5*	33.3*	48.7*	13	9.0	6.6*
Castilla-La Mancha	2*	25.0*	33.9*	2*	33.3*	19.0*
Castile and Leon	3	34.4	23.9	3	52.0	15.5
Catalonia	3	34.1	35.5	16	22.2	27.3
Valencian Community	4	35.0	43.3	3	44.3	11.6
Extremadura	7	17.6	29.1*	3	25.0	42.1*
Galicia	3	31.6	30.6	4	12.4	28.6
Community of Madrid	4	34.0	46.6	5	39.8	38.6
Region of Murcia	5	24.0	40.6	3	55.0	45.0
Navarre	2*	40.0*	11.6*	4	14.3	12.7*
Basque Country	3	38.3	13.4	7	34.2	13.4
La Rioja	3*	25.0*	--	25	0.6	--
Regional government	**3**	**32.4**	**33.7**	**10**	**29.9**	**24.7**
Sample	**485**	**485**	**297**	**2,577**	**2,577**	**841**

c) By type of procedure

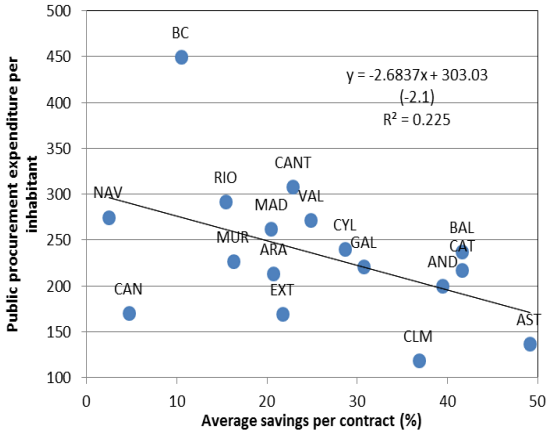
	TYPE OF PROCEDURE					
	CONTRACTS WITH COMPETITIVE PROCEDURE			CONTRACTS WITH NON-COMPETITIVE PROCEDURE		
	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)
Andalusia	3	26.8	39.4	1	100.0	12.9*
Aragon	9	31.8	36.5	1*	100.0*	33.3*
Asturias	4	26.7	14.8	1*	100.0*	1.0*
Balearic Islands	3	22.2	32.9	1*	100.0*	0.0*
Canary Islands	4	23.8	24.6	1	94.1	24.8*
Cantabria	13	8.2	24.7	1*	100.0*	0.0*
Castilla-La Mancha	2*	16.7*	30.3	1*	100.0*	0.0*
Castile and Leon	3	43.0	14.1	3	56.8	22.6
Catalonia	16	18.1	28.4	1	96.4	30.7
Valencian Community	3	36.5	23.2	1*	100.0*	32.5*
Extremadura	5	13.8	41.5	2*	75.0*	0.0*
Galicia	4	17.2	29.5	--	--	--
Community of Madrid	6	28.8	35.9	1	92.0	49.5
Region of Murcia	5	36.4	42.5	1*	100.0*	50.0*
Navarre	4	18.2	12.5	--	--	--
Basque Country	8	16.7	20.3	1	86.7	2.5
La Rioja	23	1.7	--	3*	50.0*	--
Regional government	**10**	**21.7**	**28.3**	**2**	**84.3**	**22.4**
Sample	**2,642**	**2,642**	**892**	**421**	**421**	**247**

[1] Indicator values marked with an asterisk (*) are calculated from a sample of contracts with fewer than 15 observations.
Source: TED and own elaboration

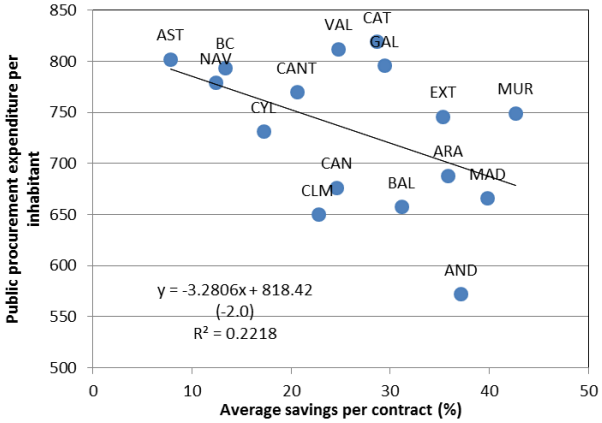
Public expenditure is determined in part by the authorities' ability to obtain savings in their contracting procedures, a hypothesis that the data seems to confirm[60] (Figure 4.30). As shown in the tables above, the level of savings obtained varies depending on the procedure used (competitive versus non-competitive) and the type of contract analysed. In addition, savings may depend on other variables, such as the number of bidder firms competing, the award criteria used, the duration of the contracting procedure, and the estimated contract award value, among other factors. To consider all these variables together, an econometric analysis of the information from the database was carried out.

Figure 4.30. Public procurement expenditure per inhabitant and average savings obtained per contract. 2016

a) Education



b) Health



Source: IGAE (2018c), INE (2018a), TED and own elaboration

Based on the sample of services and supply contracts for education and health for 2016, we analysed the determinants of the savings obtained in public contracts awarded by regional authorities. The model (4.3) is formulated as follows:

$$Sav_i = \alpha_0 + \beta_1\, procedure_i + \beta_2\, bid_i + \beta_3\, bid_i^{\,2} + \beta_4\, supply_i + \beta_5\, lot_i + \beta_6\, value_i + \varepsilon_i \quad (4.3)$$

Where Sav_i is the percentage savings obtained on contract i, $procedure_i$ is a dummy variable that takes a value of 1 if the procedure used for contract i is competitive, bid_i is the number of bidder firms for contract i, $bid_i^{\,2}$ is the square of the number of bidder firms[61], $supply_i$ is a dummy variable that takes a value of 1 if contract i is a supply contract, lot_i is a dummy variable that takes the value of 1 if contract i is a lot[62] and $value_i$ is the logarithm of the initially estimated contract award value.

[60] The level of savings is considered a proxy of efficiency in public procurement, although there may be other determining factors, such as the quality of the goods and services purchased.

[61] The number of bidder firms is considered in a quadratic form assuming that its relationship with savings is nonlinear and varies as the number of bidder firms increases.

[62] Each lot within a given contract is treated as an individual observation.

Model (4.4) additionally includes the *duration of the procedure*. Given that the information needed to calculate this variable is extracted for the most part from the observations for contracts awarded using competitive procedures, its inclusion reduces the variability of the $procedure_i$ variable. For this reason, the effect of the procedure duration on savings is analysed by the following formula:

$$Sav_i = \alpha_0 + \beta_1\, duration_i + \beta_2\, bid_i + \beta_3\, bid_i^2 + \beta_4\, supply_i + \beta_5\, lot_i + \beta_6\, value_i + \varepsilon_i \quad (4.4)$$

Where $duration_i$ is the time elapsing in days between the date of publication of the contract notice and date of award of the contract.

For education authorities, the coefficients for the $procedure$, lot and $value$ variables are positive, but only the last two are statistically significant in all models. Thus, all else being constant, a contract that forms part of a lot has, on average, a higher level of savings. In addition, all other things being equal, contract size positively influences the savings obtained.

On the other hand, the coefficient for the $supply$ variable is negative and statistically significant, which means that supply contracts have lower savings levels compared to service contracts. This holds in education and health. In the sample of contracts awarded by Spain's regional education authorities, the coefficient for the bid variable is negative and only statistically significant (at 5%) when the region dummy variable is not included.

For health, the region where the public procurement process is carried out has stronger explanatory power of the savings differences. The coefficients for the $procedure$ and bid variables are positive and statistically significant in all instances, i.e., a higher level of competition in a procedure translates into higher savings levels and, by extension, higher cost efficiency levels. However, the effect of *bid* is nonlinear, i.e., it has an inverted U-shape. This implies that the higher the number of bids, the higher the effect, up to a point at which the effect is inverted. The maximum value is always above 33 in all the different specifications in Table 4.9. Given that the median value of the number of bids is 2, the 75th percentile is 4 and the 99th percentile is 24 in our sample, the effect of *bid* is almost always positive. Additionally, since the relationship is quadratic, the effect of an additional bid is higher when there is a small number, which is what occurs in most of the contracts observed.

Contracting procedure duration plays an important role in the savings obtained in public contracts. Whereas in education a longer duration implies lower savings levels (the coefficient is negative and significant at 5–10%), in health this coefficient is negative but not statistically significant. This may be attributable to the fact that the effect of duration on the level of savings obtained is captured by other variables such as the size of contract. In any case, the fact that this relationship is negative points to a problematic consequence of the duration of the procedures: it reduces the savings obtained in public procurement. This is perhaps because the companies increase the prices bid as a consequence of the duration of the procurement procedures or because larger procedures discourage companies to participate. It would be of great interest to test these hypotheses with larger samples and by including in the evaluation the effect of the duration not only of the contracting procedures but also of the payment periods to the suppliers.

Nevertheless, the effect on savings levels of the variables modelled explains a fairly limited percentage of its variability (R^2 is 31–40% in education and 8–22% in health). The portion not explained by the determinants modelled may depend on numerous factors that come into play during the contracting process that are not controlled in this regression analysis due to the lack of sufficiently reliable information. The reports issued by public account auditors (analysed in Section 4.4.1) detect numerous issues encountered in public procurement processes in relation to the criteria used to assess the bids received, the procedure used to award the contract, the subject-matter of the contract and the splitting of contracts, which, due to a lack of reliable information, we cannot control for in the regression analysis but clearly do affect the level of competition and efficiency in the sector.

Table 4.8. Determinants of savings obtained per contract in education. OLS regression[1]. 2016

	EDUCATION			
	Dependent variable: Savings obtained in each contract (%)			
Competitive procedure *(procedure)*	0.0739 (0.0456)	0.082* (0.042)		
Number of offers received *(bid)*	-0.005 (0.005)	-0.009** (0.005)	-0.006 (0.006)	-0.0101** (0.005)
Number of offers received squared *(bid²)*	0.00008 (0.0001)	0.0002* (0.0001)	0.0001 (0.0001)	0.0002** (0.0001)
Supply contract *(supply)*	-0.227*** (0.027)	-0.264*** (0.019)	- 0.211*** (0.03)	-0.269*** (0.02)
Lot *(lot)*	0.094*** (0.031)	0.085*** (0.025)	0.069** (0.032)	0.077*** (0.027)
Initial estimated value of the contract *(value)*	0.074*** (0.009)	0.064*** (0.008)	0.073*** (0.01)	0.064*** (0.009)
Duration of procedure *(duration)*			-0.0004** (0.0002)	-0.0003* (0.0002)
Constant	-0.605*** (0.116)	-0.489*** (0.103)	-0.438*** (0.140)	-0.358*** (0.124)
Number of observations	**592**	**592**	**556**	**556**
R^2	**0.395**	**0.333**	**0.386**	**0.313**
Dummy variable REGION	**YES**	**NO**	**YES**	**NO**
Robust standard errors	**YES**	**YES**	**YES**	**YES**

[1] Table shows coefficients from regressions of the percentage of savings obtained in public contracts. Robust standard errors are in parentheses. Significance levels indicated by: * (p<0.10), ** (p<0.05), *** (p<0.01). Source: TED and own elaboration.

This section has shown that there are differences in public procurement between the various levels of government and between the various regional governments in education and health. Although this analysis enables us to illustrate the different ways in which regional authorities conduct themselves regarding the expenditure powers delegated in them — primarily education and health — the results should be read with caution for the reasons noted throughout this report and in Annex 4.1.2. Namely: 1) the information published in the TED database is not subject to verification and, consequently, the probability of error and missing values is high; 2) the samples analysed for some regions are far from representative and this conditions the results obtained for the sample of contracts examined; and 3) the heterogeneity of the subject-matter of the contracts analysed.

Table 4.9. Determinants of savings obtained per contract in health. OLS Regression[1]. 2016

	HEALTH			
	Dependent variable: Savings obtained in each contract (%)			
Competitive procedure *(procedure)*	0.035* (0.019)	0.058*** (0.021)		
Number of offers received *(bid)*	0.0110*** (0.003)	0.0108*** (0.003)	0.013*** (0.003)	0.014*** (0.003)
Number of offers received squared *(bid^2)*	-0.0001** (0.00006)	-0.00008 (0.00006)	-0.0002*** (0.00006)	-0.0001** (0.00006)
Supply contract *(supply)*	-0.0721*** (0.018)	-0.078*** (0.018)	-0.085*** (0.023)	-0.094*** (0.021)
Lot *(lot)*	-0.0128 (0.018)	-0.003 (0.019)	-0.044** (0.021)	-0.041* (0.021)
Initial estimated value of the contract *(value)*	0.0145*** (0.004)	0.012*** (0.004)	0.007 (0.005)	0.006 (0.005)
Duration of procedure *(duration)*			-0.0001 (0.00008)	-0.0001 (0.00009)
Constant	0.130* (0.073)	0.101 (0.062)	0.277*** (0.077)	0.273*** (0.067)
Number of observations	**1.114**	**1.114**	**828**	**828**
R^2	**0.223**	**0.076**	**0.192**	**0.108**
Dummy variable REGION	**YES**	**NO**	**YES**	**NO**
Robust standard errors	**YES**	**YES**	**YES**	**YES**

[1] Table shows coefficients from regressions of the percentage of savings obtained in public contracts. Robust standard errors are in parentheses. Significance levels indicated by: * (p<0.10), ** (p<0.05), *** (p<0.01).
Source: TED and own elaboration.

4.4.3.c Public contracts published in the Public Sector Procurement Platform

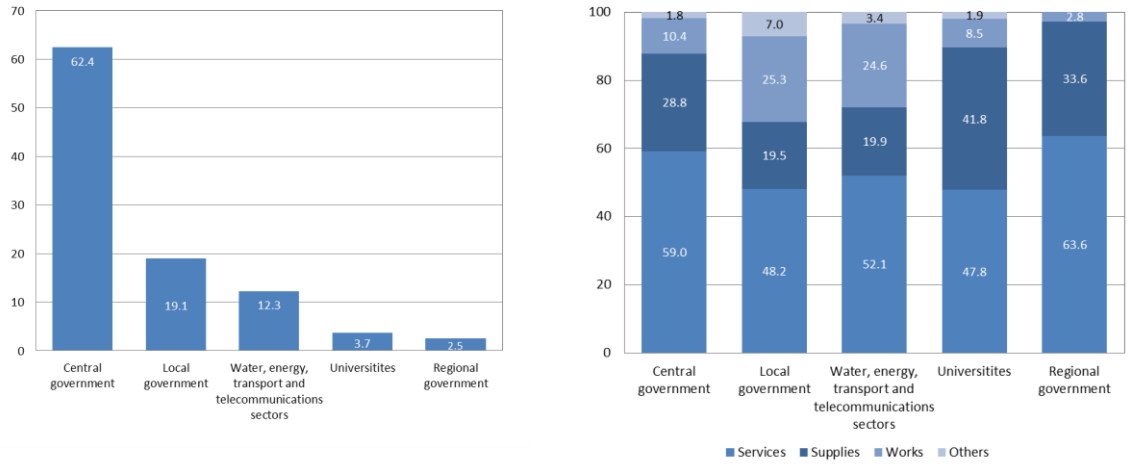
The TED database only includes contracts over a certain size threshold[63], which potentially biases the above analysis with bigger contracts. In this section, we analyse the contracts published in the Public Sector Procurement Platform, which includes contracts of more varied sizes. The sample analysed is mostly made up of contracts awarded by the central government (Panel a) Figure 4.31) as this database only includes the contracts published on the platform whose contracting authorities have added their profiles. Regional government and university contracts represent 2.5% and 3.7%, respectively.

The contracts published are primarily service contracts (48–64%). The next biggest type is supply contracts (20–42%). Works contracts are more prominent in the contracts awarded by local authorities and public entities in the water, energy, transport and telecommunications sectors (25.3% and 24.6%, respectively). The contracts classified as 'Other' account for a very small percentage of the sample, although this category accounts for 7% of contracts awarded by local authorities.

Figure 4.31. Public contracts by type of contracting authority and type of contract

a) Breakdown of sample by contracting authority (percentage)

b) Breakdown of sample by type of contract (percentage)



Source: Public Sector Procurement Platform and own elaboration

Table 4.10 shows the intensity of competition indicators for the sample of contracts analysed. In this instance, we can provide the indicators at a more disaggregated level for the central and local governments as the information permits this breakdown. Specifically, we calculate the indicators for the central government and differentiate between the 'General State Administration' and 'other public bodies'. Similarly, the local authority indicators have been calculated for this level of government as a whole, with differentiation between local authorities such as town/city councils, local councils, district authorities, local associations and provincial councils ('councils'), on the one hand, and other public bodies, such as municipal public entities, on the other.

Panel a) of Table 4.10 lists the results obtained for the overall sample of contracts analysed. Note that there are no significant differences in competition intensity by type of government, although the contracts awarded by the councils in the local authorities do

[63] Tenders for amounts above certain thresholds set in EU directives must be published in TED. These thresholds vary depending on the type of contract and the sector of the contracting authority.

garner a little more competition. As for the savings obtained, there are no significant differences by contracting authority when we analyse the overall sample. Nevertheless, it is clear that weaker competition implies lower savings levels, as observed by comparing Columns 3 and 4.

Panel b) of Table 4.10 shows that, as was the case with the TED database, the level of competition varies by type of contract. Competition is generally highest for works contracts (and translates into higher savings levels), followed by service contracts and, lastly, supply contracts. The analysis therefore confirms the positive effect that competition has on the savings obtained in public contracting and service cost efficiency, regardless of the type of contract analysed.

Table 4.10. Intensity of competition indicators in public procurement by contracting authority and type of contract[1]

a) Total contracts

	TOTAL CONTRACTS				
	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average savings obtained per contract with only one bid (%)	Sample
Central government	4	34.1	12.8	3.1	7,673
Central government (General State Administration)	4	38.5	11.6	2.2	5,085
Central government (Other Public Bodies)	4	25.4	15.3	5.9	2,588
Regional government	3	47.0	16.3	6.6	455
Local goverment	5	24.8	15.0	4.7	2,043
Local goverment (Councils)	6	24.7	14.8	4.5	1,883
Local goverment (Other Public Bodies)	4	25.0	17.1	7.4	160
Universities	3	35.1	11.3	2.5	416
Water, energy, transport and telecommunications sectors	5	33.8	17.3	4.8	1,258
Total public administrations	**4**	**33.0**	**13.7**	**3.7**	**11,845**

Table 4.10. Intensity of competition indicators in public procurement by contracting authority and type of contract[1] (cont.)

b) By type of contract

	TYPE OF CONTRACT											
	SERVICES				SUPPLIES				WORKS			
	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average savings obtained per contract with only one bid (%)	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average savings obtained per contract with only one bid (%)	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average savings obtained per contract with only one bid (%)
Central government	4	33.8	13.4	3.7	3	39.7	9.7	2.3	12	9.3	22.6	3.4
Central government (General State Administration)	4	38.1	12.4	2.7	3	43.7	8.1	1.6	14	10.9	23.4	2.5
Central government (Other Public Bodies)	4	27.6	14.7	5.8	3	25.4	15.7	6.6	9	5.6	20.7	7.4
Regional government	3	48.5	16.2	6.3	2	44.1	16.6	7.4	10*	42.9*	13.1*	5.5*
Local goverment	4	29.7	13.6	4.5	3	25.7	11.4	4.3	12	2.1	22.5	5.4
Local goverment (Councils)	4	30.0	13.3	4.3	3	26.1	10.6	4.0	12	1.9	22.4	5.8
Local goverment (Other Public Bodies)	4	27.3	16.6	6.5	4	22.4	17.3	7.8	10*	12.5*	28.4*	2.1*
Universities	3	36.8	11.1	3.2	3	35.6	10.1	1.6	8	15.6	17.5	1.3
Water, energy, transport and telecommunications sectors	3	44.4	14.7	4.3	3	35.2	14.5	5.9	9	11.4	25.6	5.3
Total public administrations	**4**	**35.0**	**13.6**	**4.1**	**3**	**37.6**	**10.6**	**2.9**	**11**	7.7	23.0	4.1
Sample	**6,455**	**6,455**	**6,455**	**6,455**	**3,607**	**3,607**	**3,607**	**3,607**	**1,463**	**1,463**	**1,463**	**1,463**

[1] Indicator values marked with an asterisk (*) are calculated from a sample of contracts with fewer than 15 observations.
Source: Public Sector Procurement Platform and own elaboration

Contract size is important in determining the type of procedure used and therefore can influence the level of competition. Table 4.11 shows the intensity of competition indicators by type of contract and by the initial estimated contract value. The thresholds used to determine whether a contract is small or large are those stipulated in European legislation, namely, €5,225,000 for work contracts and €209,000 for service and supply contracts[64]. Works contracts are not considered since the sample is not representative when distinguishing by the initial estimated contract value. In addition, we exclude the contracts awarded in the water, energy, transport and telecommunications sectors as these are subject to a different set of thresholds. Likewise, service and supply contracts whose initial estimated contract award value is lower than €18,000 have been differentiated. Above this threshold, contracts cannot be awarded directly.

Panel a) of Table 4.11 shows the intensity of competition indicators for smaller contracts, broken down by service and supply contracts of less than €18,000. In these contracts, there are substantial differences between types of government and types of contract, although the sample is not representative for supply contracts of the regional government and universities.

[64] The thresholds in force at the time of the award of the contracts analysed have been used. As of January 1, 2018, the modification of the thresholds for public sector contracting procedures by the European Union, through delegated regulations of the Commission of December 18, 2017, came into force. The new thresholds are €5,548,000 for work contracts and €221,000 for service and supply contracts.

Table 4.11. Competition indicators in public procurement by contracting authority and type of contract by contract size[1].

a) Contracts with initial estimated contract value smaller than €18,000

	TYPE OF CONTRACT							
	SERVICES				SUPPLIES			
	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average savings obtained per contract with only one bid (%)	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average savings obtained per contract with only one bid (%)
Central government	2	50.6	11.2	2.9	2	70.3	7.0	1.8
Central government (General State Administration)								
Central government (Other Public Bodies)								
Regional government	2	70.6	12.1	1.1	5*	0.0*	60.6*	--
Local goverment	3	37.4	13.9	4.1	2	34.8	8.0	2.9
Local goverment (Councils)								
Local goverment (Other Public Bodies)								
Universities	2	76.5	4.3	1.0	2*	50.0*	4.6*	0.0*
Total public administrations	**3**	**47.6**	**11.9**	**3.0**	**2**	**65.3**	**7.6**	**1.9**
Sample	**466**	**466**	**466**	**466**	**202**	**202**	**202**	**202**

b) Contracts with initial estimated contract value between €18,000 and €209,000

	TYPE OF CONTRACT							
	SERVICES				SUPPLIES			
	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average savings obtained per contract with only one bid (%)	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average savings obtained per contract with only one bid (%)
Central government	4	32.8	12.5	3.9	3	44.8	7.9	2.3
Central government (General State Administration)	4	35.4	11.9	3.0	2	50.0	5.9	1.7
Central government (Other Public Bodies)	4	28.7	13.4	5.5	3	27.4	14.4	5.7
Regional government	3	57.7	13.7	5.2	2	42.5	17.7	8.3
Local goverment	4	29.5	13.6	4.1	3	26.2	11.7	4.6
Local goverment (Councils)	4	29.6	13.3	3.8	3	26.9	10.8	4.4
Local goverment (Other Public Bodies)	4	27.9	16.4	7.0	4	20.5	18.3	7.2
Universities	3	37.0	10.9	2.0	3	38.6	8.5	1.5
Total public administrations	**4**	**33.1**	**12.7**	**3.9**	**3**	**40.9**	**9.2**	**2.9**
Sample	**3,645**	**3,645**	**3,645**	**3,645**	**1,955**	**1,955**	**1,955**	**1,955**

Table 4.11. Competition indicators in public procurement by contracting authority and type of contract by contract size[1] (cont.)

c) Contracts with initial estimated contract higher than €209,000

	TYPE OF CONTRACT							
	SERVICES				SUPPLIES			
	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average savings obtained per contract with only one bid (%)	Average number of bidder firms	Contracts with only one bid (%)	Average savings obtained per contract (%)	Average savings obtained per contract with only one bid (%)
Central government	5	32.5	15.5	3.7	3	28.0	12.5	2.5
Central government (General State Administration)	5	41.0	14.1	2.1	3	30.3	11.1	1.5
Central government (Other Public Bodies)	4	21.6	17.4	7.6	3	19.9	17.5	8.0
Regional government	3	40.6	18.2	8.2	2	56.5	7.0	4.2
Local goverment	5	20.0	13.3	9.0	4	19.0	11.1	3.3
Local goverment (Councils)	5	20.2	13.2	10.2	4	16.3	10.6	1.1
Local goverment (Other Public Bodies)	4	18.8	14.2	1.5	4	33.3	13.8	9.4
Universities	7	13.3	16.1	25.5	3	26.5	15.1	2.2
Total public administrations	**4**	**32.2**	**15.7**	**4.7**	**3**	**28.1**	**12.5**	**2.6**
Sample	**1,688**	**1,688**	**1,688**	**1,688**	**1,186**	**1,186**	**1,186**	**1,186**

[1] Indicator values marked with an asterisk (*) are calculated from a sample of contracts with fewer than 15 observations.
Source: Public Sector Procurement Platform and own elaboration

Panel b) of Table 4.11 shows the indicators for contracts whose initial estimated contract value is between €18,000 and €209,000. As was the case with the overall sample, competition intensity is higher for service contracts than for supply contracts. As a result, the savings obtained are also higher for service contracts than for the other types, although there are differences between the contracting authorities in this respect. In general, other public entities in local government obtained a higher percentage of savings on average.

Panel c) of Table 4.11 lists the same indicators for services and supply contracts with an initial estimated contract value of over €209,000. The analysis tells us that larger service contracts attract stronger competition and deliver higher savings compared to smaller contracts. This same pattern holds for supply services, albeit with some exceptions, such as at the regional government level, which may be due to the small size of the sample, and other public entities within the local authorities. In addition, Table 4.11 shows that the savings obtained in contracts with only one bid is considerably lower than the average savings obtained on all contracts regardless of the size of the contract.

Accordingly, smaller contracts imply, everything else being constant, reduced efficiency compared to larger contracts. However, those factors considered 'constant' when comparing the indicators of competition by government or type of contract (such as the type of procedure, the subject-matter of the contract, the region where the contract is performed, etc.) can be decisive in explaining why the competition indicators are lower for smaller contracts and confirm whether a greater number of bidders and more savings are equivalent to greater efficiency.

4.4.4 Progress and recommendations

Efficiency is crucial in the public procurement of goods and services from the marketplace owing to the volume of the associated expenditure. Public procurement expenditure currently accounts for 23% of all public expenditure in Spain. However, at the local and regional government levels, it accounts for 40–50%. Before the global financial crisis prompted a significant reduction in public investment, these percentages were substantially higher.

These figures indicate that governments outsource a large proportion of the goods and services they produce (in the case of works and services) or use (as intermediate inputs in their productive processes) to other enterprises. Public–private partnership can be more or less beneficial depending on a wide range of circumstances that lend themselves to analysis from both the technical and political standpoints. From the technical standpoint, the key evaluation criteria must be similar to those used by private enterprises when deciding whether to outsource. In other words, contracting is desirable to the extent it permits the acquisition of goods and services in the marketplace on better terms — cost, quality and security of supply — than if produced internally by the public sector.

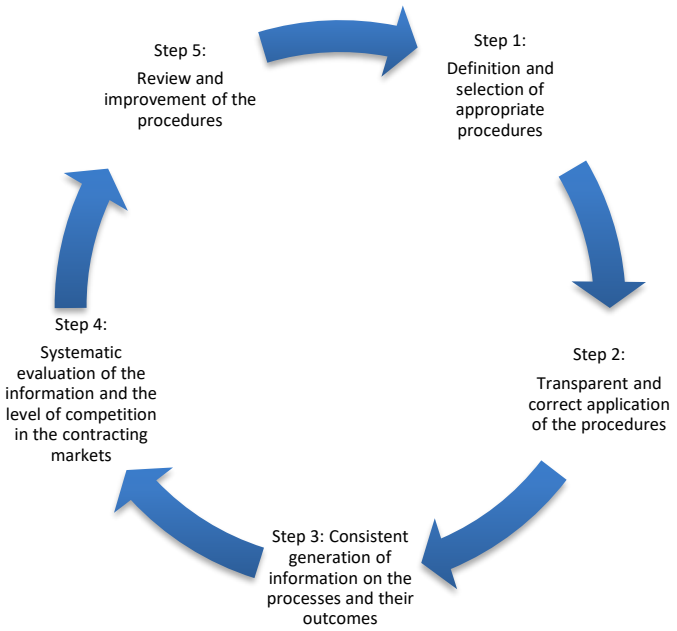
These goals are more likely to be attained when the markets generated by public authorities and supplier firms are competitive in accordance with the nature of the goods and services exchanged. The diversity of the goods and services supplied, and in some instances their complexity, means that intensity of competition cannot be evaluated exclusively on price but must also be assessed based on other factors, particularly quality[65]. Nevertheless, encouraging competition in its broadest sense is key to fostering efficiency in public contracting. To do so entails five steps. 1) The definition and selection of appropriate contracting procedures. 2) The transparent and correct application of the contracting procedures defined. 3) The consistent generation of information on the processes and their outcomes. 4) The systematic evaluation of that information and the level of competition in the contracting markets. 5) The review and improvement of the procedures (Diagram 1).

Over the past decade, Spanish public contracting has made progress in this direction, albeit with certain limitations. Specifically, the bodies tasked with overseeing the various authorities flag, in their reports on contracting practices, problems related primarily with the first two steps. These problems are caused by inadequate regulations and a deficient and opaque application of the procedures selected. Identifying these problems has set several initiatives in motion: (i) legislative reforms, in particular with the passing of a new law on public procurement (Law 9/2017, of 8 November 2017, which implements Directives 2014/23/EU and 2014/24/EU, of 26 February 2014, of the European Parliament and of the Council into Spanish legislation) and (ii) the promotion of good practices, such as those formulated by CORA, Spain's Commission for Public Administration Reform. In terms of the next two steps, related to the generation of information for evaluating contracting performance, there has also been some progress. This has taken the form of the creation of the Public Registry of Contracts, central purchasing bodies and contracting platforms such as the Public Sector Procurement Platform and Tenders Electronic Daily, which feed databases like the Transparent Public Contracts application[66] and the TED database. In turn, these databases provide a starting point for systematically evaluating public contracting competition and efficiency, such as the analysis conducted in this report.

[65] See Dimitri, N., Piga, G. and Spagnolo, G. (2011).

[66] See Transparency International Spain (2018b)

Diagram 1. Boosting efficiency in public procurement



Source: own elaboration

Despite these advances, the situation remains far from optimal due to the still partial reach of these good practices and the lack of awareness of them, precisely because the flow of information is still poor. Furthermore, the diversity and complexity of the goods and services contracted (on account of their nature, volume, homogeneity or heterogeneity, duration, etc.) and of the contracting authorities (as a result of different political preferences and cultural traditions regarding public–private partnerships, as well as these authorities' differing sizes and human/financial resources) need to be factored in. But to do this, we need far more abundant and better quality information than is currently available.

Only with such information will it be possible to analyse the contracting performance of authorities taking into consideration all the idiosyncrasies necessary to correctly identify the causes of the heterogeneity observed in contracting procedures and prices and to define, with a level of confidence, what proportion of the differences observed is attributable to contracting inefficiencies or to other factors.

Thus, to continue to improve public procurement in Spain, we propose the following recommendations for each of the five steps in the diagram above:

Step 1: Definition and selection of appropriate procedures

a) Management of contracting needs.

1. Timing: anticipation of needs sufficiently in advance to prevent having to expedite procedures or run them without a call for competition and to increase the probability of receiving bids that match the time constraints and financial and technical terms.
2. Team: contracting is a core component of the activities carried out by authorities that outsource certain tasks. It requires adequate human resources. Service contracts should not supplant ordinary, ongoing duties and tasks that correspond to positions within the entities that administer them.

b) Improved coordination of the administrative services intervening in the scheduling, advertising and execution of the contracts with the aim of avoiding overlap and unlocking synergies.

Step 2: Transparent and correct application of the procedures

a) Promotion of participation and competition.

1. Reorganisation of the processes implemented by the contracting authorities for inviting firms in negotiated procedures without a call for competition so that bids are solicited from as large a number of qualified firms as possible, thus generating effective competition among bidders.
2. Request of justification of financial resources and technical qualifications in all contracting procedures.
3. Adequate use of small contracts, eliminating the practice of 'splitting' contracts[67].
4. Enhancement of the use of the negotiated procedure without prior publication of a call for competition on the grounds of 'exclusivity for technical reasons', preventing its use for the purpose of restricting competition.
5. Prevention of awards based exclusively on price, failing to properly factor in the unique characteristics and quality of the goods and services bid.

b) Formulation and assessment of the criteria demanded: objectivity throughout the process and ultimate award decision.

1. Precise determination of the award criteria and the related evaluation methods. For criteria involving the use of judgement, it is advisable to specify which factors will be considered for qualitative evaluation purposes.
2. Analysis of the underlying reasons for excessively low bids for potential breach of performance obligations.
3. Evaluation of economic bids using methods that are readily understood by all bidders to inject transparency in the process.
4. Substantiation of the reasons for awarding *and* for not awarding contracts and the provision of this information to the chosen and other bidders in due manner and time.

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[67] 'Splitting' contracts in favour of a single bidder should not be confused with dividing the contract into lots to increase the participation of a higher number of firms and foster competition. In fact, the latter may improve the level of efficiency since it allows SMEs to participate in public procurement.

c) Prevention of deviations in execution timeframes and amounts.

    1. In contracts awarded without the prior publication of a call notice, it is crucial to take extreme care at the preparatory stage to avoid cost overruns or delays with respect to the thresholds permitting the use of this procedure.
    2. In works contracts, realistic planning is recommended in terms of both (i) the processing of bids and the execution of the works; and (ii) the quality of the construction projects.
    3. Greater rigour in drawing up contract budgets, indicating unit prices whenever possible.

Step 3: Consistent generation of information on the processes and their outcomes

a) Generation of standardised public procurement information that lends itself to use for the purpose of analysing and evaluating public contracting efficiency and competition in the corresponding markets. For example, all contract records should at least include homogeneous information about the:

    1. Type of contract
    2. Type of procedure
    3. Procedure duration
    4. Contracting authority
    5. Location of the contract
    6. Contract duration
    7. CPV code
    8. Number of bidder firms
    9. Number of lots
    10. Successful tenderer
    11. Registered office of the successful tenderer
    12. Estimated award amount
    13. Final award amount
    14. Award criteria

b) Generation of banks of public procurement information within the authorities for internal use.
c) A commitment to submitting the contracting procedure information to the shared platforms.
d) Agreements under which the authorities undertake to share their information systems.

Step 4: Systematic evaluation of the information and the level of competition in the contracting markets

a) Development of indicators for evaluating contracting efficiency.

    1. Intensity of competition indicators: number of bids; market shares; savings obtained; price differences for homogeneous goods and services.
    2. Procedure duration indicators.
    3. Indicators to track compliance with performance deadlines.
    4. Results indicators: outputs and outcomes.

b) Development of contracting evaluation methodologies and guidelines.

c) Best practice reports.

Step 5: Review and improvement of the procedures

a) Regular reports on contracting by the authorities on their practices and the improvements made in the above four steps, specifically addressing the following:

    1. Types of procedures used and their fit for purpose.
    2. Characteristics of the contracting units.
    3. Promotion of competitive procedures.
    4. Transparency and objectivity of procedures.
    5. Procedure timeframes and duration.
    6. Generation of contracting information and its use internally.
    7. Participation in initiatives for sharing contracting information with other authorities.
    8. Generation of contracting efficiency indicators.
    9. Development of contracting guides.
    10. Identification and dissemination of best practices.

4.5 Conclusions

1. Public purchases consist in spending on intermediate products, social transfers in kind via market producers and public investments. Overall, these dimensions represent 23% of public spending in Spain. This percentage was much higher before the crisis, which halved public investment. The volume of expenditure devoted to the purchase of goods and services exceeds 10% of GDP. This makes its efficiency a relevant issue. Efficiency in the purchase of goods and services is also relevant because public contracts are instruments of public–private collaboration that offer potential synergies through the outsourcing of public-sector activities through the markets. Effectively achieving these synergies depends on the efficiency of the procurement procedures and the intensity of competition in the markets.

2. The functional specialisation in a decentralised country like Spain is a determining factor in the expenditure differences in public procurement by different levels of government. Therefore, comparisons of the amount expended in public procurement do not necessarily reflect only the efficiency of each government in the processes. All governments purchase intermediate inputs and investment goods, but regional governments also spend on education, health and social services in kind, funding the private sector to provide them. The proportion of public procurement in regional and local governments is much greater than at other levels of government (between 40 and 50% of their total expenditure).

3. The differences in per capita public procurement expenditure observed across different Spanish regions — all of them responsible for similar spending powers — do not reflect only efficiency differences in procurement. These differences can also stem from the different volume of goods and services provided per inhabitant and their quality, the percentage of them procured on the market, and the different unit cost of their production. The volume of public services that each region provides and their quality are conditioned by the significant differences in the resources of the regional governments. The percentage of services acquired on the market depends on the preferences for the private provision of the service by the regional government. Unlike previous factors, the unit cost of services is directly related to efficiency in contracting and competition in the markets, although it may also reflect quality differences.

4. The audit reports published by the various authorities and courts of audit repeatedly indicate some deficiencies in the public procurement processes. They refer to the selection of adequate contracting procedures, the correct and transparent application of the procedures, the fostering of competition in the contracting markets through open procedures, the excessive duration of the procedures, contract splitting, etc. In recent years, various initiatives have been launched to advance in many of these areas, CORA being the most ambitious of them. From these initiatives, valuable tools have arisen to improve the available information — the registration of contracts, procurement platforms, central purchasing bodies — and regulatory changes have been proposed. However, the extent of the improvements is yet to be evaluated. This report has explored some possible improvements.

5. An important objective of evaluating the efficiency achieved in public procurement should be to quantify whether the unit costs of the goods and services purchased are close to the lowest offered by the market, for a given level of quality. However,

this goal requires overcoming two major obstacles. The first one is the lack of homogeneity of the goods and services acquired, which makes it difficult to assess which part of the price differences paid can be explained by characteristics or quality. The second obstacle is related to the limitations of the quantity and quality of the information published by the contracting bodies. Given the heterogeneity of the contracts, more observations than those currently available, and used in this report, would be necessary to perform a reliable analysis.

6. The recent improvement of the public procurement databases available has allowed us to quantitatively analyse that, although these databases do not fully allow achieving the objectives of the previous paragraph, they do constitute an initial estimate on public procurement efficiency and competition. The intensity of competition indicators built are based on, instead of unit prices, the number of bidder firms, the savings resulting from the procurement processes and procedure duration.

7. The results indicate that the higher the level of competition, the higher the savings in the procurement process: savings are greater when the number of competitors is large. On the other hand, savings are lower when the procurement procedures limit the number of bidders. In particular, for any contract size, the price savings are lower when there is only one bidder. This indicates that non-competitive procedures tend to increase the costs of the process. Therefore, these types of procedures should only be used when strictly justified.

8. Contract size also influences the savings achieved. Savings are greater with larger contracts. Consequently, the concentration of contracts — regardless of whether the contracts are divided into lots — can generate savings in procurement processes. Therefore, the recommendation that contract splitting should be avoided is supported by the evidence provided in this report.

9. The relevance of the indicators of savings as proxies for the intensity of the competition does not mean that a lower price should always be considered an indicator of greater efficiency in public procurement. The quality of the goods and services purchased is also relevant. When quality is not taken into account — as occurs in procedures that require awarding the most economic bid — the risk of not achieving the best value for money is higher particularly when price should not be the only award criteria. A balance between price and quality criteria is advisable.

10. The duration of the procurement procedures was analysed since it may influence the costs associated with the procurement process, both for governments and companies. The large heterogeneity observed in the duration of the procedures indicates that there are significant differences in efficacy and efficiency between governments and within their departments. To this end, the dissemination and imitation of good practices would reduce the duration of the processes and improve contracting efficiency.

11. There is wide scope for further improvement in public procurement in Spain. The improvements would significantly increase the efficiency of governments and the level of competition in the markets where goods and services are purchased. In light of the results obtained in the analysis, five steps should be worked on. 1) The definition and selection of appropriate contracting procedures so these procedures can contribute to obtaining results efficiently and effectively. 2) The transparent and correct application of the procedures to boost the number of bidders and the

competition between them, and the shortening of the duration of the procedures. 3) The systematic generation of abundant information on the quality and outcomes of the processes. 4) The generation of reliable indicators of the level of competition in contracting markets and the systematic evaluation of them. 5) The review and improvement of the procedures and the preparation and dissemination of procurement guides that facilitate the imitation of good practices. For all these areas, improvement initiatives should be fostered, and all governments should be encouraged to participate.

Annex 4.1

A4.1.1 Public Registry of Contracts

The consolidated text of the Spanish Law on Public Sector Contracts approved by Royal Legislative Decree 3/2011, of November 14, establishes the obligation of all contracting bodies (both central and peripheral), autonomous bodies and other public-sector entities to send information on the contracts awarded to the Public Registry of Contracts of the Administrative Contracting Advisory Board. For this purpose, Spain's Ministry of Finance and Civil Service provides the contracting authorities the necessary tools to register all contract awards and amendments.

Spain's Ministry of Finance and Civil Service publishes information on the total number of contracts and total amount awarded from 1998 to 2016. For recent years (2013–2016), the information is provided by contracting authority (central government, regional government, local government, universities and social security mutual societies) and by type of procedure (open, restricted and others[68]). However, the lack of uniformity in the publicly available information only allows comparing the total number of contracts and the total amount awarded over the long-term.

A4.1.2 TED database

At the European level, TED (Tenders Electronic Daily) is the online version of the EU's Supplement to the Official Journal devoted to public procurement in the EU, the European Economic Area and beyond. Tenders for amounts above the thresholds set in European legislation must be published in the TED and those falling below this threshold may also be published on the platform. This information is available in database format from 2006 until 2016. The information available on the tendering and adjudication of government contracts in the various countries is very detailed and distinguishes, among other variables, between the procedure type, tendering government, COFOG code, type of contract, estimated award value and final award value for each contract.

The key advantage of this database is that it provides information on public contracts awarded by regional governments over a broad period of time, enabling a comparison of the intensity of competition indicators among regional governments and among the various levels of governments. Moreover, the inclusion of the COFOG code allows focusing the analysis on a given expenditure function.

However, the information gleaned from this database has certain limitations because, as the European Commission itself points out, the data is taken directly from the information published by the various contracting authorities in the TED and has not been verified by the authorities, so that it could contain errors or omissions[69].

With the aim of providing results that are as reliable as possible, the sample was limited to contracts not cancelled for which information is available for all the variables needed to calculate the indicators. We also eliminated observations for which the number of bidders is displayed as zero and for which savings were negative or over 80%. Moreover, we reclassified the contracting authorities according to level of government as follows: central

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[68] The 'Others' category includes contracts awarded by negotiated procedure, competitive dialogue, directly and those in which the type of procedure is not available.

[69] One example of this affects the average savings calculation, defined as the percentage difference between the estimated contract award value and the total final contract award value. Both these variables are defined as the pre-tax contract value. However, cases have been detected in which the difference between the two was, precisely, the amount of tax. Thus, instead of zero savings, these contracts showed positive savings. In addition, we observed that the classification of contracting authorities by government (the CAE_TYPE variable) is not consistent and a given contracting authority can appear in multiple categories.

government (includes national agencies and bodies governed by public law except universities); regional authorities (includes regional agencies and bodies governed by public law except universities); universities; local authorities (includes local agencies and bodies governed by public law); and public entities belonging to the water, energy, transport and telecommunications sectors.

After we applied these filters, the sample of contracts for analysis for 2016 for all levels of government comprises 4,002 contracts. Since a contract may encompass several contract awards or lots, which thus means the inclusion of different figures for the number of bidders and award values, the number of observations used to compile the indicators is higher (6,909 observations).

The TED database analysis is rounded out with the construction of indicators for the contracts awarded by the education and health authorities within the regional governments. To this end, we took the awarded contracts not cancelled for which the type of contracting authority was a regional government[70] and whose main activity was education or health. Each contracting authority was assigned to a region as a function of the information provided about each one (address, town, postal code fields) to pave the way for comparing the regional governments.

The sample used for the regional government analysis comprises 1,614 contracts from 2016, of which 427 relate to education and the remaining 1,186 to health. Given that each contract can contain several contract awards, the number of observations used to compile the indicators is higher (1,423 for education and 3,063 for health). Note that the number of observations used to calculate the average savings indicator is much lower (611 observations for education and 1,139 for health) because we eliminated the contracts for which (i) the information required to calculate this variable was not available; (ii) the savings percentage was negative or (iii) the savings figure was over 80%. This reduces the sample substantially, which even ceases to be representative in certain regions.

A4.1.3 Public Sector Procurement Platform database

The less transparent contract management practices are concentrated in smaller contracts, which is why it is also important to analyse how the authorities conduct themselves in this size segment. Given that only contracts above a certain size threshold are published in TED, we complement our analysis with the public contracting information published in the Public Sector Procurement Platform of Spain's Ministry of Finance and Civil Service.

In accordance with the Law on Public Procurement, all public authorities must publish their tenders on the Public Sector Procurement Platform, either directly or indirectly using electronic data aggregation devices if they use their own information services. The Public Sector Procurement Platform is accessible to the general public via an application that citizens can use to search for all sorts of information on the public contracts of governments by tender and by buyer profile. As a result, the public procurement information in the public domain is very extensive and easily accessible if one wants to consult the terms of a given contract or tender. However, no public database exists that used this information to offer a detailed analysis over time of the contracts awarded by each authority.

With the aim of boosting transparency and accountability in public procurement and providing citizens with the information already available on public contracts in a more user-friendly and readily understandable manner, Transparency International Spain and the Public Procurement Observatory teamed up to create the Transparent Public Contracts application, which analyses the contracts in the Public Sector Procurement Platform. This application does not include the tenders awarded by contracting authorities that, despite publishing their tenders on the platform as stipulated by law have yet to configure their

[70] Universities controlled by regional authorities were also considered.

buyer profiles in the platform. However, the information used in the Transparent Public Contracts application is not available in the form of a public database[71].

The key advantage of this database is that it allows analysing smaller contract awards. However, as with the TED data, it has certain limitations. First, the information is obtained directly from the data published by the contracting authorities on the platform and thus may contain errors deriving from a lack of control or homogeneity[72]. Second, the information does not allow comparing regional governments as the sample is not big enough for this purpose. In fact, the contracts awarded by regional governments correspond primarily to Castilla-la Mancha, although the sample also includes contracts awarded by other regional authorities.

Thus, the analysis of the second database entails comparing governments, distinguishing between the central government (General State Administration and other public bodies), local authorities (town/city councils[73] and other public bodies), regional authorities, universities and public entities belonging to the water, energy, transport and telecommunications sectors. The analysis is based on the contracts announced, awarded, entered into or amended in 2016, irrespective of the year of publication of the call notice. As with the TED data, the platform data was filtered to enhance its quality. Specifically, we removed cancelled contracts and contracts for which there was not enough information to compile the indicators or for which the readings were deemed outliers[74].

Average savings were calculated as the percentage difference between the estimated contract award value and the total final contract value. In the case of lots, the savings level was calculated as this percentage difference per lot. We detected contracts for which the savings figure was negative and others for which it was almost 100%, which in most instances was attributable to errors in the information published. Specifically, we detected contracts for which the particulars listed on the platform featured more than one successful bidder without specifying whether the contract involved lots or some form of subcontracting where the database lists only the first awardee. When comparing the project's estimated award with the amount adjudicated to this bidder, the differences was very significant and the savings overstated. For this reason, contracts indicating negative savings or savings of over 80% were removed.

This database classifies the contracts by type into the following categories: services; supplies; public service management; public work concessions; works; special administrative contracts; private contracts and contracts involving publicly-held assets. For the purposes of the analysis, contracts were grouped and classified as follows: services (services and public service management); supplies; works (works and public work concessions) and other (special administrative contracts, private contracts and contracts involving publicly-held assets).

After applying these filters, the sample of public contracts analysed for 2016 comprises 9,821 contracts. As was the case with the TED database, a given contract can comprise several contract awards (e.g., a contract made up of different lots). As the information

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[71] For carrying out this project, the information was kindly provided by everis, a co-founder of the Public Procurement Observatory and the firm responsible for maintaining the Transparent Public Contracts application. Ivie would like to thank everis for its invaluable contribution to this initiative.

[72] This lack of homogeneity prevented us from performing the analysis by type of procedure (open, negotiated with call for competition, restricted, etc.) as was possible using the TED data. In many instances, the procedure is regulated by the contracting authority's internal rules and the procedure to be followed is not specified.

[73] The analysis includes contracts awarded by local authorities such as island, town, district and provincial councils and local associations and metropolitan areas.

[74] These criteria were applied to enhance the quality of the sample as we detected inconsistencies such as contracts awarded with no or a very high number of bidders, which we deemed could potentially distort the results.

used to compile the indicators is available for each contract award, the number of observations used in the analysis is higher (11,845 observations).

5. CONCLUSIONS

Financial health of businesses

The global financial crisis made necessary the correction of disequilibria accumulated in the credit-fuelled years of expansion, particularly the excessive debt levels and burden. At the same time, the contribution of the financial sector to the business churn through funding the more productive incumbents or emerging firms and favouring the exit of the non-viable firms has been called into question. Section 3 of this report analysed the deleveraging process of Spanish firms by examining more than 848,000 Spanish firms obtained from the SABI database (INFORMA).

The evidence indicates that although corporate sector financial health has significantly improved since 2012, there is still a significant percentage of fragile businesses. This fragility is driven not only by high debt levels but also its burden, and more precisely by the structural difficulties a large number of firms have to obtain enough profitability to satisfy their financial commitments. In 2015, 17% of firms and 11% of employment were at risk according to the criteria adopted. The percentage of debt at risk (36%) was twice the percentage of firms and three times the employment at risk. This means that debt is concentrated in fragile firms, which could threaten the stability of both the corporate and the financial sector if there is an economic slump. Microenterprises are the most fragile, with 44% of the total debt of these firms at risk. In contrast, only 30% of the debt held by large firms is at risk. There is a high proportion of the debt at risk in construction and real estate: 51%. Therefore, the legacy of the past is still burdening the construction and real estate sector, which is yet to bounce back to normalcy.

Spanish firms have continued to reduce their level of indebtedness (in 2017, the debt/GDP ratio had fallen to 96.8%, similar to in 2005), which is in line with the average for euro area countries, and the debt service ratio is equivalent to in 1999. Thus, the current level of indebtedness is no reason for concern, and Spanish non-financial corporations do not necessarily need further aggregated deleveraging, which could negatively affect investment. However, deleveraging is recommended for vulnerable companies.

A major challenge facing the Spanish economy is to continue to reduce corporate sector fragility in the current favourable macroeconomic environment. The simulations of the impact on firm financial health of forecast Spanish GDP growth and increases to interest rates suggest that the latter would be more detrimental to the financial health of enterprises than the former. An increase in the cost of external funding by 100 basis points would increase the number of firms, debt and employment at risk by 2.2, 2.8 and 1.4 percentage points, respectively. In other words, 19.2% of firms, 38.6% of debt and 12.5% of employment would be compromised. Further increases of up to 300 basis points would mean that 22.4% of firms, 43.4% of debt and 14.8% of employment could be classified as risky. These percentages mean that an increase of 100 basis points, for example, would wipe out 33% of the reduction in debt at risk achieved since 2012. For an interest rates rise of 300 basis points, 87% of the reduction of debt at risk since 2012 would be reversed.

If the actual GDP growth of 3.4% of 2015 had been the 2.6% and 2.1% forecasted for 2018 and 2019 by the European Commission, employment at risk would have increased by 0.86 and 1.35 percentage points, respectively, and the percentage of debt would have been 37.1% and 37.8%, respectively, an increase of 1.2 and 1.9 percentage points.

Therefore, despite clearly improving since 2012, the Spanish economy still faces the legacy of the debt overhang from the last credit boom and the consequences of its debt burden. Two main weaknesses still affect a large proportion of firms: excessive debt and reduced profitability, which in 2015, on average, had still not returned to the pre-crisis level. The two threats to corporate stability are an economic slowdown and a rise in interest rates. However, since 2015, the last year available in this report, the Spanish economy has maintained robust economic growth above 3% and profitability has continued to rise.

Therefore, the estimates presented here are a snapshot of the financial vulnerability of Spanish firms in 2015. This vulnerability will surely have been reduced since then.

We also examined the relationship between corporate health and the financial sector, particularly the banking industry. The scarce information available shows that after the outbreak of the crisis in 2007, the volume of refinanced loans soared, probably disguising non-performing loans on bank balance sheets. The stricter standards subsequently established by the Bank of Spain forced banks to increase the percentage of refinanced/restructured credit (182,435 million euros) recognised as doubtful loans to 50.9% and the percentage of substandard loans to 22.6%. According to the European Banking Authority (EBA) in September 2017, Spain is conspicuous in the EU owing to its high forbearance ratio and absolute value of refinanced loans (21.8% of the total of the EU).

Therefore, up until recently, banks have refinanced past loans to presumably hide nonperforming loans. As a result, the allocation of capital during the crisis was probably biased towards funding not necessarily the most productive industries. As we have seen, there is partial evidence of this phenomenon. We saw an inverse relationship between TFP levels and debt ratios, and a negative relationship between productivity and the percentage of firms at risk. With the crisis, the debt ratio fell more sharply in firms that increased net investment than in firms that did not invest, i.e., firms whose investment relied more heavily on internal funds than external finance. Therefore, although the results do not allow making a robust inference in causal terms, we can postulate the reasonable hypothesis that there is a significant misallocation of capital in Spain and that the financial system was, at least up to 2015, still remedying the excesses of the credit boom.

Public procurement

Public spending on intermediate products, social transfers in kind via market producers and public investments represents 23% of total public spending in Spain and close to 10% of GDP. This makes efficiency in public procurement a relevant issue. The use of synergies offered by public–private collaboration requires efficient procurement procedures and competitive markets. Efficiency levels and the functional specialisation of the different levels of governments are determinant factors in public procurement expenditure. The proportion of public procurement in regional and local governments is much greater than that at other levels of government (between 40 and 50% of their total government expenditure). The differences in per capita public procurement expenditure observed across different Spanish regions depend on: a) the volume of goods and services provided per inhabitant and their quality, which are both conditioned by the significant differences in the resources of the regional governments; b) the percentage of services acquired on the market as a result of the preferences for the private provision of the services by the regional government; and c) the unit cost of services, which is directly related to efficiency in contracting and competition in the markets.

The audit reports indicate some deficiencies in the public procurement processes. They recommend the selection of adequate contracting procedures, the correct and transparent application of the procedures, and the fostering of competition in the contracting markets through open procedures. These reports flag as problematic the excessive duration of procedures and contract splitting. The initiatives launched to advance in these areas have improved the information available — the registration of contracts, procurement platforms, central purchasing bodies — and regulatory changes have been proposed. However, the extent of the improvements is yet to be evaluated. The lack of uniformity of the goods and services purchased and the limitations of the quantity and quality of the information available do not allow analysing differences in unit costs and knowing whether these differences are explained by the heterogeneity of the purchased goods and services (of their characteristics and quality).

The public procurement databases allow measuring, to some extent, efficiency and competition. The results of this analysis are as follows. 1) The higher the level of competition, the higher the savings in the procurement process. Greater savings come when there are more competitors. Savings are lower when procurement procedures limit the number of bidders. Non-competitive procedures are prone to increasing the costs of the process. 2) The size of the contracts influences the savings achieved. Savings are greater for larger contracts, regardless of whether the contracts are divided into lots. Therefore, contract splitting in favour of a single bidder has a determining effect on the expected savings. 3) The heterogeneity observed in the duration of the procedures indicates differences in efficacy and efficiency between governments and within their departments. The dissemination and imitation of good practices would reduce the duration of the processes and improve contracting efficiency.

In light of the results obtained in this analysis, five steps should be worked on by governments. 1) The definition and selection of appropriate contracting procedures. 2) The transparent and correct application of the procedures to boost the number of bidders and the competition among them, and the shortening of the duration of the procedures. 3) The systematic generation of abundant information on the quality and outcomes of the processes. 4) The generation of reliable indicators of the level of competition in contracting markets and the systematic evaluation of them. 5) The review and improvement of the procedures and the preparation and dissemination of procurement guides that facilitate the imitation of good practices.

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