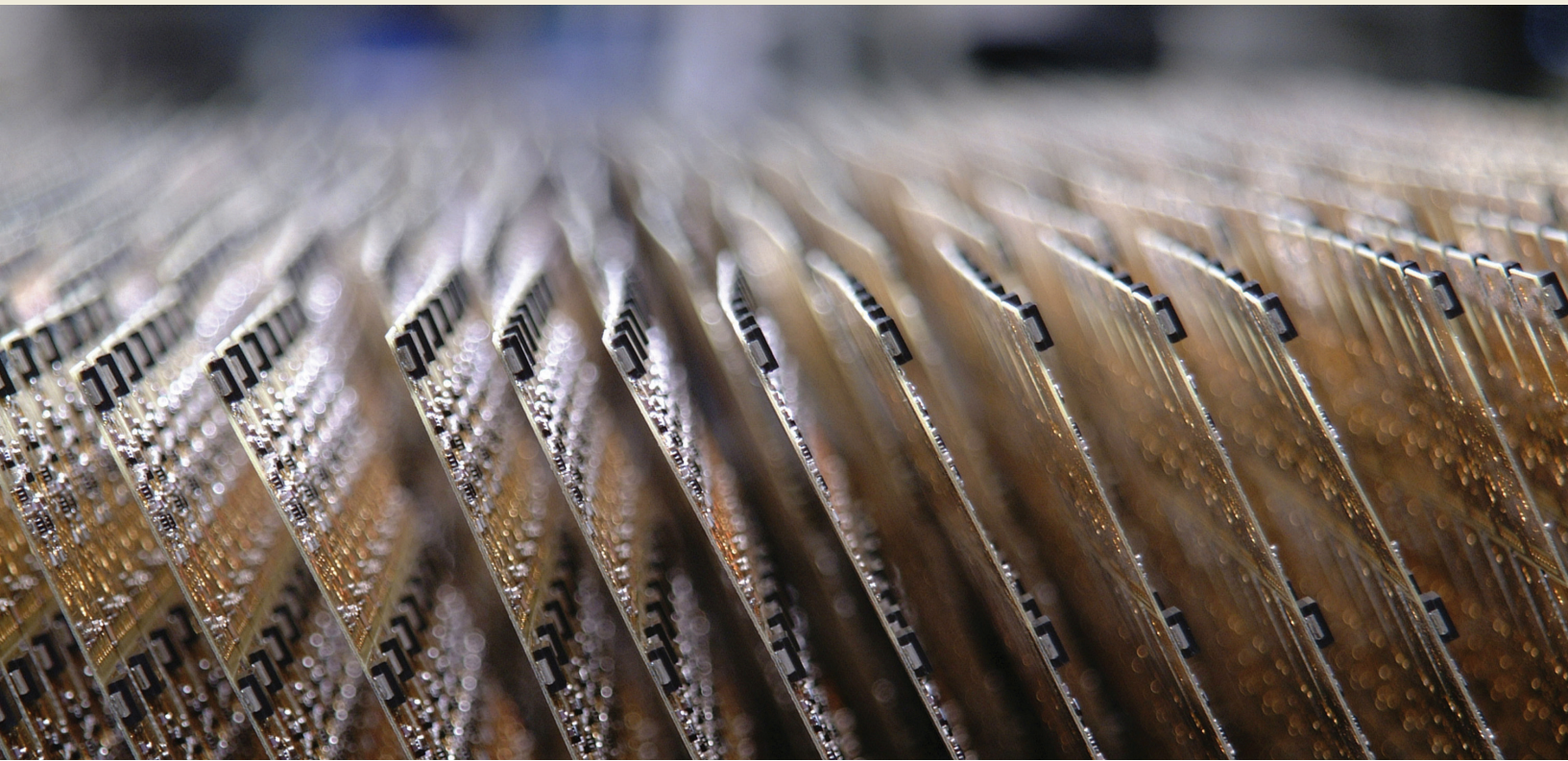


2015

# SME Investment and Innovation

France, Germany, Italy and Spain



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# **SME Investment and Innovation**

**France, Germany, Italy and Spain**

# Greetings

National Promotional Banks (NPBs) traditionally play a key role in addressing market needs for long-term financing, which becomes even more important in times of crisis when bank lending to SMEs is disturbed. The latter proved to be the case again in recent years when our promotional activities particularly for SMEs increased considerably. In addition to our national efforts we stepped up our co-operation that inter alia led to better financing conditions to SMEs in countries most affected by the crisis.

This important and often also anticyclical role of NPBs for the EU economy has now also been emphasized by the EU in the context of the Investment Plan for Europe. Throughout the EU, NPBs have pledged to contribute over EUR 34 bn to the investment offensive alongside the EU and the EIB. Much now depends on an unbureaucratic implementation and application of the EFSI regulation.

Flexibility, together with the knowledge of the respective market needs and the ability to adapt to changing economic environments, is key in the world of SME finance and a key success factor for our work. The study highlights that, while there are common themes throughout the four economies studied, large differences remain. NPBs have long ago already built up capacities to analyse their respective national markets and are thus well positioned to respond to country specific issues and changing environments.

Last but not least this study should remind us that thinking big is necessary. But it should not be limited to the financing of large projects. On the contrary: If 98% of all businesses in the EU are SMEs then it is essential to reach as many of them as possible – even if the individual financing might on the contrary be rather small. In addition to financing infrastructure projects it is essential to incentivise entrepreneurs to invest, be it in energy efficiency, renewable sources of energy, innovation or expansion. Such an approach is best suited to create a large number of jobs in the EU and NPBs are key players and partners for the EU and national governments in this respect.



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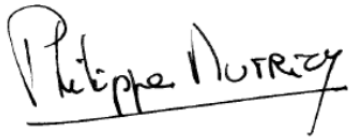
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# Foreword

The key for Europe's future is a rebound in investment and innovation as a persistent slack threatens competitiveness and long term growth prospects. European SMEs are crucial in this respect as the "SME engine" is a central driver of investment and innovation and hence of economic growth and employment. Europe's economy relies on SMEs to achieve its potential: 98 out of every 100 businesses are SMEs and they employ the majority of the workforce. Economic policy must therefore work against market failures that disproportionately affect SMEs and it must eliminate barriers to growth, not least in order to spur on the sector's dynamism in terms of innovation and investment. Many public policies which have been implemented in the EU and various European countries in recent years acknowledge this and represent important steps in the right direction. However, there is no lack of further challenges. Besides globalisation, SMEs face increasing digitalisation, rising energy and commodity prices and an ageing population. Only through new solutions and the necessary investments will we be able to achieve the major breakthroughs required to master these challenges.

It is in this context that the promotional banks of the four largest euro area economies – Bpifrance (BPI), Cassa Depositi e Prestiti (CDP), KfW Bankengruppe (KfW) and Instituto de Crédito Oficial (ICO) – have undertaken this joint investigation to map and analyse the current situation of SME investment and innovation in their countries. Access to long-term and reliable finance is a key issue for business start-up, development and growth for SMEs, as they have very different needs and face different challenges with regard to financing compared to large businesses. As national promotional banks, it is our mission to provide a wide array of corresponding financial instruments based on our substantiated knowledge of domestic markets, SME characteristics and needs, as well as regional imbalances. Consequently, our analysis draws on a range of data for these four economies from national sources which are frequently out of the scope of international comparisons.

The long term growth and welfare prospects of the four largest economies in the euro area will depend to a large extent on the viability and dynamics of their micro, small, and medium-sized firms. As promotional banks, we share our deep commitment to support their development and thereby in turn the future international competitiveness of Europe.



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# Overview





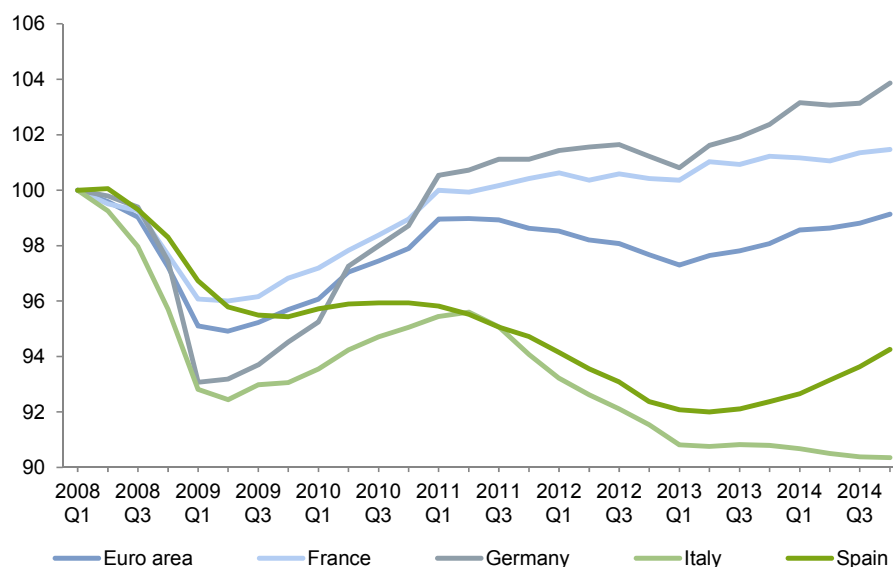
## 1.1 The economic situation in Europe

After two years of recession, short-term prospects improved and the euro area started a fragile recovery in 2014, with growth of +0.8%. Yet this picture hides very heterogeneous conditions across its four largest members where the financial and economic crisis, which had its beginnings in 2008, has been felt with different intensity (Figure 1.1).

In Germany, activity recovered to its pre-crisis level early in 2011 and, after two years of stagnating growth in 2012 and 2013, accelerated again in 2014. Its labour market proved very resilient and the unemployment rate reached with 6.7% at the end of 2014 the lowest level since German unification.

Spain and Italy, on the other hand, have experienced a severe double-dip recession. Output began to fall sharply from mid-2011, when the sovereign debt crisis intensified. Tightening financial conditions (Figure 1.2) and fiscal consolidation impacted severely on both public and private demand. In Spain, the depressed internal demand led to an unemployment high of 26% at the end of 2012. Yet at the beginning of 2013, Spain started to recover, pushed by rising exports. Domestic consumption accelerated in 2014 as the high unemployment rate began to decrease. At the same time, although recession slowed down, output in Italy continued to fall and unemployment continued to rise.

**Figure 1.1: Evolution of GDP in the euro area since 2008**



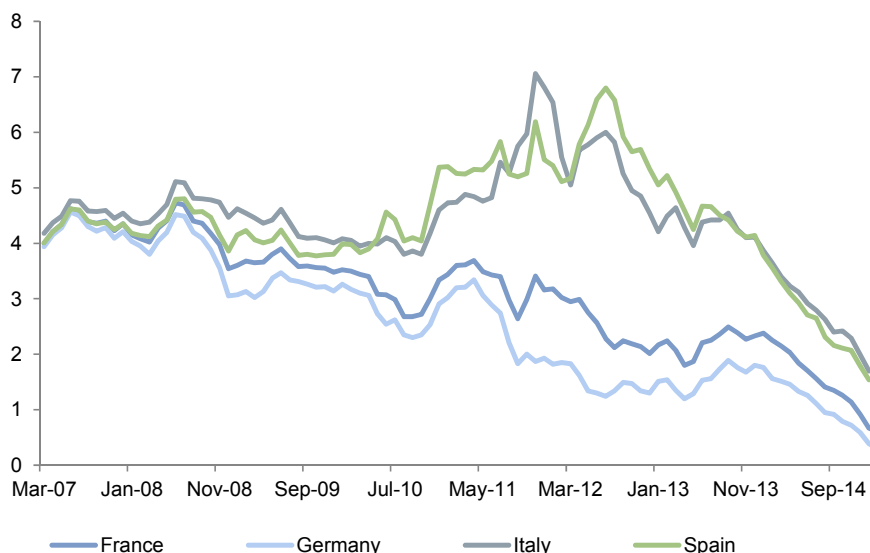
Note: GDP at constant prices, Index 2008 Q1=100.

Source: Eurostat.

The French economy took an intermediate path. It was the least impacted economy during the first stage of the crisis and output reached its pre-crisis level early in 2011, as in Germany. But this recovery quickly halted and has been followed by a long period of stagnation.

2014 was the third consecutive year of near-zero growth with unemployment rising slowly but steadily.

**Figure 1.2: 10-year long-term rates in the euro area**



Note: Ten year sovereign bond yield.

Source: OECD.

Whatever the speed of recovery in the different countries, 2015 started with some positive news for the whole euro area, nurturing hopes of soon escaping from the prolonged stagnation of the past years.

The sharp fall of oil prices will have a beneficial effect on households' purchasing power, which can already be seen in the rebound of consumer confidence indicators in the early surveys of 2015,<sup>1</sup> as well as on firms' production costs, generating more profit and investment.

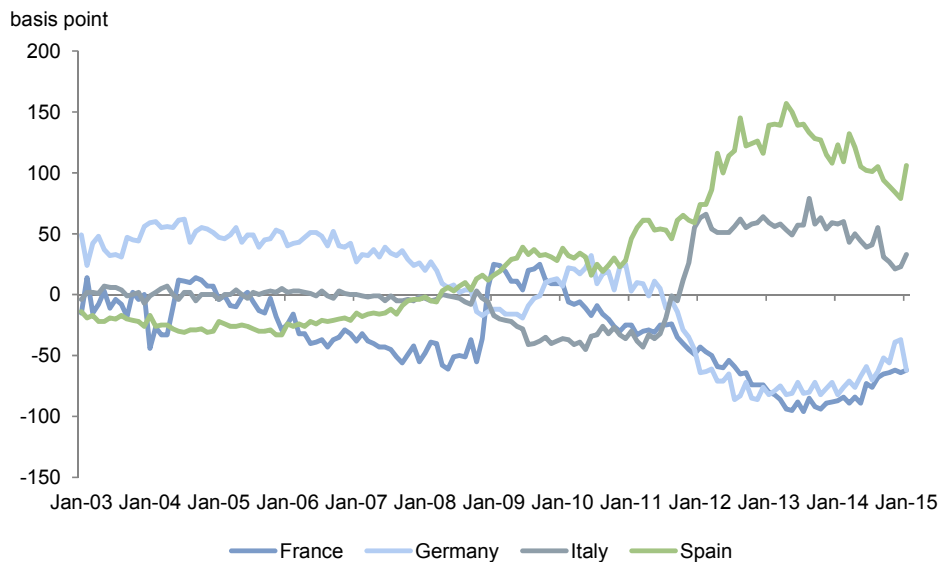
Adding to that is a more favourable policy mix, with the launch of a European quantitative easing programme by the ECB and an investment programme by the European Commission (see section 1.2 for more details). Moreover, the depreciation of the euro is a relief for the export sector. With the perspective of a consumption-led recovery, short-term prospects today look much brighter for the European productive sector than one year ago.

Still, many challenges remain. The difficult macroeconomic conditions have left their mark on the European productive sector. SMEs, which are at the core of its dynamics, were hit particularly hard. Being less diversified and more financially fragile, they were particularly vulnerable to weak demand conditions and, in many instances, faced difficulties in access to finance

<sup>1</sup> European Commission (2015a).

(Figure 1.3). This reduced their investment expenditures (Figure 1.4), and caused them to put off especially high return, yet risky projects.

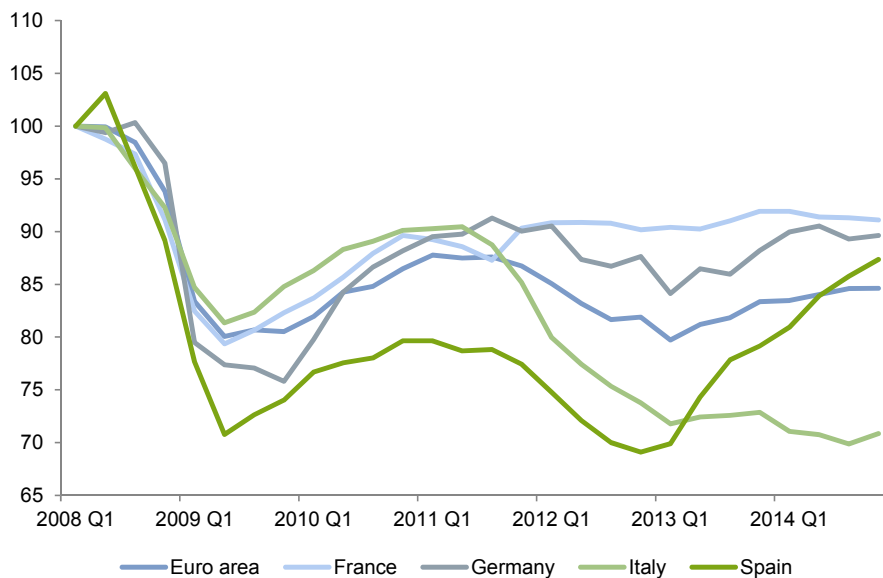
**Figure 1.3: Spread on loan rates to non-financial corporations in the euro area**



Note: Average euro area rates on bank loans of up to EUR 1 million were taken as reference.

Source: ECB.

**Figure 1.4: Investment in machinery and equipment in the euro area**



Note: Index 100=2008 Q1.

Source: Eurostat, chain-linked volumes 2010.

Moreover, the crisis revealed the need for many European economies to improve their competitiveness, especially Italy, France and Spain. All three countries have significant and strong export sectors that would benefit from competitiveness reforms as former growth drivers, such as housing and construction, consolidate their balance sheets. Beyond cost adjustments, strengthening non-price dimensions – for example quality, reputation and

innovation – is essential in the long run for economies for which external demand is an important component of GDP (see section 1.3).

To achieve a sustained recovery, many other issues need to be tackled, such as the ongoing deleveraging process, the persistence of large spare capacities, which leads to weak inflation, and the persistence of financial fragmentation across the euro area despite recent substantial improvement (Figure 1.3).

Key for European firms, however, will be a rebound in investment and innovation, as a persistent slack threatens competitiveness and long-term growth prospects of European economies, hampered by slowing productivity growth and an ageing population. European SMEs are certainly important in this respect, as the “SME engine” can be considered a key driver of investment and innovation, and hence of economic growth and employment. Many public policies which have been implemented in various European countries in recent years acknowledge this (see section 1.2) and represent important steps in the right direction.

In any case, the present easing of financial and economic conditions is an opportunity for European SMEs to address these issues. Encouraging investment strategies of SMEs, especially if they are directed towards innovation and growth, can best help to strengthen competitiveness in the deflationary environment of the euro area.

## **1.2 Ensuring future competitiveness in Europe through investment and innovation by SMEs**

From a macroeconomic perspective, investment is important to build up and sustain the physical and human capital stock of an economy. The regular renewal of machinery and equipment, buildings and infrastructure, as well as continuous education and training of the workforce is necessary to maintain and augment the production capacity of a country and enhance its international competitiveness.

Particularly important is investment in innovations, however. They foster technological change and lead to improved resource efficiency, which in turn increases labour productivity and income per capita. In industrialised countries such as France, Germany, Italy and Spain, innovations are the key drivers of sustainable economic growth and the only way to achieve higher welfare and create better living conditions in the long run.

While being important from an aggregate point of view, innovations are also crucial determinants of economic success at the firm level. Companies which continuously invest in the development of new products and the modernisation of their production processes can gain a competitive advantage over their rivals and increase their market share. Innovating enterprises grow significantly faster, both in terms of employment and turnover, and they are more

profitable than non-innovating ones.<sup>2</sup> Firms which invest and innovate too little will suffer a gradual decline in their productivity and risk losing their market position.

SMEs play a fundamental role in investment and innovation in Europe. Despite macroeconomic challenges such as weak domestic demand, difficult access to finance and lingering economic uncertainty, they continue to be an essential part of the productive sector. The four economies considered in this report had more than 13 million SMEs, which made up more than 98% of all firms in 2013. SMEs in France, Germany, Italy and Spain employed more than half the workforce in these countries. The future international competitiveness and thus the long-term growth and welfare prospects of the four largest economies in Europe will therefore depend to a large extent on the viability of their micro, small and medium-sized enterprises.

Survey results paint a rather mixed picture of the current competitiveness of European SMEs.<sup>3</sup> Nevertheless, they convey a clear message. European SMEs face tough rivals on world markets based on prices of goods and services. They will hardly be able to compete with low-price firms from emerging economies such as China and Brazil. Hence, aspects such as quality, reputation and innovation will be crucial for European SMEs to survive in a globalising world. This makes continuous investment and innovation activities even more important. Unsurprisingly, SMEs that have invested and innovated in the recent past look much more optimistically into the future.

### **International competitiveness of SMEs in Europe**

KfW recently conducted a survey to assess the international competitiveness of SMEs in ten industrialised and emerging economies. Besides a number of location-specific factors, the responding SMEs also rated their current firm performance in comparison to their international competitors, taking into account different dimensions such as the price, quality or innovativeness of their goods and services.

When it comes to prices, only Brazilian and Chinese firms perceive themselves as very competitive on international markets. French, Spanish, Italian and in particular German SMEs, on the contrary, perceive their price competitiveness as relatively weak. Their competitive position with respect to quality and innovativeness of their goods and services is much stronger, according to their own assessment (Figure 1.5).

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<sup>2</sup> See Zimmermann (2015).

<sup>3</sup> See Abel-Koch and Gerstenberger (2014).

**Figure 1.5: Firm performance of SMEs in ten industrialised and emerging economies**

Values of individual factors included in the firm performance component

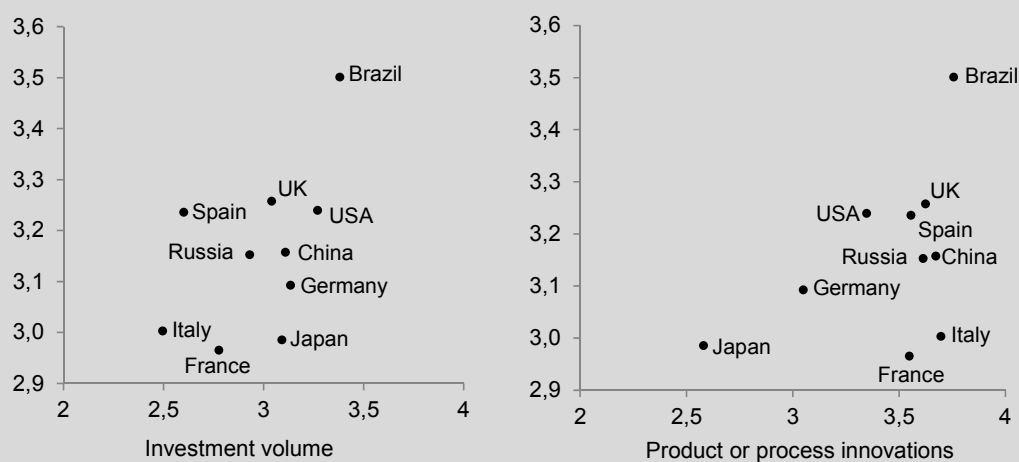
	UK	Brazil	USA	Germany	France	Russia	Spain	China	Italy	Japan
Price	3,30	3,53	3,24	2,85	3,15	3,27	3,16	3,40	3,09	2,97
Quality	3,67	3,50	3,60	3,89	3,44	3,45	3,38	3,16	3,40	3,28
Degree of innovation	3,49	3,43	3,47	3,42	3,22	3,12	3,23	3,11	3,22	3,00
Awareness	3,48	3,50	3,28	3,17	3,40	3,22	3,20	3,07	3,22	2,79
Delivery times	3,43	3,51	3,19	3,75	3,24	3,30	3,30	3,31	3,25	3,31
Service	3,58	3,36	3,53	3,85	3,34	3,30	3,27	3,09	3,11	2,87
Staff and material costs	3,32	3,22	3,14	2,55	3,00	3,01	3,07	3,44	2,92	2,77
<b>Firm performance</b>	<b>3,47</b>	<b>3,44</b>	<b>3,35</b>	<b>3,35</b>	<b>3,26</b>	<b>3,24</b>	<b>3,23</b>	<b>3,23</b>	<b>3,17</b>	<b>3,00</b>

Best value Worst value

Note: To determine firm performance, companies were asked to rate their performance relative to their main international competitors with regard to various aspects. Possible answers: (1) significantly worse; (2) slightly worse; (3) similar; (4) slightly better; (5) significantly better. The displayed values are weighted averages of all companies surveyed in a country. The indicator component firm performance is calculated as a simple mean of the seven factors.

Source: KfW Competitiveness Indicator 2014.

Besides current firm performance, the survey also assessed SMEs expectations regarding their future international competitiveness. There is a positive relationship between investment and innovation activities and the expected development of international competitiveness at country level (Figure 1.6).

**Figure 1.6: Competitiveness through investment and innovation**

Note: Vertical axis: Expected development of competitive position relative to main international competitors in the next 12 months, values ranging from 1 (significant deterioration) to 5 (significant improvement). Horizontal axis: Average development of investment volume in the last 12 months, values ranging from 1 (severe reduction) to 5 (great increase), and introduction of product or process innovations in the last 12 months, values ranging from 2 (no) to 4 (yes). The figures are all weighted averages of all the companies surveyed in a country.

Source: KfW Competitiveness Indicator 2014.

Besides globalisation, SMEs face a number of other challenges such as increasing digitalisation, rising energy prices and an ageing population, which require sensible investment and innovation strategies. The computerisation of manufacturing, or fourth industrial revolution, offers lots of opportunities for SMEs that are willing to invest in process innovations but poses a threat to enterprises that take a defensive attitude towards it. Energy prices, although still low, will most likely rise in the medium term and make investment in energy-efficient technologies indispensable. This is especially true for SMEs with energy-intensive production processes. SMEs also face demographic challenges, which feed back into their investment behaviour. The average age of SME owners in Germany, for instance, has risen from 45 years in 2002 to 51 years in 2013. Older owners tend to invest significantly less often and focus more on replacement investment than on capacity expansion.<sup>4</sup> This underlines once more the need for comprehensive economic policies that foster investment and innovation, including more indirect measures such as the promotion of young entrepreneurial talents and company successors.

European policy makers have realised this and started several initiatives to foster investment and innovation across Europe. In this regard, what is known as the “Juncker Plan” is certainly the most prominent initiative.

### **The Juncker Plan**

In November 2014, the European Commission President Jean-Claude Juncker announced a new plan to revive investment in Europe, the EU Investment Plan or “Juncker Plan”, by addressing the main obstacles consistently.

The Juncker Plan aims at unlocking public and private investment in the “real economy” by leveraging on:

- a) new financial tools to address the current shortage of risk financing in Europe;
- b) a pipeline of projects at EU level and enhanced support for project development through more user-friendly technical assistance, for public sector stakeholders as well as private investors;
- c) a more stable, business-friendly and predictable regulatory environment at European, national and sub-national level, focusing on the completion of the single markets for energy, digitalisation, transport as well as capital.

The Juncker Plan will be driven by the European Fund for Strategic Investments (EFSI). The EFSI will support strategic investments in infrastructure as well as risk finance for small businesses which the market cannot finance alone. Therefore it will finance projects with a higher risk profile, thus attempting to maximise the impact of public spending and to unlock private investments.

The EFSI will focus its financing on investments in infrastructure and innovation, as well as on small and medium-sized enterprises (SMEs). According to the European Commission, the EFSI is expected to be the main channel to mobilise at least EUR 315 billion of additional investment in the real economy over the next three years (2015–2017), of which EUR 240 billion is envisaged for long-term investments in infrastructure and EUR 75 billion is planned for SMEs financing.

The EU will provide EUR 21 billion in initial funding (for a 15x multiplier effect), more precisely a EUR 16 billion guarantee (to be authorised via an EU Regulation) and EUR 5 billion in own resources

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<sup>4</sup> See Schwartz and Gerstenberger (2015).

of the European Investment Bank (EIB). The fund will be set up within existing EIB Group structures, allowing it to start quickly and to benefit from the EIB's experience.

The participation of private sector entities as investors is a key feature of the EFSI. Investors could participate in project co-financing on a risk-sharing basis, with the EIB covered by the EFSI. Investors could also participate in investment platforms which may be established in the future, notably with the participation of National Promotional Banks and Institutions (NPBI).

The NPBIs of France (CDC with EUR 8 billion), Germany (KfW with EUR 8 billion), Italy (CDP with EUR 8 billion), Luxembourg (SNCI with EUR 80 million), Poland (BGK with EUR 8 billion) and Spain (ICO with EUR 1.5 billion) have committed a total of up to EUR 33.58 billion in financial resources to the EFSI so far.

NPBIs will cooperate with the EIB to rapidly implement the Juncker Plan and are available to expand their activities with the complementary support of the increased EIB Group risk capacity (partly covered by EFSI) in the following areas: (i) increasing investment activities in ABS Transactions, acting as an anchor investor in such transactions or providing structuring expertise in the field of securitisation; (ii) providing technical assistance and improving access to funding via global loans and guarantees; (iii) investing in venture capital funds and/or fund of funds; (iv) increasing commitments in Fonds Marguerite, which targets equity and mezzanine investments in projects; (v) boosting project finance or public-private partnerships (PPP) for eligible infrastructure projects, including social infrastructure projects.

Further joint instruments and initiatives such as regional, sectoral and national investment platforms that attract private resources could be developed by joint working groups among NPBIs and the EIB in connection with the EFSI once the final framework and regulation has been adopted. NPBIs will also seek to contribute their expertise under advisory services for project preparation.

How did investment and innovation activities of SMEs in the four largest European economies evolve over time and what is their current state? Where are the differences across sectors, firm size classes and countries? To shed light on these questions, we need a careful analysis of European SMEs' investment and innovation behaviour at the national level, which is the aim of the current study.

A key challenge of this exercise is the choice of appropriate data sources. European data sources such as the Community Innovation Surveys follow the same methodology in all European countries and offer the advantage of providing internationally comparable information on SMEs. National data sets such as the Bpifrance SME Survey, the German KfW SME Panel, the MET Survey for Italy or the INE Innovations in Companies Survey for Spain, which are used in this study, give a more comprehensive and also more nuanced view of the activities of SMEs in the respective countries. They often include the smallest firms with fewer than 10 employees, provide information for additional economic sectors and address a broader set of questions. Designed by national institutions, they give insight into national specificities such as the institutional environment, regulatory constraints, and economic structures which have no equivalent in other countries. They also reveal regional imbalances within countries. However, this comes at the cost of comparability. Examples include the different role of self-employed persons, the handling of economic and financial links between different SMEs, and the different definitions of sectors, which need to be kept in mind when reading the next sections.



### 1.3 A perspective on SMEs investment and innovation behaviour in France, Germany, Italy and Spain

Taken individually, single SMEs have only very little weight. In their entirety, however, SMEs make up more than 98% of all independent business units in France, Germany, Italy and Spain. Besides dominating national economies in terms of numbers, they employ the majority of the workforce and they account for substantial shares of value added in all four countries.

These aggregate facts hide a strong heterogeneity among SMEs, even within national borders. Typically, a large number of very small businesses, with no or very few employees, coexist with a smaller number of medium-sized enterprises. Besides differing in size, they also differ in level of development. Some SMEs grow fast, either organically or through mergers and acquisitions, while others expand more slowly, taking a stable and perennial path. Furthermore, they are distributed across a number of sectors which differ in characteristics, such as capital intensity, skill requirements, barriers to entry or degree of competition, to mention only a few. Summing up, there is no “representative” SME but rather a multitude of micro, small and medium-sized enterprises which reflect the diversity of the productive sector.

#### The European Commission’s definition of micro, small and medium-sized enterprises (SMEs)

According to the definition of the European Commission, the category of micro, small and medium-sized enterprises (SMEs) is made up of enterprises which employ fewer than 250 persons, measured in annual working units, and which have an annual turnover not exceeding EUR 50 million and/or an annual balance sheet total not exceeding EUR 43 million.<sup>5</sup>

SMEs can further be classified into **micro enterprises** (< 10 employees and ≤ EUR 2 million turnover and/or ≤ EUR 2 million balance sheet total), **small enterprises** (< 50 employees and ≤ EUR 10 million turnover and/or ≤ EUR 2 million balance sheet total) and **medium-sized enterprises** (< 250 employees and ≤ EUR 50 million turnover and/or ≤ EUR 43 million balance sheet total).

An enterprise is understood as an entity engaged in an economic activity, irrespective of its legal form. Thus, self-employed or family firms, as well as partnerships or associations that regularly engage in an economic activity, would also count as SMEs if they meet the respective thresholds.

When calculating the number of employees, annual turnover or annual balance sheet total, links to other firms must be taken into account. For instance, if an enterprise holds more than 25% of capital or voting rights in another enterprise, it must add a proportion of the other enterprises’ headcount, turnover, and balance sheet total to its own figures.

However, due to limited information on annual working units, turnover, balance sheet total, or financial and economic links between enterprises in the different national data sets, in the following sections the definition of SMEs might slightly differ from the European Commission’s recommendation.

This heterogeneity makes the analysis of SMEs’ behaviour tricky but no less important, as they are a fundamental part of the economy. From a dynamic point of view, SMEs are

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<sup>5</sup> See European Commission (2003).

essential as they are at the centre of the regeneration process of the productive sector. Characterised by large exit and entry rates, they are a key driver of the continuous renewal of the economy. They are usually leaner and more flexible than large firms, which allows them to react more quickly to radical technological innovations. Very often, SMEs in general and start-up firms in particular are an important channel for the commercialisation of such radical innovations. Moreover, many SMEs occupy market niches that are not profitable for large firms and they can better adapt new products to individual customer needs. Another argument underlining the importance of SMEs is the competitive pressure they exert on large firms. New and dynamic enterprises must continuously challenge large firms to counteract market concentration processes and avoid the negative consequences of cartelisation for consumers, such as higher prices and lower quality.

A balanced company size distribution with a viable SME sector is thus crucial for a sustainable market economy. Consequently, economic policy must work against market failures that disproportionately affect SMEs and it must eliminate barriers to growth, not least in order to spur the sector's innovation and investment dynamism. This is true for all four countries considered in this report, France, Germany, Italy and Spain, in which SMEs' investment and innovation behaviour shows a number of common features.

Starting with the investment behaviour of SMEs, a striking feature is its uneven distribution, both with regard to frequency and intensity. Investment choices depend on the capital intensity of production processes, leading manufacturing SMEs to generally invest more than in the services sector, although investment intensity is very heterogeneous in services. Moreover, due to the fixed cost aspect of investment, investment expenditure is less frequent in smaller SMEs. Indeed, conditional on investing, small SMEs devote more expenditures to buying capital relative to their annual turnover. Credit constraints could also play a role, as they are generally considered to be most severe for small and/or young firms due to information asymmetries and lack of collateral.

Data on innovation and research and development (R&D) activities show the same pattern. These activities are traditionally less frequent in SMEs than in larger firms and less frequent in services than in manufacturing, where product innovation is more prevalent. This pattern reflects, among other things, the size of the market and the nature of competition. As innovation is generally more difficult to fund on external debt than traditional collateralised investment expenditure due to information asymmetry, financing difficulties are even more decisive here. Moreover, conditional on engaging in R&D, smaller enterprises display a higher R&D intensity. This suggests a fixed cost effect, as is the case for investments, as well as the start-up nature of many small firms that conduct R&D activities. In part, this finding is also corroborated by smaller enterprises which have specialised in R&D activities as

subcontractors for other firms. Further, innovation and R&D are generally found to correlate strongly with the capacity to compete on foreign markets.

### Definition of innovations

According to the Oslo Manual (2005), innovations may be classified into the following types:

#### **Technological innovations**

Technological innovations comprise product and process innovations. A **product innovation** is a new product or service, or one whose key features have been significantly improved. A **process innovation** is a new or significantly improved process for the production of a product or service.

If the innovation is only new to the company, it is an imitative innovation. If it is also new to the market, it is an original innovation.

#### **Non-technological innovations**

Non-technological innovations comprise marketing and organisational innovations. A **marketing innovation** is the implementation of a new marketing concept or strategy that differs significantly from the firm's existing marketing methods and which has not been used before. It requires significant changes in product design or packaging, product placement, product promotion or pricing and excludes seasonal, regular and other routine changes in marketing methods. An **organisational innovation** is a new organisational method in a firm's business practices, workplace organisation or external relations that has not been previously used by the firm. It must be the result of strategic decisions taken by the management, and exclude mergers or acquisitions, even if for the first time.

Beyond these common structural characteristics, SMEs in France, Germany, Italy and Spain also share some common developments. Most importantly, national data reveal a significant decline of SMEs' investment and innovation activities throughout the crisis. Across the four largest European economies, SMEs reduced or postponed investment and innovation expenditures during the past years. In doing so, they were mostly reacting to worsening business expectations, that is, a lower expected rate of return on investments and sometimes responding to rising financing difficulties, which were hampering access to financial means for investments.

Despite sharing many common traits and following some common trends, SMEs in France, Germany, Italy and Spain also differ in a number of dimensions. For instance, although micro firms represent the majority of firms in all four countries, they are particularly important for the Spanish economy. In Germany, on the other hand, the SME landscape is more skewed towards medium-sized enterprises. The Italian SME sector is very atomised but does not seem to be particularly skewed towards either micro or medium-sized enterprises. The dynamics of the SME sector since the financial crisis also differs across countries. While the number of SMEs shrunk a lot in Italy and Spain, Germany and France experienced years of net creation of SMEs.

These features can explain part of the observed differences in investment and innovation diffusion across countries, as firm size is often discriminating. Barriers to growth are thus a key challenge, as mentioned earlier.

Regarding investment behaviour, the data also suggests the need for an in-depth investigation going beyond classic quantitative analysis, as there is evidence of relatively low productivity of investment in France despite substantial total expenditures over the past years. Generally, investment choices must focus on quality rather than quantity. This also holds true for innovations. A striking fact in this regard is the relatively high share of innovators among SMEs in Germany, which seems to be driven by imitative innovators more than in other countries.

The overall drop in investment and innovative activities of SMEs seen in most countries reflects common issues but of varying importance. Financial constraints proved to have a decisive impact in Spain or Italy, while low business expectations appear to be the most pressing issue in France and Germany.

These findings call for policies to foster high-quality investment and innovation at the national level to complement European initiatives such as the Juncker Plan, as they can better take into account the regional heterogeneity in SME structure and development. Promotional banks such as BPI, KfW, CDP and ICO play an important role here and have developed best practices that respond to country-specific issues. Continuing cooperation and sharing these best practices is important for benefiting from each other's experiences.

### **Best practices of national promotional banks in France, Germany, Italy and Spain**

#### ***BPI Development Loans Programme***

Bpifrance has developed a specific loan scheme to address the SMEs' need to fund immaterial investments. Usually difficult to fund, especially because of the lack of collateral associated with this type of needs (development, export, digitalisation, external growth, innovation activities, ...), these loans, guaranteed by a public fund, require no collateral from the entrepreneur and have a maturity of 7 years, with a 2-year grace period.

These loans are systematically accompanied by a loan or equity investment by a private actor, for an amount at least equal to the public loan.

They are at the heart of the bank's aim to foster modernisation plans of firms as well as to support their growth and innovative strategies, especially through foreign markets. This programme is rapidly expanding.

#### ***The KfW ERP Innovation Programme***

KfW provides promotional funds for investments in research and development of self-employed professionals and enterprises. It finances up to 100 % of the investments costs, up to EUR 5 million per project. For the development of new technologies to save, store, transmit or produce energy, even up to EUR 25 million per project and up to EUR 50 million per enterprise are available.

Small enterprises may benefit from reduced interest rates, which are fixed for 10 years and thus provide a reliable basis for calculation. The financing package may include both debt and subordinated capital.

A special feature of the KfW ERP Innovation Programme, as well as of all other KfW programmes, is the on-lending principle, which means that customers apply for the respective loans with their local bank. This ensures that competition between banks is not distorted.

***The Fondo Italiano di Investimento of CDP***

In 2010, CDP endorsed a partnership with private investors and public sponsors in order to launch a new investment fund called Fondo Italiano di Investimento (FII or the Fund). The aim of the Fund, designed for a medium- to long-term time horizon, is to create a broader spectrum of medium-sized companies by encouraging the aggregation of smaller companies, allowing them to be more competitive at the national and international level. In November 2010, the Fund completed its first closing of EUR 1.2 billion.

The project essentially involves investing in the risk capital (private equity) of SMEs that operate in various industry, trade and services sectors to accompany them coherently and professionally in their growth plans.

The Fund promotes and manages closed-end investment funds for qualified investors aimed at enhancing the capitalisation of SMEs through both direct and indirect investments as a "fund-of-funds". The Fund targets companies with a turnover ranging between EUR 10 million and 250 million, as part of "expansion capital" operations aimed at funding the development of already established companies, which may also include the funding of acquisitions.

From inception, FII has already invested EUR 825 million, thus mobilising investments – directly or indirectly – in 120 firms totalling over EUR 5 billion of sales and 26,500 employees. In the second half of 2014, once again on the initiative of CDP, two new funds of funds were launched, one for the venture capital market and the other for the private debt market for Italian SMEs.

***The ICO Innovation Finance Line***

In 2014, ICO implemented a programme line which specifically focuses on financing innovation projects. It is co-financed by the European Union Development Fund (ERDF) and makes about EUR 314 million available for the period until 2015. The total amount is allocated to firms within four different regions of Spain, respecting regional differences in the level of development, local business conditions and other factors. The programme aims at both promoting convergence and fostering excellence in innovation.

The financing will always be made through loans with terms of up to 7 years (including a 1-year grace period) and up to EUR 1.5 million for each SME (in one or more investments). Interest on the line is the average of market rates, or even lower for SMEs.

Summing up, the study draws a nuanced picture of the current state and recent trends regarding the investment and innovation activities of SMEs in France, Germany, Italy and Spain. Despite some heterogeneity within and across countries, the findings lead to a common conclusion: A rebound of investment and innovation activities of SMEs is indispensable to ensure the future competitiveness of the four largest European economies. European initiatives to foster high-quality investment and path-breaking innovations of SMEs are important but must be complemented by national policies that are able to address country-specific issues.



# **Country Reports**





## 2.1 France

Baptiste Thornary (Bpifrance)

The French productive sector is characterised by a large proportion of small and medium-sized enterprises. They account for slightly under 50 % of the total employment and of the total value added of the productive sector, as two thirds of them do not have any employees. Their investment and innovation behaviour remain crucial to economic growth and have been recently characterised by the following features:

- (1) The weak economic conditions over the past years weighed on investment expenditures. SMEs reduced or postponed their investment expenditures in view of empty order books and rising uncertainty. Replacement objectives became the main driver of firms' investment choices in industry, suggesting a restrictive investment-by-necessity behaviour over the past years.
- (2) The most pressing problems reported by SMEs remain the lack of demand and the drop in profits. Indeed, SMEs, as well as French firms in general, experienced a pronounced decline of their profit margins since 2007, to reach the lowest level in thirty years at the end of 2014. Apparently, investment slowdown has not been amplified by financial constraints. Access to credit, at least investment credit, remained quite easy for French SMEs over the past years, offsetting in part the downward impact of falling profitability.
- (3) Until recently, investment intensity remained rather high in France. However, the high investment intensity of SMEs has been driven for a large part by rising prices in construction. This could be one of the explanations for the puzzle observed in the past years, that is weak economic performance despite a sustained investment effort.
- (4) Turning to innovation behaviour, French SMEs display some good results but still remain below the best performers among European countries. What needs to be highlighted, however, is the high proportion of original technological innovators. Thus, the diffusion rather than the excellence of innovations appears to be an issue in France.

### 2.1.1 The relevance of SMEs for the French economy

SMEs embrace the largest sector of firms producing on the French territory. Including the smallest ones, they represent 99.9 % of the 3,144,000 firms registered in France (Figure F.1).

They account for nearly half of the total persons employed by the private sector, for 44 % of the total value added and for 32 % of total investment.<sup>6</sup>

In detail, micro enterprises, which have less than 10 employees, account for around 3 million distinct business units, for 20 % of the French private labour force (2.9 million employees) and for 21 % of the total value added. Two thirds of the micro enterprises have no employees and only 12 % of them employ more than two persons.

The 137,500 firms with 10 to 249 employees employ more than 4 million people and account for 23 % of total value added. The average SME in this size class has around 30 employees. Those with 50 or more employees account only for 11 % of all firms within this size class.

**Figure F.1: The relevance of SMEs for the French economy**

	Micro enterprises (0 to < 10)	Small and Medium enterprises (10 to < 250)	Intermediate-size enterprises (250 to < 5,000)	Large enterprises (> 5,000)	Total
<b>Number of enterprises</b>	3,001,329	137,534	4,959	243	3,144,065
<i>Share</i>	95.5 %	4.4 %	0.2 %	0.01 %	
<b>Number of employees</b>	2,925,000	4,153,000	3,363,000	4,493,000	14,934,000
<i>Share</i>	19.6 %	27.8 %	22.5 %	30.1 %	
<b>Value Added</b>	EUR220 bn	EUR234 bn	EUR237 bn	EUR344 bn	EUR1,036 bn
<i>Share</i>	21.3 %	22.6 %	22.9 %	33.2 %	

Note: 2011 figures for France according to the Law for the Modernisation of the Economy (LME) definition of SMEs (see box below for a definition of firm size classes). Includes the self-employed but excludes main activities in agriculture and public administration.

Source: Ésane, Clap and Lifi datasets.

The French business population has been increasing over time but the breakdown by size class remained quite stable. 70 % of employees of micro enterprises work in tertiary activities (compared to 64 % for all firms) and another 19 % in the construction sector (compared to 11 % for all firms). With only 11 % of their employees, micro enterprises are under-represented in industry (25 % for all firms). Almost half of all employees of micro enterprises are active in crafts or services, underlining the local market reach of the smallest enterprises.

Activities are more diversified for the small and medium sized SMEs, which have a greater weight in the construction sector, traditional industries (textile, wood, printing, metallurgy and extractive industries), services (accommodation and meals, education in the market sector,

<sup>6</sup> These data from INSEE (reference year 2011, except finance and insurance activities) are the latest available data in line with the new statistical definition of firms as defined by the Law for the Modernisation of the Economy (LME; see box 1 below).

social and clinic-social accommodation and social action) and more qualified activities (legal and accounting services, other professional, scientific and technical activities, publishing industry and film production).<sup>7</sup>

### 2.1.2 The investment and innovation behaviour of SMEs in France

Assessing investment and innovation in SMEs is generally difficult due to the scarcity of data. Moreover, the definition of SMEs is in itself not homogeneous across sources. This implies recurrent flaws in the analysis as the economic and organisational reality of firms does not always match the perimeter covered by statistical sources, generally based on business legal entities.

In France, an official statistical definition of different firm size classes has been put in place with the Law for Modernisation of the Economy in 2008 (see box below). Unfortunately, this statistical definition does not yet apply to all sources of data and the perimeter and definition of the economic object studied can vary from one study to the other.<sup>8</sup> This needs to be kept in mind when reading and interpreting the results discussed below.

#### The LME definition of French SMEs

Since the introduction of the Law for the Modernisation of the Economy (LME) in 2008, and in line with the European definition, SMEs in France are statistically defined as a group of business legal entities financially linked meeting a combination of accounting criteria

**Figure F.2: Statistical categories of firms according to the LME**

Turnover	Balance sheet size	Total number of employees		
		Less than 250 employees	From 250 to 4,999 employees	More than 5,000 employees
Less than EUR 50 m		Small and medium-sized enterprises (SME)	Intermediate size enterprises	Large enterprises
More than EUR 50 m and less than EUR 1.5 bn	Less than EUR 43 m			
	More than EUR 43 m			
More than EUR 1.5 bn	Less than EUR 43 m	SME		
	More than EUR 43 m and less than EUR 2 bn			
	More than EUR 2 bn			

The objective of this definition is to give a more accurate economic view of SMEs, to be considered as production entities with autonomy of decisions. This way, potential flaws emerging from statistics at the juridical level, that is at the level of business legal entities, which accounting data and legal registration usually refer to, should be avoided. Indeed, many small and medium legal entities are financially linked with other business entities and are in reality part of a larger group where economic decisions (investment, financing etc.) are made for them.

<sup>7</sup> Ésane, Clap, and Lifi datasets. Figures for 2011.

<sup>8</sup> See the appendix for the main characteristics of the different sources.

To illustrate the differences in results arising from these concurring definitions, consider the relevance of French SMEs. According to the LME definition, French SMEs (including micro enterprises) account for 50 % of total employment and 44 % of value added, whereas according to the business legal entities definition, SMEs weigh for 63 % of total employment and 59 % of value added.

Although the definition based on independent production entities is preferable from an economic point of view, however, very few data respecting this definition are available in practice.<sup>9</sup>

### 2.1.2.1 Investment

According to Banque de France data,<sup>10</sup> French SMEs substantially reduced their investment expenditures in the last two years (-13.7 % in 2012 and -11.3 % in 2013). This contraction took place in all sectors and survey results for 2014<sup>11</sup> indicate no trend reversal over the previous quarters.

This decrease in global investment expenditures came with a decrease in investment diffusion. In the light of persistently weak demand conditions, SMEs tend to reduce or postpone their investment decisions. This behaviour does not appear to be aggravated by financial constraints in France. Access to credit, at least investment credit, remained quite easy for French SMEs over the past years<sup>12</sup> and the outstanding amount of credit remained rather dynamic as it compensated for falling profits. In fact, the most pressing problems reported by SMEs remain the lack of demand and the drop of their profitability. Replacement objectives became more and more firmly the main driver of firms' investment choices in the industry, suggesting a restrictive investment-by-necessity behaviour over the past years.<sup>13</sup>

Indeed, French firms more generally experienced a substantial drop in their profit margins since 2007 (Figure F.3), to finish at their lowest level in thirty years at the end of 2014. Profit margins of SMEs did not stand out to this respect and followed the same path.

Furthermore, for a long time investment intensity (investment over value added) of French firms remained rather high. But it seems the high investment intensity of SMEs has in large part been driven by rising prices in construction. This could be one of the explanations for the puzzle observed over the past years, namely a weak economic performance despite a sustained investment effort.

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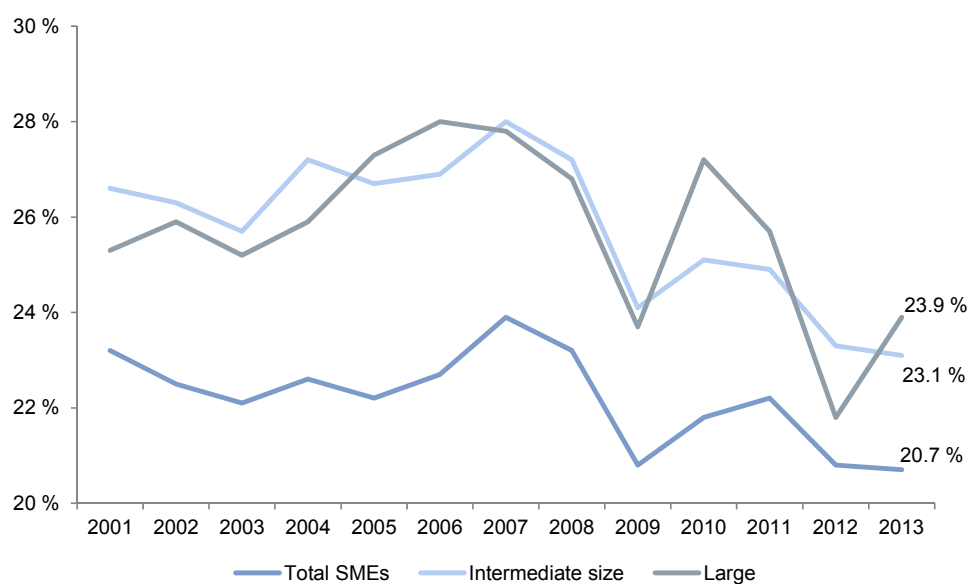
<sup>9</sup> See the appendix for more details.

<sup>10</sup> The FIBEN dataset from Banque de France gathers account data from nearly 173,000 firms (LME definition) and is only representative for SMES with more than 10 employees.

<sup>11</sup> See Bpifrance (2015).

<sup>12</sup> According to the Banque de France quarterly survey on firms' access to credit, over the past years, more than 90 % of SMEs have received the investment credit they applied for.

<sup>13</sup> See Observatoire du financement des entreprises (2014a).

**Figure F.3: Profit rates of French firms as a share of value added by size class**

Note: Gross operating surplus over value added, LME definition of SMEs. Only few very small firms are included in the sample but the data are representative for companies with an annual turnover larger than EUR 750,000.

Source: FIBEN dataset (Banque de France).

### Investment diffusion

The most useful data to assess SMEs investment behaviour comes from the Bpifrance Biannual Survey on SMEs (see box below). According to the 2014 November survey, 48% of French SMEs declared having invested in 2014, after 48% in 2013 and 52% in 2012 (Figure F.4). There is a wide gap between small SMEs with less than 10 employees, of which 35% invested in 2014, and medium and large SMEs for whom investment was more frequent (59%).

This investment diffusion could be underestimated as recent work on micro enterprises conducted by INSEE based on exhaustive fiscal data displayed slightly higher results (50% of micro enterprises invested each year, on average between 2009 and 2011).<sup>14</sup> One explanation could be that in the survey SMEs give an appreciation of the most significant investments conducted during the year, which could prove more restrictive than the investment that can be effectively measured in their accounts.

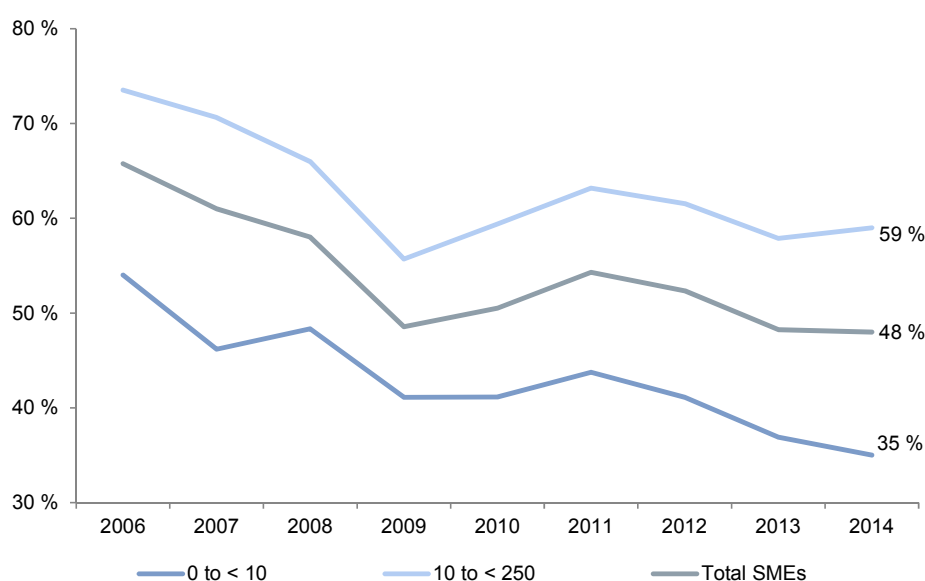
Nevertheless, the Bpifrance survey and the INSEE data both tend to show an unequal distribution of investment across SMEs, with the size being the main determinant of the differences. Moreover, an important part of SMEs does not invest continuously. In fact, the smaller the size of the firm, the more irregular the investment decisions are. For example, in the INSEE analysis, 27% of active micro enterprises never invested between 2009 et 2012 and

<sup>14</sup> See Observatoire du financement des entreprises (2014b).

35% invested two years at the most over this period. In contrast, from the small medium-sized enterprises, 91% invested at least three years between 2009 and 2012.<sup>15</sup> Beyond the impact of economic and financial health conditions, this illustrates the strong heterogeneity among SMEs, in terms of sector or simply business model, with very different goals in terms of economic development.

In the long run, the share of SMEs investing has decreased substantially, suggesting that economic downturns tend to not only affect the level of expenditures, but also the decision to invest itself (Figure F.4).

**Figure F.4: Development of investment activities of French SMEs**



Note: Share of SMEs declaring an investment during the respective year in the November survey.

Source: Bpifrance Biannual Survey on SMEs.

### **Bpifrance Biannual SMEs Business Climate Survey**

The Bpifrance Biannual SMEs Business Climate Survey has been conducted since 1985. It covers SMEs with 1 to 250 employees and a turnover of less than EUR 50 million, from all non-agricultural non-financial commercial companies.

Surveys are conducted in May and November each year. SMEs are asked a range of questions about the past and future evolution of their turnover, workforce and investment, as well as their financial health and financing structure.

It gives a useful insight into the economic and financial climate of French SMEs, small and medium ones as well as micro enterprises and complements business surveys run by public statistics providers INSEE and Banque de France. It is designed to be representative of the whole productive sector, therefore including large enterprises.

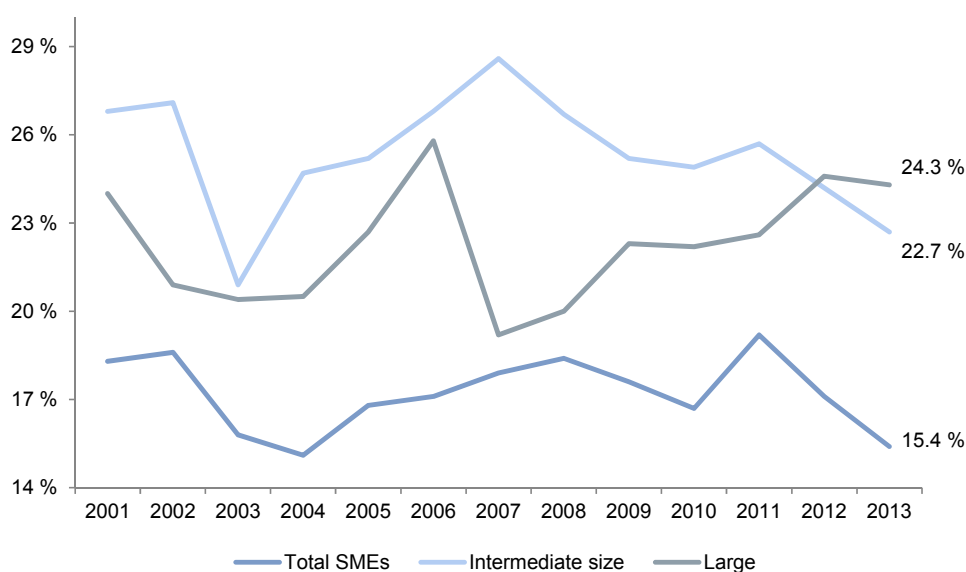
To allow for regional comparisons, the panel has recently been enlarged. 29,000 SMEs participated in the 60<sup>th</sup> wave of the survey in November 2014, the results being based on the first 4,631 responses judged complete and reliable.

<sup>15</sup> See Bacheré (2014).

### Investment intensity

As pointed out in a recent report on the economic and financial situation on French SMEs,<sup>16</sup> the investment intensity of French SMEs, measured as the part of their value added dedicated to investment, appeared to be quite resilient over the past decade, even after the beginning of the crisis (Figure F.5). Despite the drop in total investment expenditures during this period, the investment intensity of SMEs remained above 17% until 2012. Yet, in view of persistently weak demand conditions and a fall of profit margins, the investment intensity significantly dropped in 2013.<sup>17</sup>

**Figure F.5: Investment intensity of French firms**



Note: Investment over value added, based on accounting data. LME definition of firm size. The investment rate is an average over all firms of a given size class in the sample, therefore including firms who did not invest in a given year.

Source: FIBEN dataset (Banque de France).

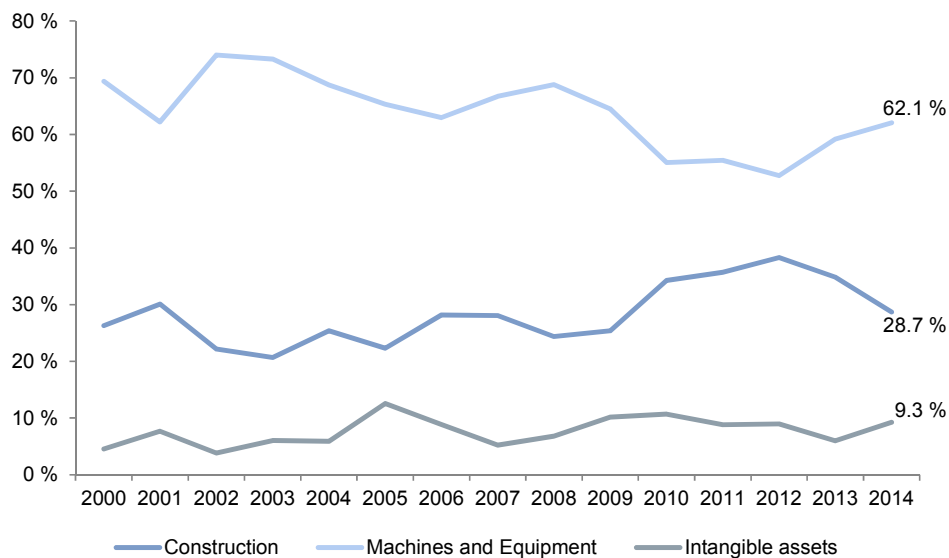
### Types of investments

Since 2006, investment of SMEs slowly shifted toward investment in construction (Figure F.6). This matches with observations for non-financial corporation level based on national accounts data. The rise in the relative price of construction seems to have played a major role in this evolution.<sup>18</sup>

<sup>16</sup> Observatoire du financement des entreprises (2014a).

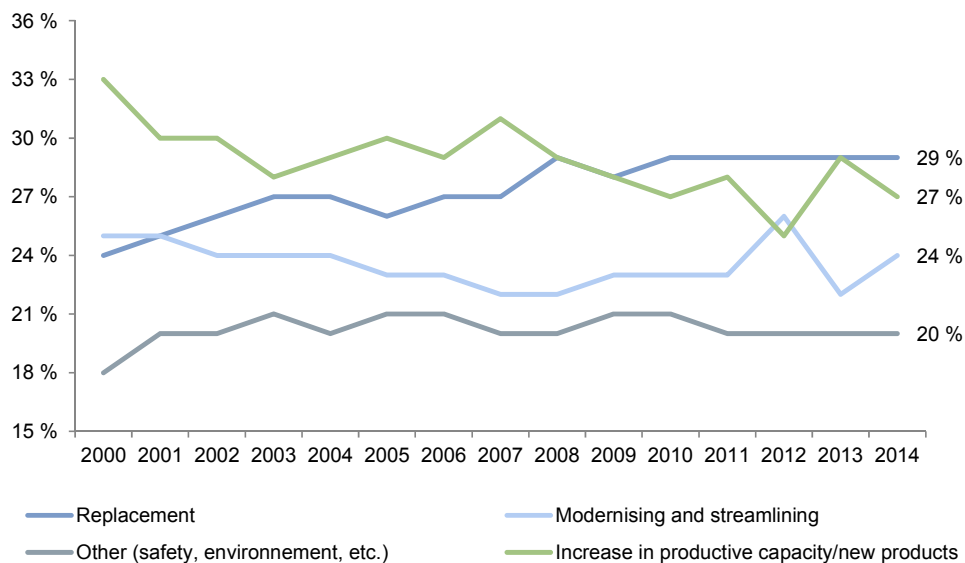
<sup>17</sup> See Banque de France (2014).

<sup>18</sup> Observatoire du financement des entreprises (2014a).

**Figure F.6: Average composition of investment of French SMEs**

Note: Share of each type of investment in total investment as declared in the November survey.

Source: Bpifrance Biannual SME Survey.

**Figure F.7: Investment objectives of French manufacturing firms**

Note: Share of each type of objectives in total investment as declared by manufacturing firms.

Source: INSEE Biannual Survey on Investment in the Industry.

This value effect which has driven investment intensity in the past years casts doubts on the efficiency of investments of French firms in general and SMEs in particular in the recent past. As a matter of fact, investment in intangible assets remained quite low in the investment



portfolio of SMEs, although if this type of investment is often not accurately measured by respondents in the Bpifrance survey.<sup>19</sup>

Another indicator of the quality of investment is the firm's objective when deciding to invest. There is no data on SMEs on this matter for France but the overall results of the quarterly survey on industrial investments conducted by INSEE show that investments were more and more defensive in the past years. The share of firms reporting replacement motives increased over the period, while capacity extension motives suffered from persistently low order books (Figure F.7).

### **2.1.2.2 Innovation**

The data used in this section comes from the last Community Innovation Survey (CIS). The survey is the best source of information on the innovation behaviour of French SMEs with 10 and more employees. According to CIS data, more than half of French SMEs (52 %) innovated in the period between 2010 and 2012, slightly more than the EU-28 average (48 %). Organisational innovations are the most frequent type of innovations produced by SMEs (33 % of all SMEs), far ahead of marketing innovations (25 %), product (23 %) or process (23 %) innovations. Similar to with investment, the larger the firms, the more innovative they are. This gap applies for all types of innovations and is the largest for product innovations.

All in all, 35 % of SMEs were engaged in technological innovation (product and/or process innovations) over the period. The proportion has increased slightly compared to the 2008 and 2010 results (33 %). French SMEs are characterised by a high proportion of original innovators, as two third of product innovators brought new innovations to the market between 2010 and 2012.

#### **Innovation diffusion**

Innovation diffusion, defined as the share of firms which have implemented a product and/or process innovation, varies greatly across sectors and size classes. According to CIS data, 70 % of large firms were engaged in either product or process innovation or both in the period between 2010 and 2012, while the respective share is only 35 % for SMEs with 10 and more employees. The proportion has slightly increased compared to the previous survey

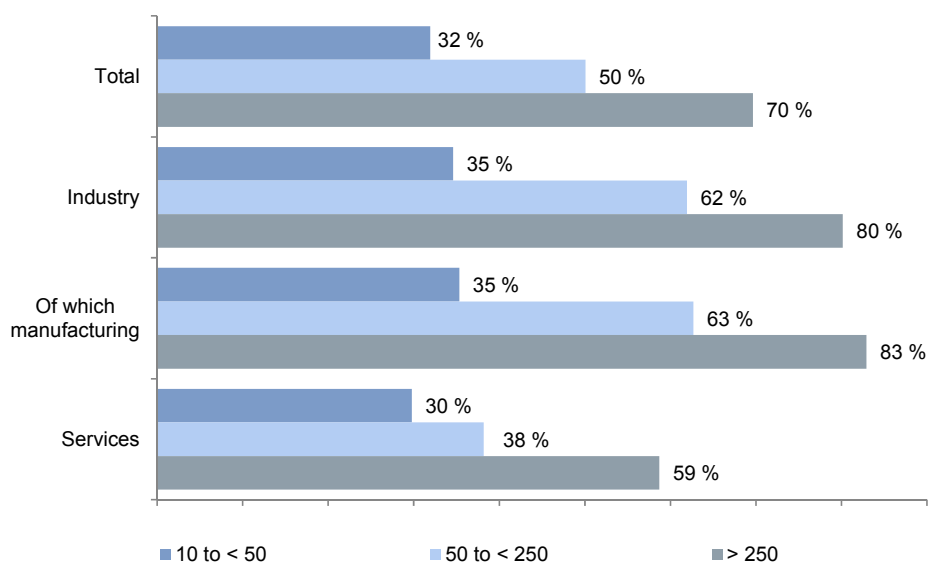
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<sup>19</sup> At the aggregate level, investment in intangible assets (software, databases, R&D expenditures) is the most prevalent type of investment of non-financial corporations (40 %) according to French national accounts data. The large gap between survey data on SMEs and aggregate data of national accounts for all non-financial corporations can have several explanations. First, this kind of investment is often difficult to measure by respondents of the survey. Second, the overall investment of non-financial corporations is shaped by large firms' expenditures as only 23,300 firms (0.7 % of total firms) account for 85 % of total investment (Bacheré, 2014). For example, R&D expenditures are an important part of non-tangible investments in the national accounts methodology which typically concerns primarily large firms (nearly 80 % of firms' R&D expenditures in 2012).

(CIS 2010 reported that 33 % of French SMEs introduced technological innovations between 2008 and 2010).

Within SMEs, innovation is more frequent in large SMEs (50 % for SMEs with more than 50 employees vs 32 % for smaller SMEs, Figure F.8). Moreover, whatever the size, innovation is more frequent in the manufacturing sector than in services, although the gap between the different size classes is smaller in services. These results are widely shared with other economies (see chapter 1.3 and the country reports in this section).

**Figure F.8: Share of French firms with technological innovation**



Note: Percentage of total firms. Product or process innovation. Size class defined by employee criterion. Sectors according to NACE: industry (B, C, D, E), of which manufacturing (C), services (G46, H, J, K, M71, M72, and M73).

Source: CIS 2012.

One out of five small SMEs introduced at least one product innovation between 2010 and 2012. The same frequency applies to process innovations. For larger SMEs, rates were higher with 35 and 33 % respectively (Figure F.9). Moreover, smaller SMEs are more exclusively oriented toward one type of innovation.

Compared to the average innovation activities in the European Union, French SMEs tend to keep up with the average for product innovation and are slightly above the average for process innovations. The gap is nonetheless important when considering countries such as Germany (see section 2.2), which place France as an innovation “follower” in European innovation rankings.<sup>20</sup> The most frequent types of innovation implemented by French SMEs are those relative to organisation (see box below).

<sup>20</sup> European Commission (2015b).

**Figure F.9: Types of technological innovation introduced by French firms**

	Small SMEs (10 to < 50)	Medium and large SMEs (50 to < 250)	Large firms (> 250)
<b>Share of firms introducing product innovation</b>			
Total	20 %	35 %	55 %
Manufacturing	22 %	45 %	67 %
Services	19 %	26 %	45 %
<b>Share of firms introducing process innovation</b>			
Total	21 %	33 %	49 %
Manufacturing	23 %	40 %	59 %
Services	19 %	25 %	41 %

Note: Share of total firms which introduced respective type of innovation in 2010–2012. Size class defined by employee criterion. Sectors according to NACE: industry (B, C, D, E), of which manufacturing (C), services (G46, H, J, K, M71, M72, and M73).

Source: CIS 2012.

### Organisational and marketing innovations of French firms

Organisational innovations were the most common innovations to be found in French SMEs from 2010–2012: 31 % of small SMEs and 41 % of medium and large SMEs introduced new organisational methods, more than the European average. Marketing innovations concern fewer SMEs (23 % of small SMEs and 31 % of medium and large SMEs). For small firms, these non-technological innovations are more frequent in services, whereas for SMEs with more than 50 employees or larger firms, the distribution across sectors is more balanced.

**Figure F.10: Types of non-technological innovation introduced by French firms**

	Small SMEs (10 to < 50)	Medium and large SMEs (50 to < 250)	Large firms (> 250)
<b>Share of firms introducing organisational innovation</b>			
Total	31 %	41 %	56 %
Manufacturing	30 %	44 %	57 %
Services	33 %	39 %	55 %
<b>Share of firms introducing marketing innovation</b>			
Total	23 %	31 %	45 %
Manufacturing	21 %	31 %	45 %
Services	25 %	31 %	45 %

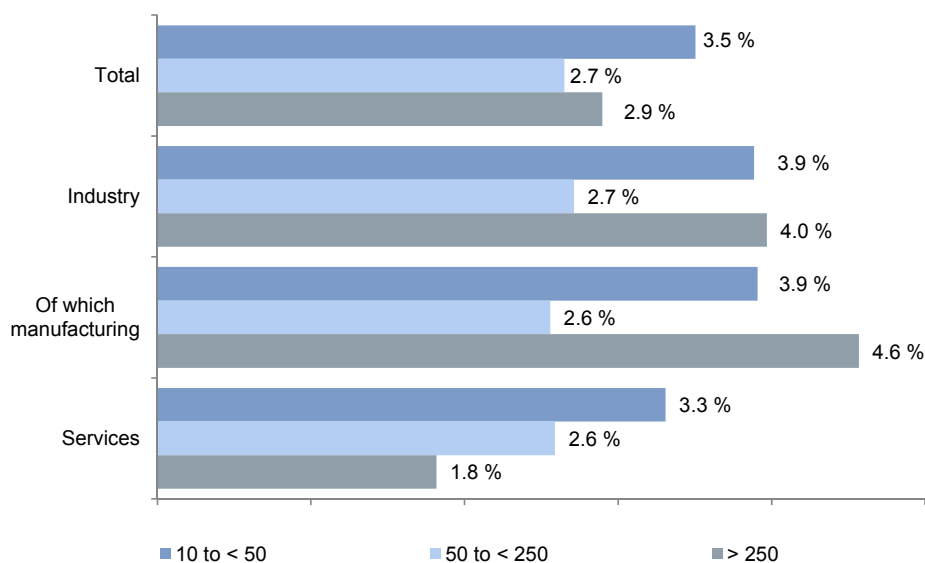
Note: Share of total firms which introduced respective type of innovation in 2010–2012. Size class defined by employee criterion. Sectors according to NACE: industry (B, C, D, E), of which manufacturing (C), services (G46, H, J, K, M71, M72, and M73).

Source: CIS 2012.

### Innovation intensity

In 2012, SMEs with less than 50 employees spend on average of 3.5% of their annual turnover on innovation, which is above the average innovation intensity of medium and large SMEs (2.7%) and large firms (2.9%, Figure F.11). Large firms in the manufacturing sector do however stand out. With 4.6%, they are the group that spends most on innovation relative to turnover.

**Figure F.11: Innovation intensity of French firms**



Note: Innovation expenditures as share of total turnover. Firms with product and/or process innovation in 2010–2012. Size class defined by employee criterion. Sectors according to NACE: industry (B, C, D, E), of which manufacturing (C), services (G46, H, J, K, M71, M72, and M73).

Source: CIS 2012.

### Original product and process innovation

Original innovations, defined as being new to the market and not only new to the firm,<sup>21</sup> are more frequent for product than for process innovations, which tend to be more imitative. This hierarchy can be observed for all firm size classes. In most cases, the competitive strategy of French companies relies on original product innovation.<sup>22</sup> In particular, 76% of large product-innovative firms had an original innovation in 2010–2012 compared to only 66% of small and medium to large product-innovative SMEs (Figure F.12). This gap between firm size classes appears to be more important in the manufacturing than in the service sector. Original process innovations, on the other hand, are more frequent in small SMEs. About one third of all process-innovative small SMEs implemented original process innovations in 2010–2012.

<sup>21</sup> See box in section 1.3 for the definition according to the Oslo Manual (2005).

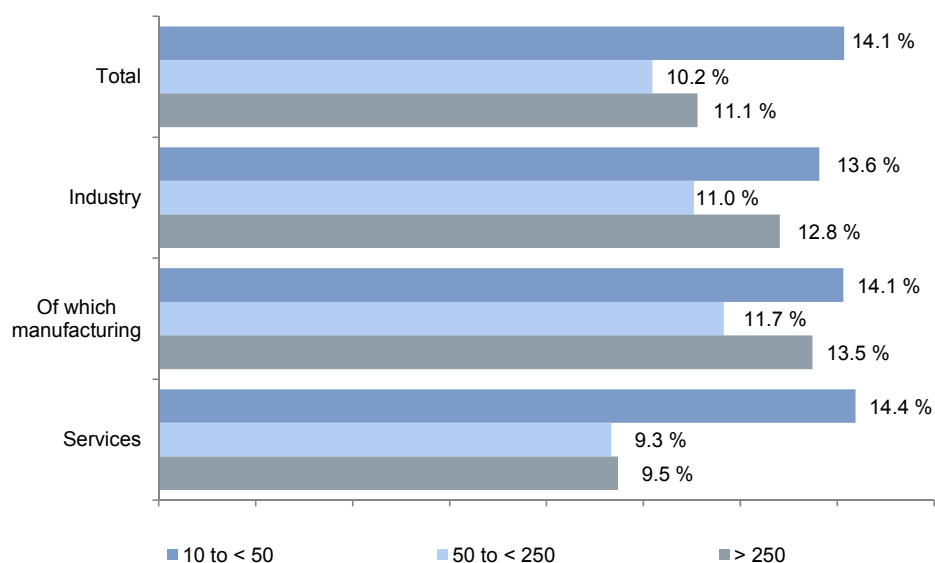
<sup>22</sup> Firms can implement both original and imitative innovations according to the survey.

**Figure F.12: Original product and process innovations of French firms**

	Small SMEs (10 to < 50)	Medium and large SMEs (50 to < 250)	Large firms (> 250)
<b>Share of firms introducing product innovation new to the market</b>			
Total	66 %	67 %	76 %
Manufacturing	66 %	70 %	82 %
Services	67 %	63 %	68 %
<b>Share of firms introducing process innovation new to the market</b>			
Total	34 %	30 %	27 %
Manufacturing	33 %	28 %	25 %
Services	35 %	33 %	31 %

Note: Percentage of firms introducing a product novelty to the market among product innovators and percentage of firms introducing a process innovation to the market among process innovators. Size class defined by employee criterion. Sectors according to NACE: B, C, D, E, G46, H, J, K, M71, M72, and M73.

Source: CIS 2012.

**Figure F.13: Share of revenues of French firms from original innovative products**

Note: Average share of total turnover due to original product innovations among the population of firms with product innovations. Size class defined by employee criterion. Sectors according to NACE: industry (B, C, D, E), of which manufacturing (C), services (G46, H, J, K, M71, M72, and M73).

Source: CIS 2012.

The share of original innovators among French SMEs which implemented a product innovation is rather high, according to the global results of the 2012 Community Innovation Survey.<sup>23</sup> The share of original innovators among product or process innovators appear

<sup>23</sup> See CIS 2012.

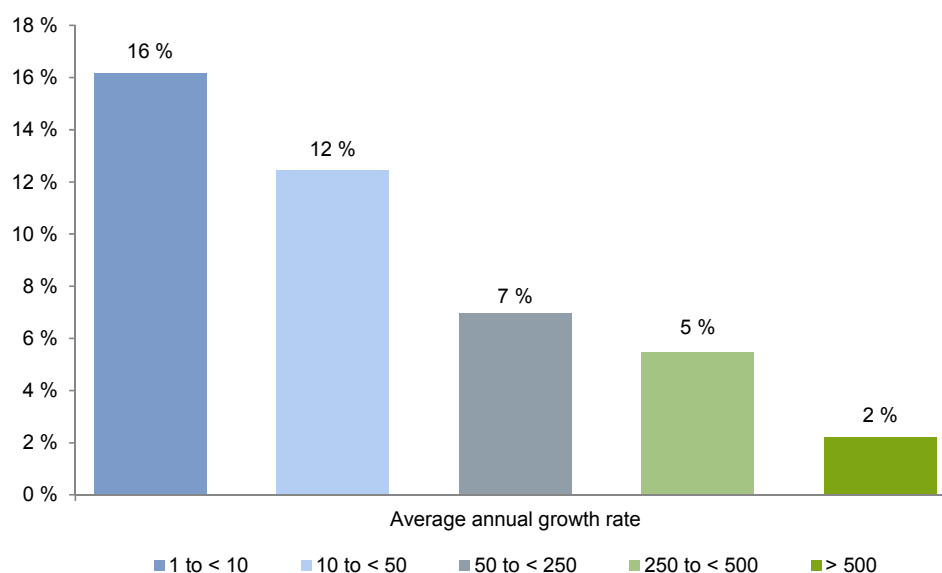
comparable among manufacturing and service SMEs. Moreover, nearly one quarter of product innovators declared bringing at least one “world first” innovation between 2010 and 2012.

The CIS data suggest that there is an issue related to the overall diffusion of innovative practices in French SMEs rather than to their quality (as measured by the share of original innovators, which seems very good by international comparison). The share of revenues extracted from original product innovation amounts to 14 % of the total turnover of small product-innovative SMEs and 10 % for medium and large SMEs (Figure F.13). By comparison, the share of revenues extracted from imitative product innovations is of the same importance among product innovators (14 % of total turnover for small SMEs product innovators in 2012 and 11 % for medium and large SMEs), although imitative product innovations<sup>24</sup> are slightly less frequent (introducing original and imitative innovations not being mutually exclusive).

### 2.1.2.3 Research and Development

French internal R&D expenditures rose to EUR 46.5 billion in 2012, thanks to a growing contribution of R&D conducted by French firms, which amounted to EUR 30.1 billion in 2012 after EUR 28.9 billion in 2011. If SMEs were responsible for only 23 % of the total expenditures in 2012, this share is rising. Indeed, SMEs were the size class which experienced the fastest growth of R&D expenditure since 2007 (Figure F.14).

**Figure F.14: Average annual growth rate of R&D expenditure of French firms**



Note: Average annual nominal growth rate of total R&D expenditures of each firms size class between 2007 and 2011. Size class defined by employee criterion.

Source: R&D Survey, Eurostat.

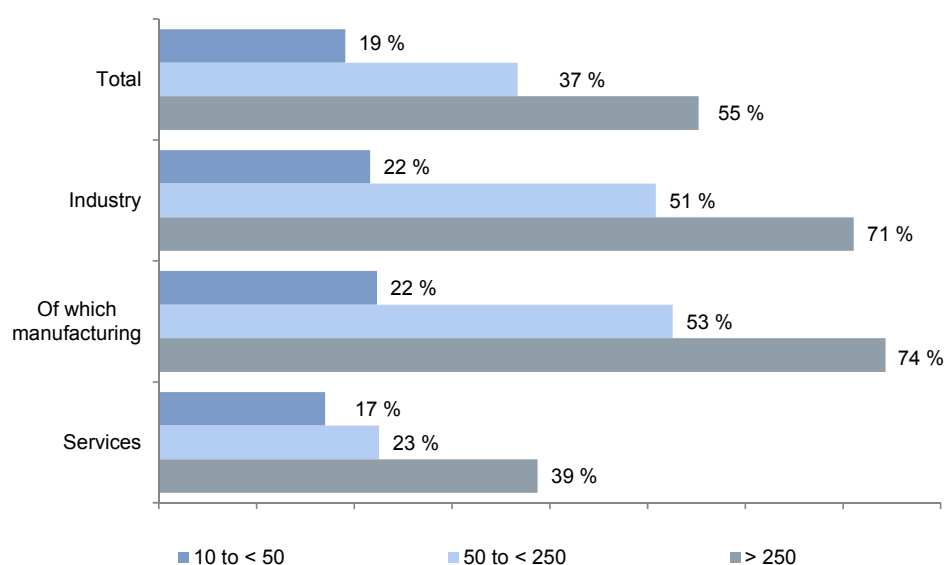
<sup>24</sup> These are innovations which are new to the firm, but not new to the market.

Although SMEs account for 90 % of firms carrying out R&D in France, they spend less than a quarter of total R&D expenditures. Of the average 37 employees of an SME, about 5 are dedicated to R&D activities. Moreover, SMEs account for only 31 % of the total research personnel,<sup>25</sup> measured in terms of full time equivalents. As for investment, R&D expenditure is highly skewed toward large firms in France.

### R&D diffusion

More than half of all medium and large SMEs in the manufacturing sector were engaged in R&D activities in 2012, compared to 74 % of large firms (Figure F.15). Small SMEs are less prone to R&D activities as only one fifth of them were carrying out in-house R&D in 2012. Generally, R&D activities in the service sector are less frequent. However, the data here does not take into account micro enterprises which may play an important role in sub-contracted R&D, especially those working in the service sector.

**Figure F.15: Share of French SMEs carrying out R&D**



Note: Firms with more than 10 employees engaged in in-house R&D activities in 2012. Size class defined by employee criterion. Sectors according to NACE: industry (B, C, D, E), of which manufacturing (C), services (G46, H, J, K, M71, M72, and M73).

Source: CIS 2012.

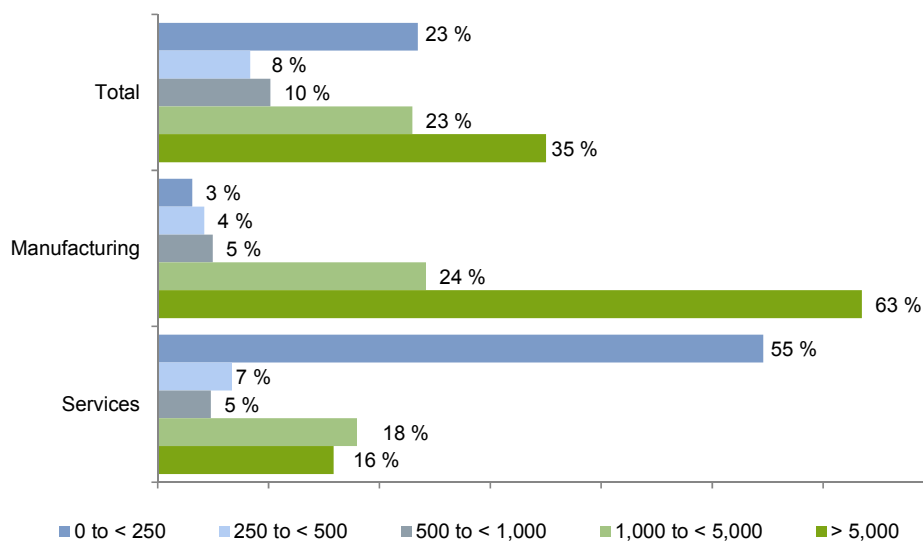
### R&D expenditure

The contribution of SMEs to total R&D expenditure is also uneven across sectors. It is negligible in the manufacturing sector, which was responsible for 80 % of total R&D expenditure in 2012. This is because R&D expenditure is dominated by the major companies in pharmacy, motor, aircraft and spatial industries. However, SMEs play a more important role in the

<sup>25</sup> Full time equivalent.

service sector, especially those SMEs providing business services. Firms with less than 250 employees accounted for more than half of the total R&D expenditure in the service sector in 2012 (Figure F.16). Most of them are working for R&D projects subcontracted by large industrial firms. These subcontractors account for three quarters of the total R&D expenditure in specialised, scientific and technical activities (engineering services, R&D specialised firms such as biotech, medtech etc.) and for half of the R&D expenditure on computing activities and information services.<sup>26</sup>

**Figure F.16: Share of different firm size classes in total French R&D expenditure**



Note: Share of R&D expenditure by given size class in total R&D expenditure of the sector. Firms with internal R&D activity in 2012. Size class defined by employee criterion. Sectors according to NACE: industry (B, C, D, E), of which manufacturing (C), services (G46, H, J, K, M71, M72, and M73).

Source: R&D Survey 2012 (MENESR – SCSESR – SIES Pôle recherché).

### R&D intensity and external sources of funding

Despite their relatively modest share in global expenditure, SMEs invest more in R&D in terms of total turnover (5% on average in 2012) than the larger firms (between 2 and 3%, Figure F.17), a pattern also observable in other countries. This could reflect a selection effect (small firms doing R&D being specialised R&D subcontractors or start-ups at the early stage of their development where the initial cost of investment has not yet paid for itself).

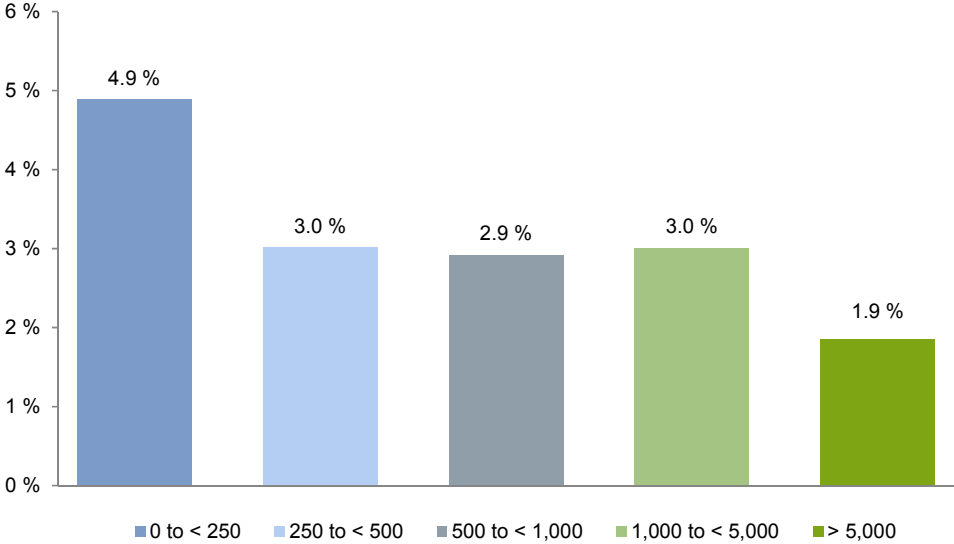
SMEs rely more heavily on own resources but also on public support to finance their R&D expenditure. Public funds make up for 39% of their total external financing. Larger firms, on

<sup>26</sup> The data used here encompass micro firms.



the contrary, rely mainly on private funding from domestic or foreign firms<sup>27</sup> or international organisations.

**Figure F.17: R&D intensity of French firms**



Note: Average R&D expenditures over turnover in 2012. Firms with internal R&D activity in 2012. Size class defined by employee criterion.

Source: R&D Survey 2012 (MENESR – SCSESER – SIES Pôle recherché).

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<sup>27</sup> This could indicate part of the access to the internal capital market within the group as external financing is considered here at the level of the business legal entities without considering the financial links with holdings or subsidiaries.



## 2.2 Germany

Dr Jennifer Abel-Koch, Juliane Gerstenberger and Dr Vivien Lo (KfW)

SMEs do not only dominate in numbers but also account for a substantial share of employment in Germany and hence are an integral part of the German economy. Their investment and innovation behaviour will be crucial for the future competitiveness of the country and can be characterised by the following key features:

- (1) Regarding investment, firms in the manufacturing sector with 50 to 250 employees were most active. About 89% of them invested in 2013. As in other European countries, the share of investors decreases with firm size. It also differs across sectors. However, comparing only those firms which invested, smaller firms display higher investment intensities. This is in part due to the fixed cost nature of investments.
- (2) Investment activities of SMEs in Germany have weakened in recent years, especially in the manufacturing sector. This development is to a large extent driven by negative business expectations and should be taken as a warning sign. If the European economy fails to accelerate, firms will continue to hold back investments, with detrimental consequences for competitiveness in the long run.
- (3) Firms in the manufacturing sector with 50 to 250 employees were also the most active ones in terms of innovations. About 68% of them innovated in 2011–2013, whereas only 28% of the firms with less than 10 employees implemented product or process innovations in the same period. As in other European countries, the share of innovators decreases with firm size.
- (4) Similar to the share of SMEs investing, the share of SMEs innovating has declined in Germany recently. Both the share of process innovators and the share of product innovators have fallen since 2006–2008. Given that innovative SMEs grow faster in terms of employment and turnover, this is a worrisome trend. Efforts on a national and European level in particular must be made to foster investment and innovation to ensure future competitiveness and sustainable growth in Europe.
- (5) Besides heterogeneity across firm size classes and sectors, there is also considerable heterogeneity of innovation activities across regions. Small and medium-sized enterprises in the South and in the West are more innovative than those located in the East or North of Germany, with shares of innovating firms varying between 43 and 55%.
- (6) SMEs which engage in R&D activities are more likely to be successful innovators and exporters than firms which do not engage in R&D.

### 2.2.1 The relevance of SMEs for the German economy

The German corporate sector is characterised by a large number of micro enterprises (Figure G.1). In 2011, more than 90 % of the 3.6 million firms in Germany had less than 10 employees. Despite being small, they account for nearly 27 % of total employment in Germany. Only 6 % of the micro enterprises with less than 10 employees work in the manufacturing sector, while more than 60 % of them are active in the service sector. In contrast, more than 32 % of the firms with 100 and more employees are active in manufacturing, while only 50 % operate in the service sector. Hence, among the smallest firms in the Germany economy, service firms are much more prevalent, while manufacturing firms are rather underrepresented. However, firms with 100 or more employees account for only 0.9 % of the total firm population. Approximately two thirds of the firms in this size class or 0.6 % of the total population have less than 250 employees and could thus be classified as medium-sized enterprise. This implies that SMEs, defined as micro, small and medium-sized enterprises with less than 250 employees, account for about 99.7 % of all firms in Germany. As in other European countries, the firm size distribution is clearly skewed towards smaller firms.

**Figure G.1: The relevance of SMEs for the German economy**

Firm size class	Number of enterprises		Number of employees	
	Number	Share	Number	Share
1 to 4	2,941,432	81.3 %	6,932,653	19.1 %
5 to 9	331,969	9.2 %	2,713,707	7.5 %
<b>Micro enterprises</b>	<b>3,273,401</b>	<b>90.5 %</b>	<b>9,646,360</b>	<b>26.6 %</b>
10 to 19	173,837	4.8 %	2,838,838	7.8 %
20 to 49	102,347	2.8 %	3,676,355	10.1 %
<b>Small enterprises</b>	<b>276,184</b>	<b>7.6 %</b>	<b>6,515,194</b>	<b>18.0 %</b>
50 to 99	34,561	1.0 %	2,899,823	8.0 %
≥ 100	33,636	0.9 %	17,168,949	47.4 %
<b>Medium and large enterprises</b>	<b>68,197</b>	<b>1.9 %</b>	<b>20,068,773</b>	<b>55.4 %</b>
<b>Total</b>	<b>3,617,782</b>	<b>100.0 %</b>	<b>36,230,326</b>	<b>100.0 %</b>

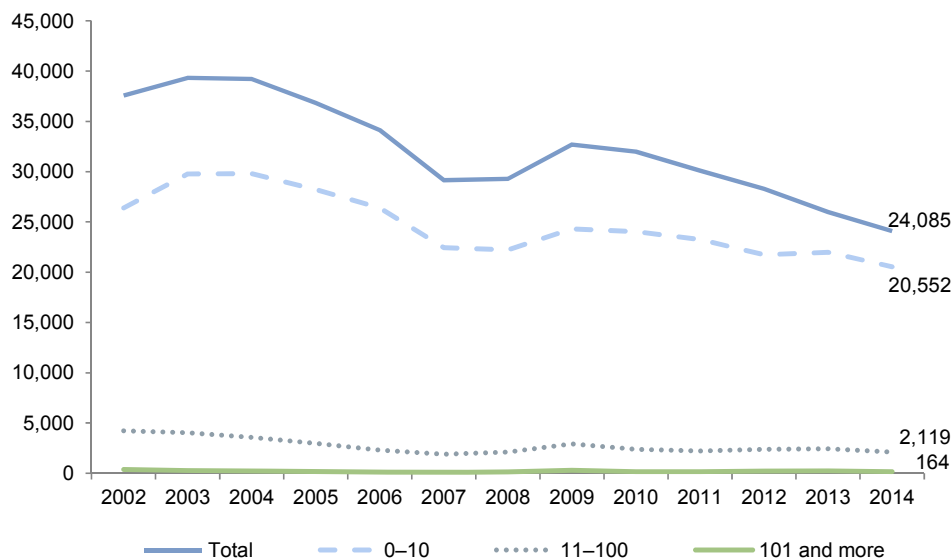
Note: Figures for 2011. Includes firms in the following sectors: manufacturing (NACE Rev. 2 sections C, J58, and S95), construction (NACE Rev. 2 section F), wholesale and retail (NACE Rev. 2 section G) and services (NACE Rev. 2 sections E37–39, H, I, J59–63, K, L, M, N, P, Q, R, and S96), as well as agriculture, forestry and fishing (NACE Rev. 2 section A), mining and quarrying (NACE Rev. 2 section B), electricity supply (NACE Rev. 2 section D) and water supply (NACE Rev. 2 section E36). Firm size class measured in terms of employees. A more detailed classification of firm in the largest size class is not available, but can be approximated based on data for earlier years. This would imply that about 21,342 firms or 0.6 % of the total population have 100 to 249 employees, while 12,294 firms or 0.3 % of the total population have ≥ 250 employees.

Source: KfW SME Panel.

Micro, small and medium-sized enterprises have gained importance since 2008, mainly because larger firms, which rely more heavily on exports, were hit harder by the financial

crisis.<sup>28</sup> This is also reflected in the number of bankruptcy proceedings (Figure G.2). While there was a surge of insolvencies across all firm size classes, the increase was much more pronounced for larger firms. In particular, while the number of bankruptcy proceedings rose by about 10% from 2009 to 2010 for firms with 10 or less employees, it nearly doubled for firms with more than 100 employees, climbing from 152 to 292 proceedings.

**Figure G.2: Bankruptcy proceedings of German firms**



Note: Bankruptcy proceedings of firms by size class as measured by employees. The numbers for the different size classes do not add up to the total, as the total also includes firms with unknown size.

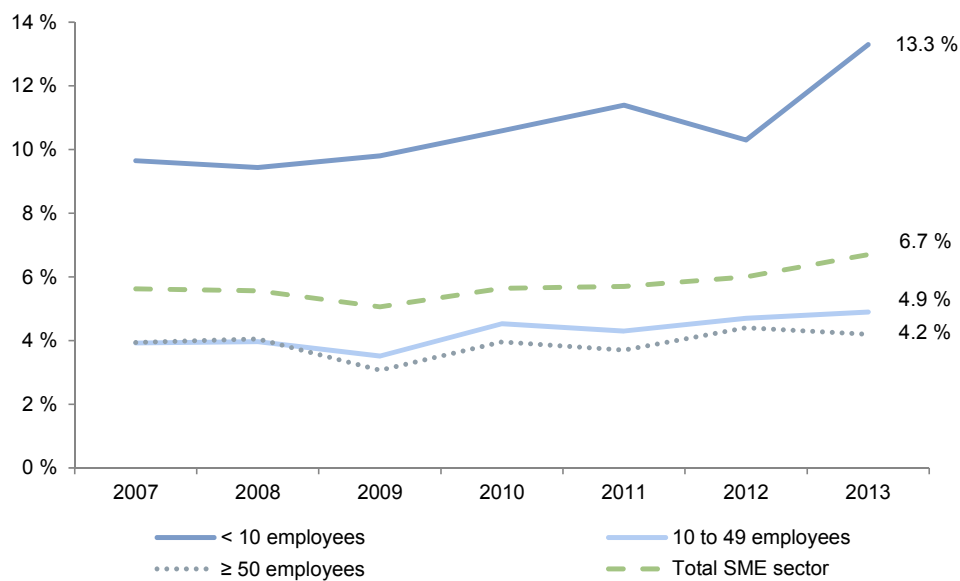
Source: Deutsches Statistisches Bundesamt.

The remarkable resilience of micro enterprises is also visible in their profit rates. While especially larger firms with more than 50 employees experienced a loss in profitability during the financial crisis, with profit rates falling from 4.0 to 3.1% on average, micro enterprises even saw a slight increase in their profit rates from 9.4 to 9.8% (Figure G.3).

While economic prospects were particularly good and profit rates increased for German SMEs in 2013, they were rather moderate in 2014, which was characterised by geopolitical uncertainties and repeatedly dashed hopes of an economic upswing in Europe. Only towards the end of 2014, falling oil prices and a declining external value of the Euro spurred growth. Cautious optimism best describes the expectations of SMEs for 2015, according to the KfW-ifo SME Barometer.<sup>29</sup>

<sup>28</sup> See European Commission (2014a).

<sup>29</sup> See Müller (2015).

**Figure G.3: Profit rates of German SMEs**

Note: Gross operating profits over total turnover. Includes firms with up to EUR 500 million turnover in the following sectors: manufacturing (NACE Rev. 2 sections C, J58, and S95), construction (NACE Rev. 2 section F), wholesale and retail (NACE Rev. 2 section G) and services (NACE Rev. 2 sections E37–39, H, I, J59–63, K, L, M, N, P, Q, R, and S96), as well as agriculture, forestry and fishing (NACE Rev. 2 section A), mining and quarrying (NACE Rev. 2 section B), electricity supply (NACE Rev. 2 section D) and water supply (NACE Rev. 2 section E36). SMEs defined as all firms with less than EUR 500 million annual turnover.

Source: Schwartz 2014a.

Different to the situation in southern European countries, funding conditions for the corporate sector in Germany are favourable. Interest rates are low and access to finance is comparably easy, even for SMEs.<sup>30</sup> Rather, the challenges lie in the uncertainty regarding the future economic development in Europe. Additionally, a series of recently introduced reforms might put economic growth prospects and competitiveness of SMEs at risk. A nationwide minimum wage of EUR 8.50 was introduced in all sectors in January 2015. While the economic impact is still uncertain, however, it is very likely that SMEs will be particularly affected since the share of low-paid employees is generally higher the smaller the firm. The DIW estimated that around one third of enterprises with less than five employees have to increase wage payments when the minimum wage is introduced.<sup>31</sup> This will put profits under pressure and might potentially affect investment and innovation activities of SMEs.

Moreover, a newly introduced pension system reform – allowing long-term employees to retire at the age of 63 without pension payment reductions – can potentially harm SMEs in Germany if elderly and more experienced employees leave the companies earlier than planned. This could additionally worsen the skilled labour shortage, a problem Germany will

<sup>30</sup> See Schwartz and Braun (2013).

<sup>31</sup> See Brenke and Müller (2013).

most likely face in the upcoming years as its working-age population and total population shrink.

But not only demographic developments hold major challenges for German SMEs. Rising energy and electricity costs put SMEs returns under pressure<sup>32</sup> and depress investment activities.<sup>33</sup> The Energiewende, i.e. the shift from conventional non-renewable to renewable energy sources, could intensify this development. However, Germany's energy transition also holds many opportunities for SMEs as the pressure to increase the use of energy efficient production methods and machinery can also drive innovation activities related to these areas.

### 2.2.2 The investment and innovation behaviour of SMEs in Germany

SMEs do not only dominate the German corporate sector in terms of numbers. They also account for a substantial part of investment and innovation activities in Germany. In 2013, micro, small and medium-sized enterprises were responsible for EUR 144 billion and hence 53% of gross investment in fixed capital of German firms.<sup>34</sup> Moreover, SMEs accounted for EUR 24.2 billion and hence nearly 19% of total innovation expenditures in the German corporate sector in 2012.<sup>35</sup> These numbers underline the need to have a closer look at the investment and innovation activities of SMEs, which will reveal substantial variation across sectors and firm size classes and uncover interesting time trends.

The analysis in the following sections is based on data from the KfW SME Panel.

#### The KfW SME Panel

The KfW SME Panel has been conducted since 2003 as a recurring postal survey of small and medium-sized enterprises in Germany with an annual turnover of up to EUR 500 million. It covers SMEs of all sizes and from nearly all sectors except the public sector, banks, and non-profit organisations.

With data based on up to 15,000 companies a year, the KfW SME Panel is the only representative survey in the German SME sector, making it the most important source of data on issues relevant to the SME sector, such as business performance, investment behaviour, financing structure, or innovation activities. It allows analysing the current situation as well as the needs and plans of even the smallest companies with fewer than five employees.

10,515 SMEs participated in the 12<sup>th</sup> wave of the survey, which was conducted between 1<sup>st</sup> February and 30<sup>th</sup> May 2014.

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<sup>32</sup> See Dieckhöner et al. (2014).

<sup>33</sup> See Schwartz (2014a).

<sup>34</sup> See Schwartz (2014a).

<sup>35</sup> See Zimmermann (2014). The definition of SMEs varies slightly here. With regard to gross fixed capital formation, SMEs are defined as all enterprises with less than EUR 500 billion annual turnover. With regard to innovation expenditure, the group of SMEs is restricted to enterprises with less than EUR 500 billion annual turnover and 5 to 249 employees.

The KfW SME Panel sample is designed in such a way that it can generate representative and reliable statements for the population of SMEs. To this end, the results of the survey are weighted. The extrapolation factors take into account the sector, the number of employees, whether the firm is located in the east or west of Germany and whether it received promotion.<sup>36</sup>

For the purpose of this report, the sample is restricted to SMEs with less than 250 employees, measured in terms of full time equivalents (FTE). Firms are aggregated into three size classes, i.e. micro (0 to < 10 FTE), small (10 to < 50 FTE) and medium-sized enterprises (50 to < 250 FTE).

Further, firms are aggregated into four sectors according to the WZ 2008 classification system, which is based on NACE Rev. 2. These sectors are manufacturing (NACE Rev. 2 sections C, J58, and S95), construction (NACE Rev. 2 section F), wholesale and retail (NACE Rev. 2 section G) and services (NACE Rev. 2 sections E37–39, H, I, J59–63, K, L, M, N, P, Q, R, and S96).

To allow for regional comparisons, the KfW SME Panel is matched with a data set that provides information about the federal state in which the SME is located. To keep the number of observations in each cell sufficiently large and minimise the effect of outliers, the federal states are aggregated into four larger regions.

### 2.2.2.1 Investment

As emphasised in the introductory chapters, investments are key to building up and sustaining the capital stock of an economy. The regular renewal of machinery and equipment, buildings and infrastructure, as well as the expansion of human capital and technological knowledge, is necessary to maintain and expand the production capacity of a country. This is particularly true for Germany, which is scarce in natural resources and thus depends more than other economies on its stock of physical and human capital. If firms invest too little, their productivity will gradually decline and they will inevitably lose international competitiveness, with negative consequences for economic growth and welfare of the country.

A first look at the share of SMEs which invested in 2013 shows that firms in the service and in the manufacturing sector are much more active than firms in the construction or wholesale and retail sector (Figure G.4). Across all firm size classes, about 42.6% of SMEs in the service sector and 41.1% of SMEs in the manufacturing sector invested. The lowest share of investors can be found among wholesale and retail firms. In 2013, it was 35.7% on average. However, investment activities vary not only across sectors but also between firm size classes. The highest share of investors can be found among large SMEs with more than 50 employees. In the manufacturing and construction sector, nearly 90% of large firms invested in 2013. SMEs with less than 10 employees are generally less willing or able to invest and do therefore exhibit lower investment diffusion.

A striking fact is the comparably high share of investors among service firms with less than 50 employees. This result is neither driven by particular subsectors, nor by particular regions. The gap between small and medium-sized enterprises has always been much smaller than

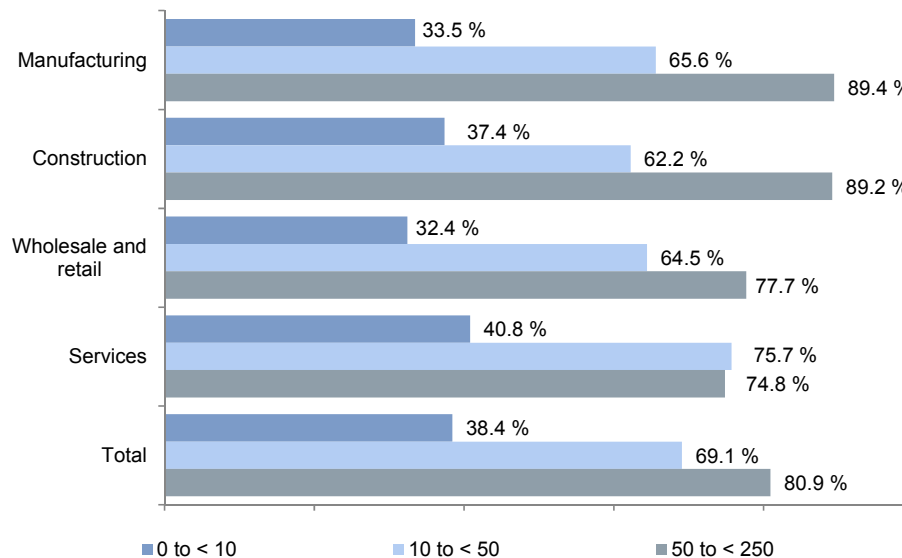
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<sup>36</sup> For more detailed information, see Schwartz (2014b).



the gap between micro and small enterprises and it has closed further recently, with small enterprises being much more dynamic than medium-sized ones.

**Figure G.4: Share of German SMEs investing**



Note: Share of German SMEs which invested in 2013, by sector and size class.

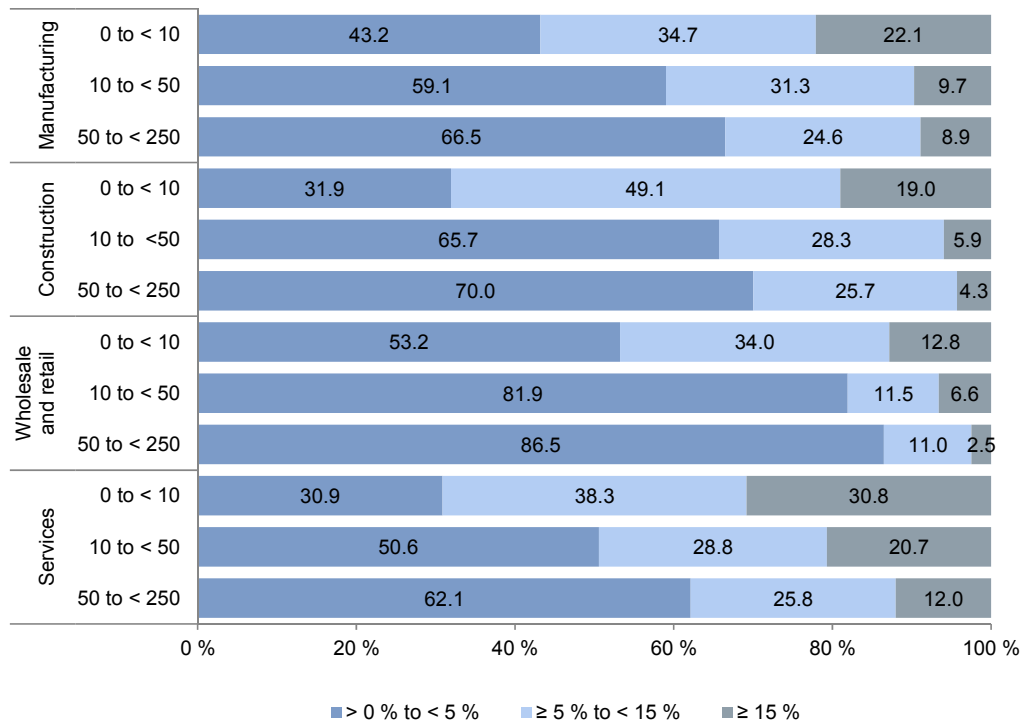
Source: KfW SME Panel.

### Investment intensity

An interesting pattern emerges when comparing investment intensities of SMEs across firm size classes (Figure G.5). Although micro enterprises are less likely to invest, those that do invest exhibit higher investment intensity than small or large SMEs that invest. Put differently, conditional on investing, investment expenditure as a share of total turnover decreases with firm size. This may be driven by the intermittent nature of the investment decision of SMEs, as pointed out already in the French country chapter, and the fixed cost character of many investment projects. In the service sector, for instance, 30.8 % of all micro enterprises which invested in 2013 exhibit an investment intensity of 15 % or more. About 20.7 % of the small firms which invested in 2013 show comparable investment intensity. Among large investors with more than 50 employees, only 12 % display investment intensities beyond 15 %. Comparing the service sector to other sectors reveals that the investment intensity is particularly high in this sector, in line with the findings on investment diffusion. Service firms do not only invest more often but also invest higher volumes relative to their turnover on average. In contrast, the investment intensity is rather low in the wholesale and retail sector, where only 12.8 % of the smallest investors spent 15 % or more of their turnover in 2013. However, this result is rather driven by the relatively high turnover of firms in the wholesale and retail sector than by low investments. In any case, regarding the relationship between firm size and

investment intensity, the same pattern emerges in the wholesale and retail sector as in all other sectors.

**Figure G.5: Investment intensity of German SMEs**

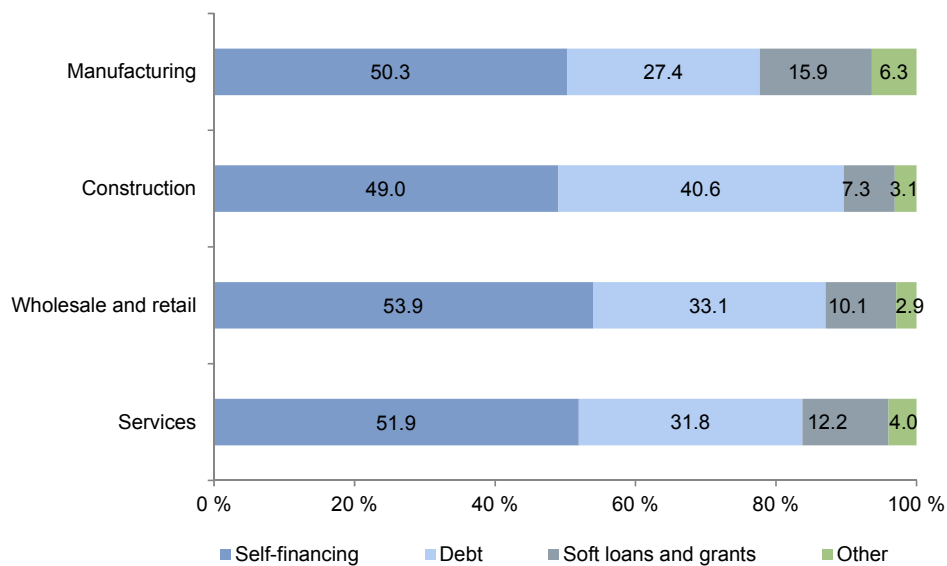


Note: Share of investing German SMEs with investment intensity (defined as investment expenditure over total turnover) of > 0%, < 5%, 5%, < 15% and ≥ 15% in 2013, by sector and size class.

Source: KfW SME Panel.

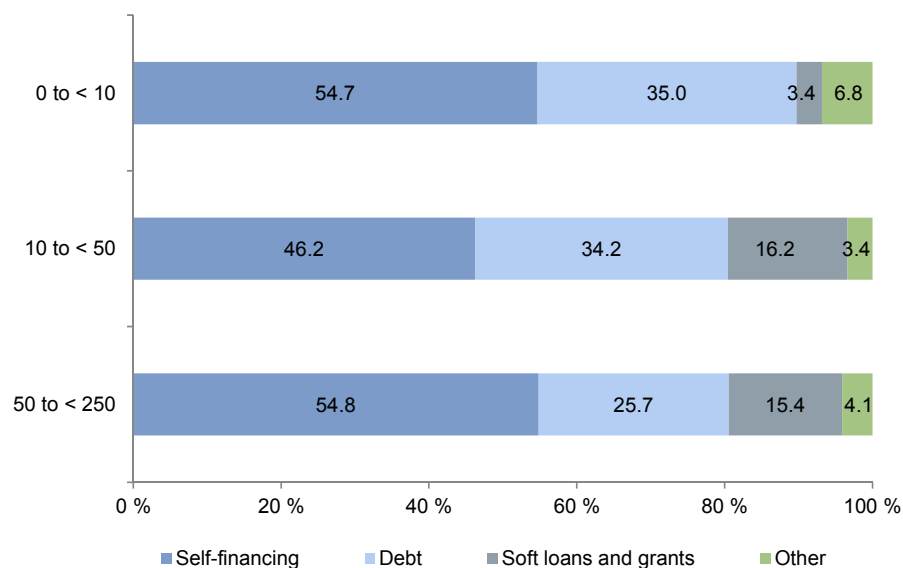
### Investment financing

On average, about half of the investment volume of SMEs is financed by own means and about one third by debt (Figure G.6). Only in the construction sector is the share of external funds considerably higher and amounts to 40%. Subsidised loans and grants make up for about 16% in the manufacturing sector and about 12% in the service sector. Alternative sources of finance, such as mezzanine or venture capital, play only a minor role. An interesting pattern also emerges from a comparison of the investment financing structure across different firm size classes (Figure G.7). While micro enterprises finance about 54.7% of their investment volume with own resources, small firms with less than 50 employees finance only 46.2% of their projects with internal funds. Surprisingly, self-financing is again more important for medium-sized enterprises with 50 to 249 employees, making up about 54.8% of their investments.

**Figure G.6: Sources of funds for investments of German SMEs by sector**

Note: Share in total funds used to finance investments in 2013, conditional on investing. Weighted average across all firms with less than 250 employees. Other sources include venture capital or mezzanine capital, for instance.

Source: KfW SME Panel.

**Figure G.7: Sources of funds for investments of German SMEs by size class**

Note: Share in total funds used to finance investments in 2013, conditional on investing. Weighted average across all sectors. Other sources include venture capital or mezzanine capital, for instance.

Source: KfW SME Panel.

The u-shaped relationship between firm size and the share of own resources in investment financing is stable over time<sup>37</sup> and consistent with findings in other countries, such as Italy (see page 70).<sup>38</sup>

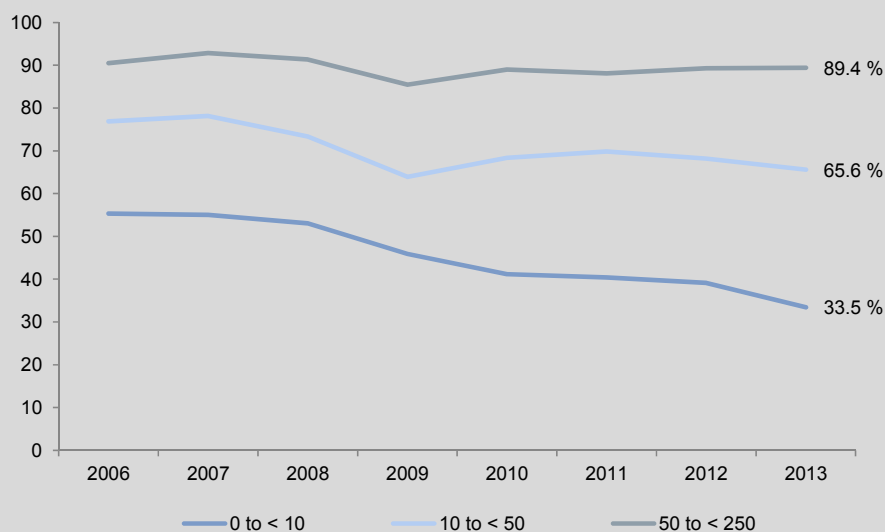
<sup>37</sup> See Schwartz (2014b).

### Do German companies invest too little?

Investments of German firms as a percentage of GDP reached an all-time low of 9.9% in 2013. A number of potential explanations for this development have been discussed recently and are feeding an ongoing debate on whether there is a structural investment gap that calls for economic policy measures.

In fact, this development seems to be driven mainly by large companies, rather than by SMEs. Net investments (i.e. investment in new machinery and equipment less of depreciation) of SMEs were positive and amount to roughly 350 billion Euros in total since 2004. Net investments of large companies, however, were negative in recent years and total up to EUR -100 billion since 2004 (Schwartz and Gerstenberger, 2014a). Nevertheless, the propensity to invest has fallen considerably among SMEs in recent years, particularly in the manufacturing sector (Figure G.8). Moreover, the investment gap between micro and medium-sized SMEs has widened.

**Figure G.8: Development of investment activities in the German manufacturing sector**



Note: Share of German SMEs in manufacturing sector which invested, by size class and year.

Source: KfW SME Panel.

The driving force behind these developments are first and foremost negative business expectations. About one half of SMEs which are optimistic about their future economic development invest, while among those SMEs with a negative or neutral outlook, it is only about one third. And the share of optimistic SMEs has declined considerably in recent years, from 51% in 2009 to 37% in 2012.<sup>39</sup>

SMEs' answers to the question why they abandoned, postponed or downscaled investments draw a similar picture. Falling sales price expectations and uncertainty about domestic demand development were among the most important reasons for revising investment plans (Figure G.9).

<sup>38</sup> An extensive theoretical literature discusses the determinants of the capital structure of firms. Empirical analyses on this topic usually conclude that there is a positive relationship between firm size and leverage but mostly focus on large stock companies. Robust evidence on the capital structure of SMEs is still relatively scarce. For a comprehensive summary, see Jöeveer (2013) or Degryse et al. (2012), for instance. To shed more light on the relationship between firm size and investment financing of SMEs, more research would be needed, which is however beyond the scope of this paper.

<sup>39</sup> See Schwartz and Gerstenberger (2014b).

**Figure G.9: Reasons for abandoning, postponing or downscaling investments**

Note: Responses to the reasons for abandonment, postponement or downscaling on a five-point scale ranging from 1 "Has played a major role" to 5 "Has not played any role". The combined data for the first two categories are presented.

Source: KfW SME Panel (additional survey September 2014).

In sum, while there might be a need for action to foster investments of large companies or public investments,<sup>40</sup> there is no fundamental investment weakness among German SMEs, although recent developments should be taken as a warning sign.

### 2.2.2.2 Innovation

Innovation and technological change are not only key drivers of sustainable growth at the aggregate level but also important determinants of economic success at the firm level. As shown in a recent study on the innovation activities of SMEs in Germany,<sup>41</sup> innovating SMEs grow significantly faster, both in terms of employment and turnover. All else equal, the growth rate of employment is about 2.6 percentage points larger for innovators than for non-innovators. With respect to turnover, the difference in growth rates between innovators and non-innovators even amounts to 3.9 percentage points. Innovating SMEs are also more profitable than non-innovating ones: their return-on-sales is about 0.5 percentage points higher.

#### Innovation diffusion

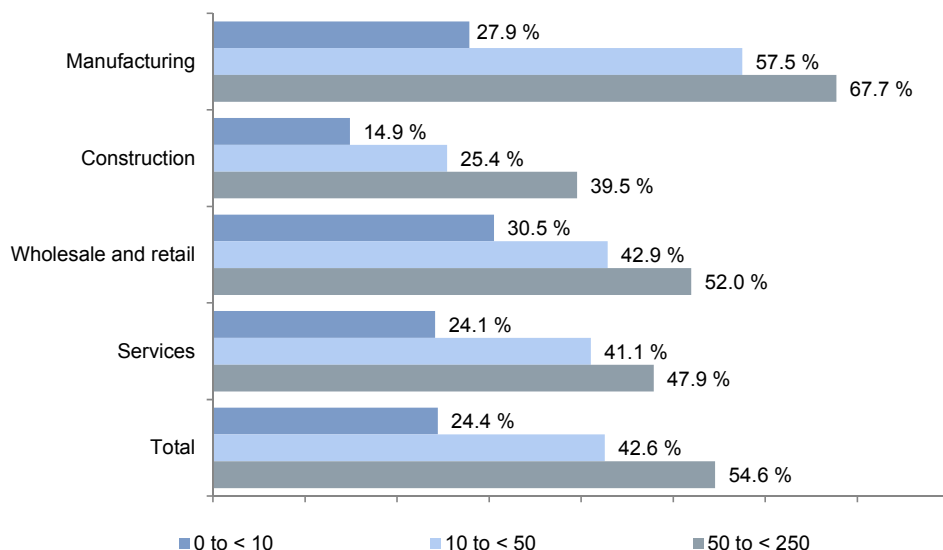
Figure G.10 illustrates the share of firms which innovated in 2011–2013. Overall, it can be noticed that innovation activities vary significantly across firm size classes and sectors. Firms

<sup>40</sup> See Deutsche Bank Research (2014).

<sup>41</sup> See Zimmermann (2015).

with less than 10 employees are considerably less likely to innovate than larger SMEs. The gap in innovation activities between large and small SMEs is particularly pronounced in the manufacturing sector. In this sector, for instance, only 28% of SMEs with less than 10 employees innovated in 2011–2013, while the share of innovators is more than twice as large among SMEs with 10 to 49 employees. Obviously, size is an advantage in the innovation process. Larger firms have broader market coverage and can thus generate higher sales volumes when they launch new products. It is thus easier for them to cover the often high fixed costs related to the development of market innovations. In addition, they can make use of economies of scope in the production of innovations. Working on several innovation projects at the same time does not only help to diversify risk, it also allows the use of positive spillovers between different innovation activities. Further, large firms can often make multiple use of new technologies, which makes research and development activities even more attractive for them. Another important reason for the positive relationship between firm size and innovation propensity lies in the financing of innovation projects. As they are inherently risky and often involve huge investments in intangible assets which cannot serve as collateral, getting external finance is rather difficult. The financing constraints are usually more severe for smaller firms and for riskier projects.<sup>42</sup>

**Figure G.10: Share of German SMEs innovating by sector and size class**



Note: Share of German SMEs which innovated in 2011–2013, by sector and size class.

Source: KfW SME Panel.

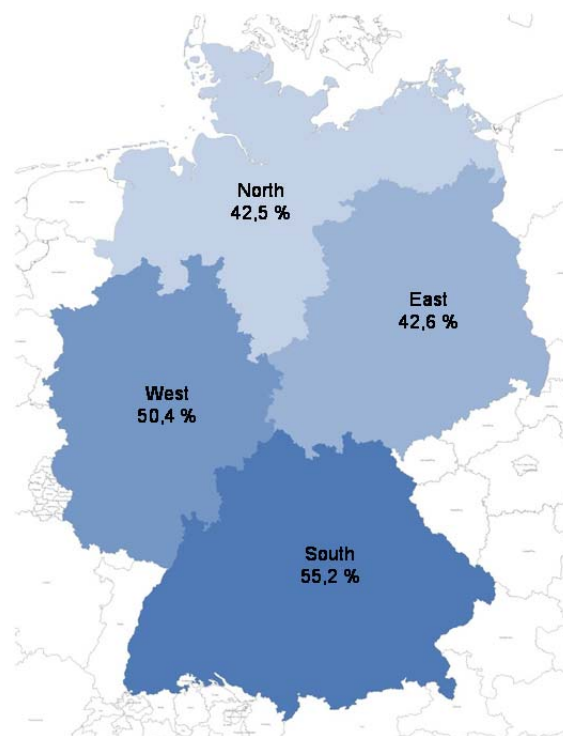
Unsurprisingly, marked differences in the propensity to innovate also exist between sectors. Firms in the manufacturing industry are generally more likely to innovate than firms in other

<sup>42</sup> See also Zimmermann (2014).

sectors, while SMEs in the construction sector show particularly low innovation activities. This depends, among other things, on the nature of the production process, the dynamics of the relevant market, the institutional environment and the degree of competition in a given sector.

Besides heterogeneity across firm size classes and sectors, there is also significant variation of firm behaviour across regions, even within the same country (Figure G.11). With 42.5%, the share of firms with 10 to 250 employees which have implemented innovations in 2011–2013 is lowest in the North.<sup>43</sup> In the South of Germany, on the contrary, more than 55% of all small and medium-sized enterprises innovated in 2011–2013. Similar findings were obtained for expenditure on R&D, which is also concentrated in the South of Germany.

**Figure G.11: Share of German SMEs innovating by region**



Note: Share of SMEs with 10 to 249 employees from the manufacturing, construction, wholesale and retail and service sector which have introduced a product and/or process innovation in 2011–2013.

Source: KfW SME Panel.

Figures for 2011 indicate that about 52% of all internal R&D expenditure was made in Baden-Württemberg and Bayern, which account for less than 30% of the German population.<sup>44</sup> In addition to the divide between North and South, considerable differences also persist

<sup>43</sup> The German regions as defined in this section comprise the following federal states: North: Schleswig-Holstein, Hamburg, Lower Saxony, Bremen, and Mecklenburg-Vorpommern; West: North Rhine-Westphalia, Hesse, Rhineland-Palatinate, and Saarland; East: Berlin, Brandenburg, Saxony-Anhalt, Saxony, and Thuringia; South: Baden-Württemberg and Bavaria.

<sup>44</sup> See Kladroba (2013).

between the East and the West of Germany. While the share of innovators in the Eastern federal states is equally low as in the Northern ones, it is much higher in the Western part of Germany, where it amounts to more than 50 %.

The regional concentration of innovative activities is driven by a number of different factors.<sup>45</sup> First, the population density plays an important role. Firms located in urban agglomeration are usually more innovative than firms located in rural areas. Accordingly, there are considerable differences even within the four German regions, with lots of innovating firms being located around Stuttgart, Munich, or Darmstadt, for instance. Further, the size and the structure of the regional economy are important determinants. A strong manufacturing sector, as well as a high density of business service providers in a region are also driving the innovative behaviour of the SMEs located there. A large local pool of qualified employees is also beneficial, as is a well-developed infrastructure including research facilities and institutions of higher education. Generally, a strong technology orientation of the region and a positive attitude towards new things of its population, as well as an effective system of public financial support, are conducive to innovative behaviour of its SMEs.<sup>46</sup>

Looking at past data reveals a gradual decline in innovation activities (Figure G.12). While nearly 35 % of all micro enterprises introduced product or process innovations in the period from 2006–2008, before the onset of the financial crisis, this figure fell to 24 % in 2011–2013. Similar developments are visible for small and medium-sized enterprises as well, although here the decline is somewhat less pronounced in relative terms. In addition, the downward trend seems to be more stable for the largest firms in the sample. A potential explanation may be that large firms have perpetuated their innovation processes, whereas smaller firms seize market opportunities whenever they arise and hence react stronger to business cycles.

The reasons for the downward trend in innovation activities of SMEs, which is also observed by other German institutions, are currently under research and not yet entirely clear.<sup>47</sup> However, lower sales expectations also seem to be a driving force in the case of innovations. The economic outlook for Germany, but also for other European countries which are key export destinations especially for larger SMEs, is rather modest. This induces firms to curb and postpone their innovation activities and wait for a more favourable market environment. This business cycle effect is usually more pronounced for product innovations, especially imitative ones, and less prevalent for process innovations.<sup>48</sup>

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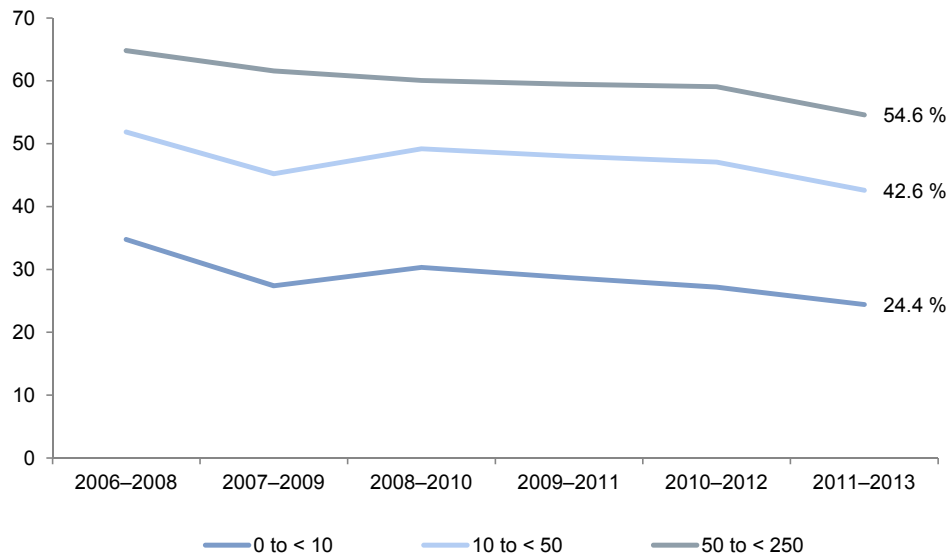
<sup>45</sup> An overview of the respective literature is given by Sternberg and Arndt (2001), for instance.

<sup>46</sup> European Commission (2014b).

<sup>47</sup> See Bundesministerium für Wirtschaft und Energie (2015).

<sup>48</sup> See Poschen and Zimmermann (2014).



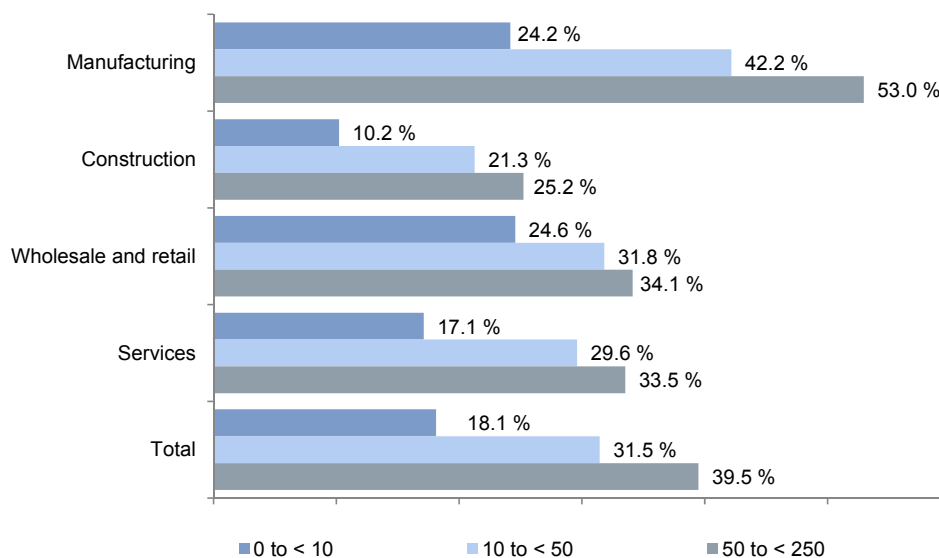
**Figure G.12: Development of innovation activities of German SMEs**

Note: Share of German SMEs with innovation activities in all sectors, by size class.

Source: KfW SME Panel.

### Product innovation

A product innovation is a new product or service, or one whose key features have been significantly improved. If the innovation is new to the company, it is an imitative product innovation. If it is also new to the market, it is an original product innovation. Product innovations are especially relevant in the manufacturing sector, as shown in Figure G.13.

**Figure G.13: Share of German SMEs with product innovation by sector and size class**

Note: Share of German SMEs with product innovation in 2011–2013, by sector and size class.

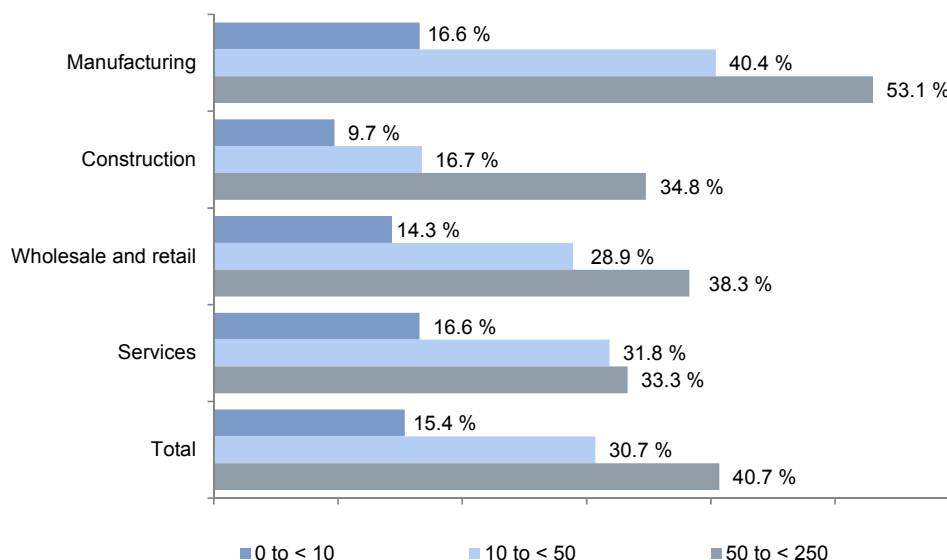
Source: KfW SME Panel.

More than half of all firms with 50 to 249 employees introduced a product innovation in 2011–2013. About 27 % of these product innovations may be considered as market innovations. In the construction, the wholesale and retail and the service sector, by contrast, only a quarter or a third of the largest firms introduced imitative or original product innovations in 2011–2013. As with innovation activities in general, product innovation activities are mainly conducted by SME with more than 10 employees.

### Process innovation

A process innovation is a new or significantly improved process for the production of a product or service. Again, the innovation must be new to the company but not necessarily new to the market. Concerning process innovation activities, similar patterns can be found as those for product innovations. Clearly distinctive process innovation behaviours emerge for different sectors and firms size classes, where firms in the manufacturing sector and SMEs with more than 10 employees introduced significantly more process innovations than firms in other sectors or size classes (Figure G.14).

**Figure G.14: Share of German SMEs with process innovation by sector and size class**



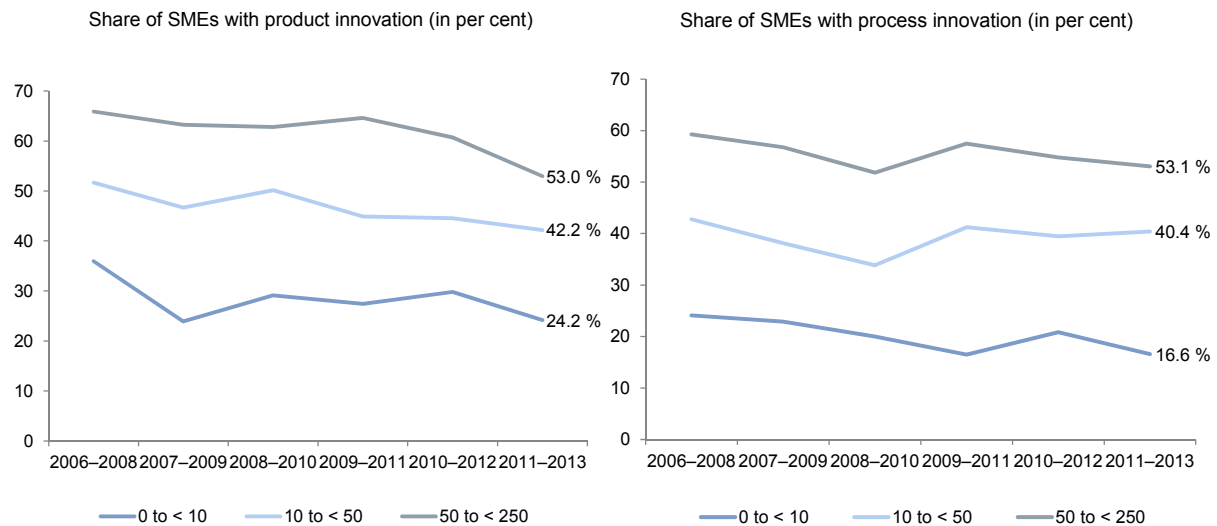
Note: Share of German SMEs with process innovation in 2011–2013, by sector and size class.

Source: KfW SME Panel.

Zooming into the manufacturing sector and comparing the development of product and process innovation activities over time (Figure G.15) confirms the general trend. The share of innovators has fallen since the onset of the financial crisis, regardless of whether we look at product or process innovators. Moreover, innovations by small firms, in particular product innovations, show more variation over time, reflecting their high dependence on favourable business conditions. The share of process innovators, on the contrary, is less volatile. In fact, the introduction of product innovations often requires the introduction of new processes as

well, which makes them subject to economic fluctuations. More importantly, however, the need to modernise processes to reduce production costs is particularly large in an economic downturn, which has a stabilising effect on the share of process innovators.<sup>49</sup>

**Figure G.15: Development of product and process innovation in the German manufacturing sector**

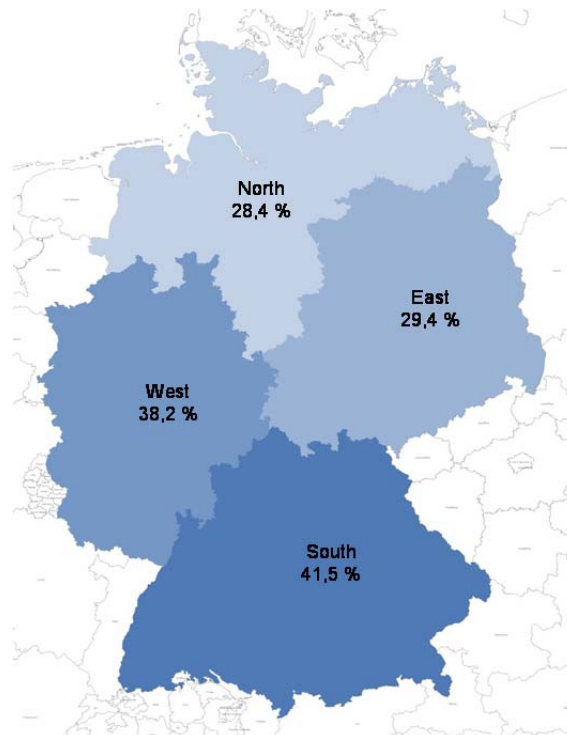


Note: Share of German SMEs in manufacturing with product/process innovation in manufacturing sector, by size class.

Source: KfW SME Panel.

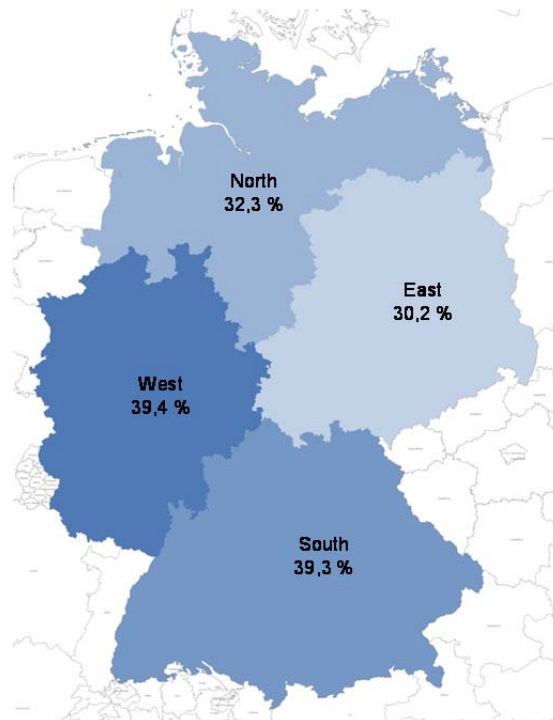
The regional distribution of product and process innovation fits well with the overall picture on innovative activities in four larger German regions that was discussed earlier (Figures G.16 and G.17). While the North and the East display shares of innovating SMEs below the national average, the West and the South appear to be relatively strong in this regard. Interestingly, there is more regional variation in the share of product innovators than in the share of process innovators. Thus, product innovations are not only more responsive to business cycles, they are also more responsive to location factors than process innovations.

<sup>49</sup> See Poschen and Zimmermann (2014).

**Figure G.16: Share of German SMEs with product innovation by region**

Note: Share of SMEs with 10 to 249 employees from the manufacturing, construction, wholesale and retail, and service sector which introduced a product innovation in 2011–2013.

Source: KfW SME Panel.

**Figure G.17: Share of German SMEs with process innovation by region**

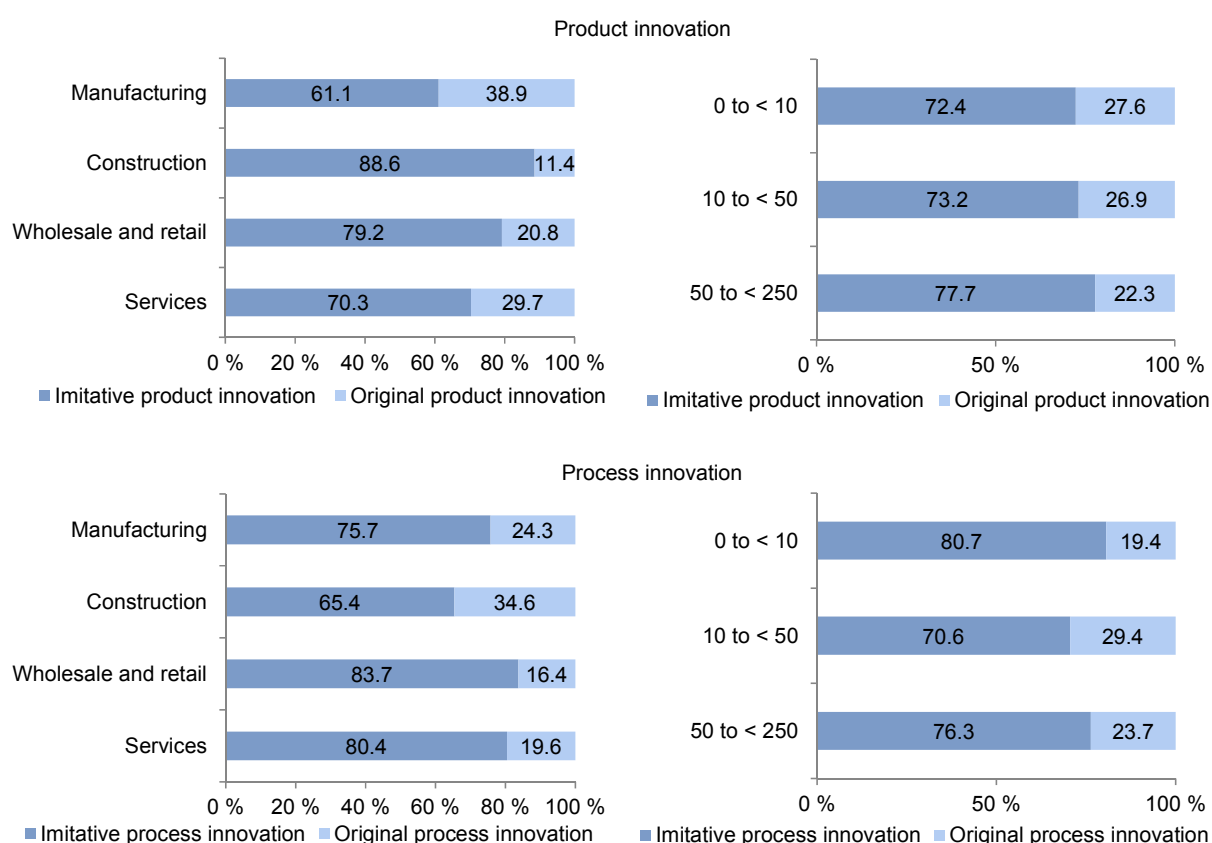
Note: Share of SMEs with 10 to 249 employees from the manufacturing, construction, wholesale and retail and service sector which introduced a process innovation in 2011–2013.

Source: KfW SME Panel.

### Original versus imitative innovation

Regarding the share of original as opposed to imitative innovations, there is more variation across different sectors than across firm size classes (Figure G.18). Unsurprisingly, the share of innovators which introduced a product or service that was not only new to the firm, but also new to the market, is highest in the manufacturing sector. In 2013, about 39% of the innovating manufacturers introduced an original product innovation. The remaining 61% simply imitated a product that had already been introduced to the market by another company. The share of original product innovations is lower in the service sector and lowest in the construction sector. The construction sector, by contrast, stands out by a very high share of original process innovators. In this sector, they make up more than one third of all innovators. SMEs in the wholesale and retail sector are the least original ones when it comes to process innovations. The majority of process innovations in this sector, more than 83%, were imitative.

**Figure G.18: Original versus imitative product and process innovation**



Note: Share of product/process innovators which introduced an imitative or original product (process) innovation.

Source: KfW SME Panel.

Comparing the share of product or process innovations which are new to the market across firm size classes shows that it is not necessarily the largest SMEs which are the most original ones. Although larger SMEs are more likely to innovate, more than three quarters of their

product or process innovations are imitative. A share of product innovators of 39.5%, and a share of original product innovations of 22.3% imply that 8.8% of all firms with 50 to 249 employees introduced an original product innovation in 2011–2013. With 8.4%, the share of original product innovators is similarly high among firms with 10 to 49 employees.

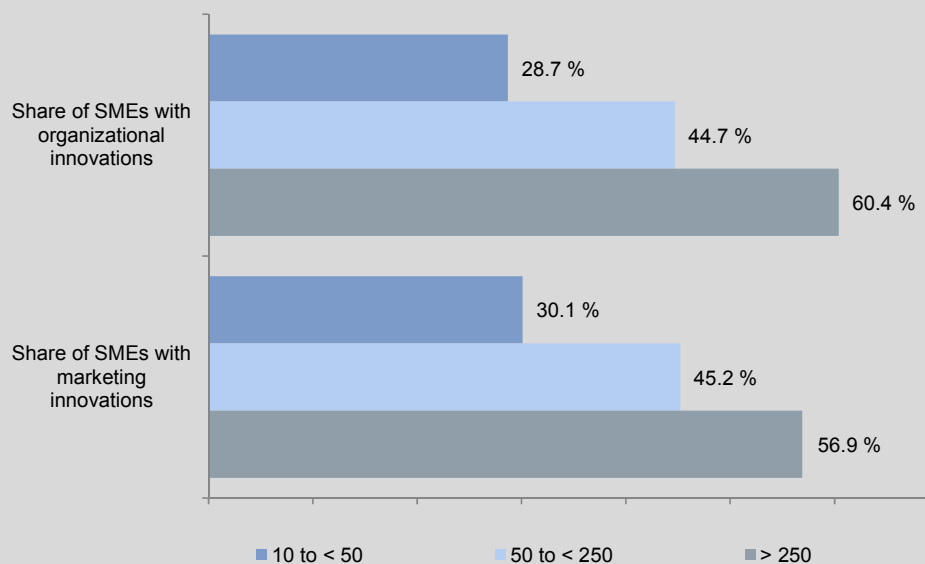
What is striking, however, is that although the share of product and process innovators among German SMEs is higher than in Spain, Italy or France, original innovators are relatively less prevalent. For instance, while original product innovators make up for 60% and more of product innovators in the Italian or French manufacturing sector, they represent a mere 39% of product innovators in the German manufacturing sector. Thus it seems that the innovative activities among German SMES are more than in other European countries driven by products and processes which are new to the firm but not necessarily new to the market.

### Organisational and marketing innovation of German firms

Two other important types of innovation, besides product and process innovations, are organisational and marketing innovations, commonly summarised as non-technological innovations.

The KfW SME Panel does not collect information on the other two types of innovation activities. However, data from the Community Innovation Survey (CIS) reveals that about 29% of all manufacturing firms with 10 to 49 employees introduced organisational innovations from 2010–2012. In line with the pattern for other types of innovation, the share of organisational innovators is higher among larger firms. For firms with 50 to 249 employees, it amounts to 45%. For firms with more than 250 employees, it even amounts to 60%. The share of firms that introduced marketing innovations in 2010–2012 is also increasing in firm size and similarly high (Figure G.19).

**Figure G.19: Share of German firms with organisational and marketing innovation**



Note: Share of German firms in manufacturing with organisational/marketing innovations in 2010–2012, by size class.

Source: CIS 2012.

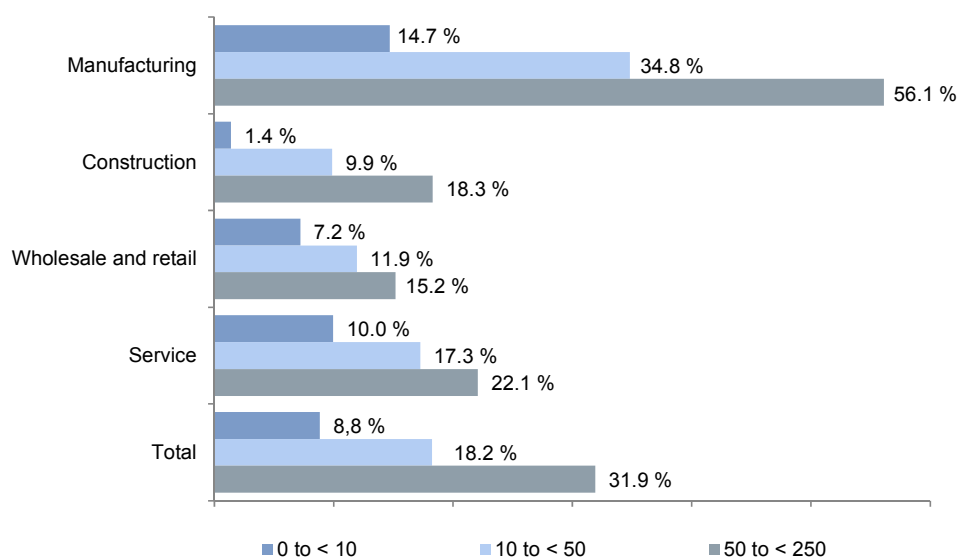
### 2.2.2.3 Research and Development

In SMEs, ideas for innovations often emerge from the production process or from close interaction with customers or suppliers. Only few firms engage in research and development activities to create new knowledge or design new products. The reason is that research and development activities are generally very resource intensive and carry great risks regarding their future returns.<sup>50</sup>

#### R&D diffusion

This fact is confirmed in Figure G.20, which depicts the share of SMEs carrying out R&D by sector and firm size. The sector in which own R&D activities are most prevalent is the manufacturing sector. Nevertheless, only 56 % of the largest SMEs in the manufacturing sector carried out research and development on an occasional or continuous basis during the period 2011–2013. Among the smallest firms with less than 10 employees, only 15 % engaged in R&D activities – compared to 28 % which innovated in 2011–2013.

**Figure G.20: Share of German SMEs carrying out R&D**



Note: Share of German SMEs with R&D activities in 2011–2013, by sector and size class.

Source: KfW SME Panel.

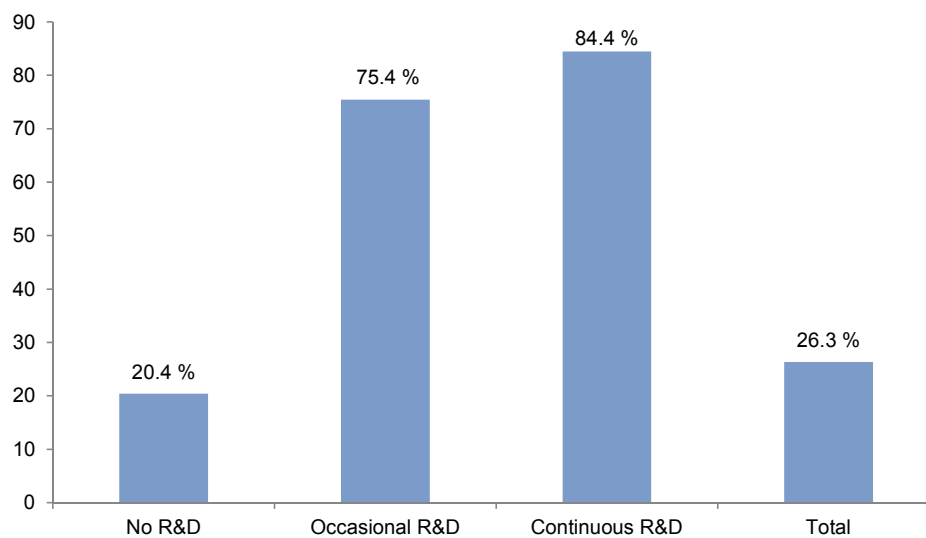
The huge gap between large and small firms is also visible in other sectors. Firms in the construction as well as in the wholesale and retail sector are much less likely to carry out R&D. Averaging across all sectors and firm size classes, the share of SMEs which engaged continuously in R&D in 2011–2013 amounts to nearly 4 %. Another 6 % have at least occasionally engaged in R&D during this period. Thus, with about 10 %, the share of SMEs which

<sup>50</sup> See Zimmermann (2015).

engaged at least to a limited extent in R&D is much lower than the share of firms which innovated in 2011–2013, which is about 26 %, including all sectors and firm size classes. Nevertheless, it follows a similar trend: in 2006–2008, more than 14 % of all SMEs conducted their own R&D activities.

Although there are different ways for SMEs to generate ideas for new products and better processes, being a successful innovator is much more likely for SMEs which engage in R&D (Figure G.21). Across all sectors and firm size classes, about 85 % of the SMEs with continuous R&D activity successfully introduced a product or process innovation in 2011–2013. The share of innovators is a bit lower for firms with occasional R&D activity, for which it amounts to 75 %. However, among those firms that did not engage in R&D at all, which represent about 90 % of all SMEs, only one fifth came up with new ideas and successfully implemented them.

**Figure G.21: R&D activity and successful innovation in German SMEs**



Note: Share of German SMEs which have introduced a product or process innovation depending on whether they carried out own R&D in 2011–2013, across all sectors and size classes.

Source: KfW SME Panel.

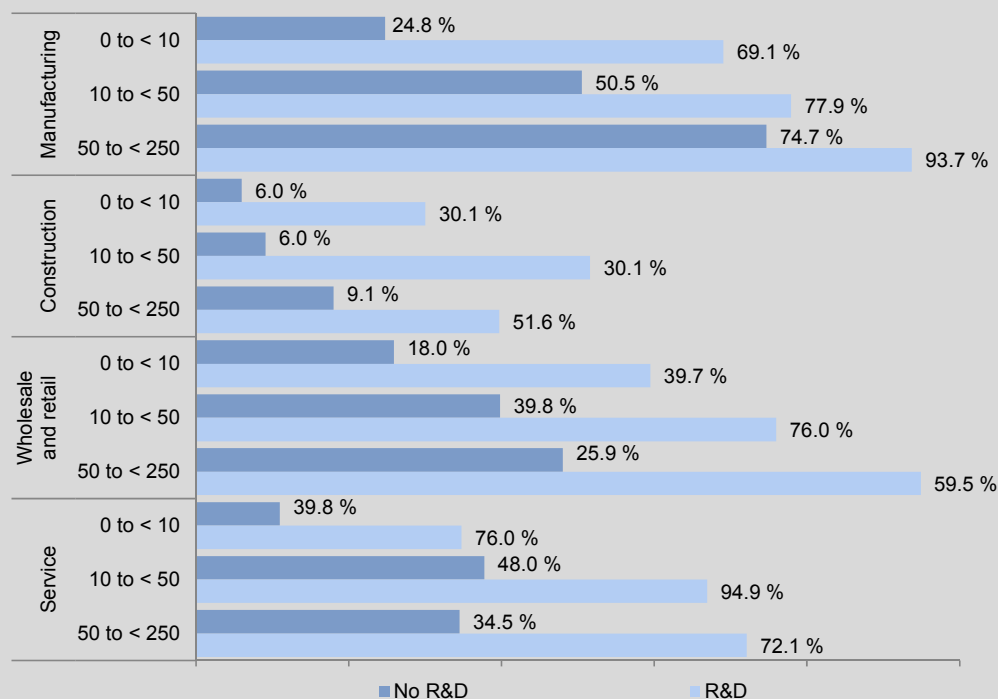


## Exporting and R&D

As revealed by Figure G.22, there is also a positive correlation between R&D activities and exporting. The share of exporters is substantially higher among those firms that engaged in R&D activities in 2011–2013 than among those that did not engage in R&D. This pattern holds for all sectors and for all firm size classes. It can also be seen in Italy, for instance (see pages 79 to 82). The question is, however, whether there is also a causal relationship between R&D or innovation activities more generally and a firms' export decisions. The theoretical literature on heterogeneous firms in international trade has developed models in which firms can choose their productivity endogenously by engaging in innovation activities and adopting new technologies. When entering foreign markets is associated with fixed costs, only the most productive and hence the innovating firm will start exporting.<sup>51</sup>

The empirical results on the causal relationship between innovation and exporting are rather mixed, however, and seem to depend heavily on the measure of innovation that is used.<sup>52</sup> While most studies fail to find a significant link between R&D and the probability to export,<sup>53</sup> the evidence is stronger for product and process innovations. In particular product innovations seem to drive a firms' exporting decision.<sup>54</sup> This relationship seems to be driven by an anticipation effect. Firms which plan to export expect their market size as well as competitive pressure to increase, which makes cost reductions or quality upgrades more valuable.<sup>55</sup>

**Figure G.22: Exporting and R&D of German SMEs**



Note: Share of German SMEs which exported in 2013, by size class, sector and R&D activity in 2011–2013.

Source: KfW SME Panel.

<sup>51</sup> See, for example, Bustos (2011) or Yeaple (2005).

<sup>52</sup> See Van Beveren and Vandebussche (2010) for a summary of the relevant literature.

<sup>53</sup> See, for example Aw et al. (2007) or Cassiman and Martinez-Ros (2007).

<sup>54</sup> See, for example, Caldera (2010) or Becker and Egger (2007).

<sup>55</sup> See Van Beveren and Vandebussche (2010) and Iacovone and Smarzynska-Javorcik (2008).



## 2.3 Italy

Gino del Bufalo (CDP)

Italian industrial structure is exceptionally dominated by micro enterprises as well as small and medium-sized enterprises. Excluding self-employment, micro enterprises (1 to 9 employees) accounted for 89%, small (10 to 49) and medium-sized (50 to 249) enterprises for 9.4 and 1.4%, respectively, of total Italian corporates within the industry and production services sectors in 2013.

Data show how deep the economic and financial crisis from 2008 to 2013 impacted on the Italian industrial system, with a sharp fall of about 41% in the number of firms over the same period, or in other words 637,729 less firms in 5 years (-127,546 firms per year, -10,628 firms per month, -354 firms per day). Notwithstanding the prolonged downturn, SMEs proved to be extremely resilient above all with regards to export performance.

In terms of employment, SMEs accounted for 77.5% of the total reference workforce in 2013, a much higher proportion compared to 2008 (72.4%). This clearly means that the dramatic 2,188,674 drop in the number of employees from 2008 to 2013 is disproportionately attributable to large firms. In fact, while large firms represent only 0.2% of total firms in 2008 as well as in 2013, they account for more than 42% of the total drop in the number of employees. These data highlight the prominent role of SMEs for the Italian economy.

Moreover, the link between firms' ability to carry out dynamic activities (in terms of innovation, R&D or internationalisation processes) and their size hinges on theoretical arguments which overlook recent developments in the Italian industrial system. Thus, the aim of this chapter is to challenge such a perspective by looking in depth at the performance of Italian SME's during the 2008–2013 crisis period.

The analysis, conducted on the basis of an updated and detailed database referring to the Italian industrial and production services sectors (MET database), shows how SMEs represent the backbone of the Italian industrial system, not only in terms of industrial structure but also in terms of dynamic response to the economic downturn.

(1) Firstly, large firms proved to be less dynamic throughout the crisis in many regards. Although they initially had higher levels of investment and innovation, they have recovered more slowly than SMEs in many aspects. Observing the evolution of innovation activities for different size classes over time, it is remarkable that the share of innovating SMEs has increased over the 2009–2013 period, while the share of innovating large firms increased only from 2009 to 2011 but decreased afterwards. Thus, small and medium-

sized enterprises can be regarded as the most dynamic group in terms of innovation within the Italian industrial system.

- (2) Secondly, although trends have reversed since the onset of the financial crisis, innovation activities still lag behind their pre-crisis levels for most groups of firms. Part of this slow recovery might have to do with negative expectations which induce firms to postpone or abandon investments in the development or market introduction of new products. A further element hampering investments are financial conditions. As a matter of fact, Italian firms have to rely mainly on their own resources to finance investments and innovation – as bank credits are currently on short supply and other financial intermediaries are hardly present in Italy.
- (3) Thirdly, the analysis shows the direct relationship between firms' innovation activities (in particular R&D) and internationalisation. The positive correlation intensified during the financial crisis as depressed domestic demand forced firms to look for new sources of revenues abroad. Fierce competition on international markets requires very high levels of differentiation which can be acquired through R&D and innovation.
- (4) Finally, more active policy actions are not only desirable but urgently needed in order to strengthen SMEs' competitive position, as well as to enhance their long-term sustainability. An appropriate mix of policies and innovative financial instruments would be able to structurally support SMEs' financial resilience and therefore boost their investments' propensity in R&D and innovation. To this extent, effective incentives and guarantee schemes, both publicly funded and mutual, can be tailored to promote SMEs recapitalisation and access to long-term financing facilities.

### **2.3.1 The relevance of SMEs for the Italian economy**

Italian industrial structure is usually depicted as populated by an exceptionally high proportion of micro and small enterprises if compared with other industrialised countries, referring to this peculiar feature as the main cause for its low degree of innovation. Indeed, the most recent data (2012) of the Italian National Institute of Statistics (ISTAT) clearly show that micro enterprises (< 10 employees), including self-employment, account for more than 95% of the Italian firm population (4.44 million), while small (10 to 49 employees) and medium sized (50 to 249 employees) firms amount to 4.2 and 0.5%, respectively (Figure I.1). Therefore, while SMEs are often regarded as the backbone of the Italian economy, they are also repeatedly considered to be its Achilles' heel, curbing innovation processes and competitiveness.

Nevertheless, the peculiarity of the Italian industrial system has not always hampered innovation. Until the 1970's, the industrial system in Italy, like in other industrialised economies, experienced the managerial capitalism era, characterised by large firms making investments

and introducing new technological and organisational innovations. In Italy, however, due to some specific issues, such as the small size of domestic capital and consumption markets, this industrialisation process was carried out through a massive public sector engagement.

**Figure I.1: The relevance of SMEs for the Italian economy**

	Micro enterprises (1 to 9)	Small enterprises (10 to 49)	Medium enterprises (50 to 249)	SMEs	Large enterprises (≥ 250)	Total
Italian firms population						
<b>Number of enterprises</b>	4,229,730	187,514	21,606	4,438,850	3,602	4,442,452
<i>Share</i>	95.2%	4.2%	0.5%	99.9%	0.1%	100.0%
<b>Number of employees</b>	7,803,370	3,341,020	2,088,952	13,233,342	3,488,868	16,722,210
<i>Share</i>	46.7%	20.0%	12.5%	79.1%	20.9%	100.0%
Italian firms' population excluding self-employment						
<b>Number of enterprises</b>	1,432,368	173,238	21,517	1,627,123	3,600	1,630,723
<i>Share</i>	87.8%	10.6%	1.3%	99.8%	0.2%	100.0%
<b>Number of employees</b>	3,721,119	3,146,850	2,082,889	8,950,858	3,488,224	12,439,082
<i>Share</i>	29.9%	25.3%	16.7%	72.0%	28.0%	100.0%
Industry and production services firms population (self-employment excluded)						
<b>Number of enterprises</b>	827,068	87,059	13,013	927,141	2,174	929,315
<i>Share</i>	89.0%	9.4%	1.4%	99.8%	0.2%	100.0%
<b>Number of employees</b>	1,913,994	1,613,076	1,368,013	4,895,084	1,418,134	6,313,218
<i>Share</i>	30.3%	25.6%	21.7%	77.5%	22.5%	100.0%

Note: Data on the 'Italian firm population' and on the 'Italian firm population excluding self-employment' come from the Italian National Institute of Statistics (ISTAT) database and refer to the NACE Rev. 2 sections A to S. Data on the 'Industry and production services firms excluding self-employment' come from the MET Survey 2013 and refer to the industrial and production-services sectors only (NACE Rev. 2 sections B to E, H, J and M) excluding self-employment cases.

Source: MET Survey 2013.

Progressively, the domestic and international changes in demands and markets as well as the decrease in investments led many Italian large firms to become obsolete with respect to international competitors. Meanwhile, the need for flexibility and customisation to overcome mass production and differentiate fostered the rise of SMEs. These were often organised in industrial districts, i.e. territorial areas characterised by a huge density of small enterprises highly specialised in a specific productive sector and/or process. Thanks to their success on international markets based on high quality products, which were often the result of non-codified innovation, these highly-specialised industrial districts substantially contributed to strengthening the Italian industrial structure.

In the 1990's, the lack of both investments and appropriate public policies supporting technological innovation put this industrial model under severe strain. Nonetheless, the final result was an uncoordinated management of structural changes rather than the whole decline of the Italian industry or the breaking up of its SMEs, which proved to be extremely resilient, especially with regard to their export performance.

Thus, the Italian industrial system should not be assessed according to its firm size distribution, which has proved to be contingent on ever-changing economic factors as in other industrialised economies, but rather according to those factors that might either foster or hamper its success. In particular, the analysis should focus on three specific items: investments (including R&D), innovation and internationalisation, all of them being interconnected indices of dynamism.

To this end, the following analyses will exploit data from the MET Survey which is specifically designed to study industrial and production services firms and their strategies. Differently from the majority of other Italian firms' databases, the MET dataset includes enterprises with less than 10 employees. However, since its main task is to study firms, not individuals, the MET data do not encompass self-employment cases. This implies that it represents only a subset of the 4.44 million enterprises. In particular, by excluding self-employment and by focusing only on the industry (NACE Rev. 2 B to E) and production services (NACE Rev. 2 H, J and M) sector, the Italian firm population shrinks to 929,315 units for 2013 (Figure I.1). In relative terms, this sub-population equals to 57% of total Italian firms (excluding self-employment) and refers to more than 50% of the Italian workforce.

**Figure I.2: Development of Italian firms in the industry and production services sector**

	Number of enterprises				Number of employees			
	2008		2013		2008		2013	
	Number	Share	Number	Share	Number	Share	Number	Share
Micro	1,443,266	92.1%	827,068	89.0%	2,746,213	32.3%	1,913,994	30.3%
Small	106,449	6.8%	87,059	9.4%	1,972,213	23.2%	1,613,076	25.6%
Medium	14,793	0.9%	13,013	1.4%	1,438,949	16.9%	1,368,013	21.7%
<b>SMEs</b>	<b>1,564,508</b>	<b>99.8%</b>	<b>927,141</b>	<b>99.8%</b>	<b>6,157,375</b>	<b>72.4%</b>	<b>4,895,084</b>	<b>77.5%</b>
Large	2,536	0.2%	2,174	0.2%	2,344,517	27.6%	1,418,134	22.5%
Total	1,567,044	100.0%	929,315	100.0%	8,501,892	100.0%	6,313,218	100.0%

Source: MET Survey 2008 and 2013.

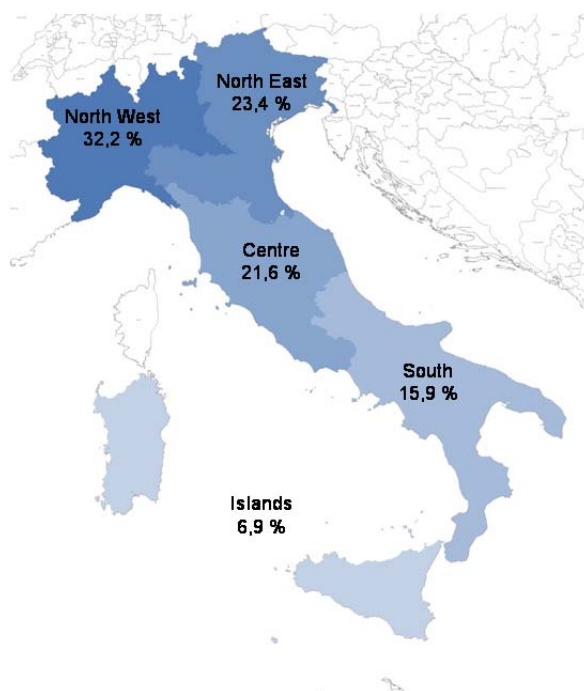
Regarding the number of firms within the industry and the production services sectors, SMEs encompassed almost the entirety (99.8%) of the reference firms, both in 2008 and 2013 (Figure I.2). A further look, however, reveals how deep the economic and financial crisis from

2008 to 2013 impacted on the Italian industrial system, with a sharp fall of about 41 % in the number of firms over the same period, or in other words 637,729 less firms in 5 years (-127,546 firms per year, -10,628 firms per month, -354 firms per day).

In 2013, SMEs were more or less evenly distributed between the two sectors, with production services accounting for 51.8 % and industry for 48.2 % of the total. Furthermore, the overwhelming majority of SMEs falls within the class of micro enterprises (1 to 9 employees), even though the final shares change according to the sector under consideration. For instance, in industry, micro enterprises represent around 82 % of the total, while in production services, micro firms make up for about 95 % of the total.

In terms of employment, SMEs accounted for 77.5 % of the total reference workforce in 2013, a much higher proportion if compared with 2008 (72.4 %). This clearly means that the dramatic 2,188,674 drop in the number of employees from 2008 to 2013 is disproportionately attributable to large firms. In fact, while large firms represented only 0.2 % of total firms in 2008 as well as in 2013, they accounted for more than 42 % of the total drop in the number of employees. This highlights the prominent role of SMEs for the Italian economy.

**Figure I.3: Regional distribution of Italian SMEs**



Note: Data show SMEs' distribution across five Italian macro regions (North West, North East, Centre, South, Islands).

Source: MET Survey 2013.

Looking at the regional distribution, Italy can be divided into five macro regions: North West (Valle d'Aosta, Piemonte, Lombardia, Liguria), North East (Trentino Alto Adige, Friuli Venezia Giulia, Veneto, Emilia Romagna), Centre (Toscana, Umbria, Marche, Lazio), South (Molise,

Abruzzo, Campania, Puglia, Basilicata, Calabria) and the Islands (Sicilia, Sardegna). The highest concentration of SMEs is in the North of Italy (55.6%), especially in the North West (Figure I.3). Only 22.8% of Italian SMEs can be found in the South (including Southern regions as well as Sicilia and Sardegna). There are historical reasons for this phenomenon, partly related to the tradition of satellite activities surrounding large firms.

This becomes clearer when splitting the firm population into industry and production services. In industry, the share of SMEs established in the North of Italy is about 53.9%, while in production services this share rises to 57.2%, thus demonstrating that the traditional satellite activities of providing services to large enterprises have deeply influenced those territories.

By looking at the regional distribution of SMEs in terms of employment, the difference between the North and South of Italy is even stronger: the former reaches over 60% of total Italian SME employment, while the latter barely achieves 17.3%.

Accordingly, the average SME in the South has about 4 employees while in the North it has about 6 employees. In the industry sector, this gap is even larger (2 vs 9 employees). These differences are partly driven by the type of industrial firm established in the North-East, especially in Emilia Romagna. Here, a high-tech industry made-up of small and medium-sized enterprises exporting all over the world has developed.

The Centre takes an intermediate position. On the one hand, the share of SMEs located in this region is not too far from the share of SMEs in the North East (21.6 vs 23.4%). On the other hand, the share of the workforce employed by SMEs is much closer to the one in the South (19 vs 17.3%). This means that Toscana, Umbria, Marche and Lazio host lots of SMEs whose average size is very small. This uneven distribution is partly related to the type of manufacturing settled within these areas, basically typical handcraft bound to historical traditions.

### **2.3.2 The investment and innovation behaviour of SMEs in Italy**

Having appropriately delimited the actual reference population of firms, and having recognised the tremendous relevance of SMEs for the Italian economic and industrial system, also by hinting at the regional differences in their distribution, it is critical to attempt a comprehensive analysis of SME investments behaviour with a closer look at their innovation and R&D policies.

Indeed, investments are strictly related to firms' innovative capacity and therefore to their potential growth opportunities. In addition, suitable investments not only contribute to



increasing a firm's own productivity but also widen the set of available knowledge and competencies ultimately needed for innovation.<sup>56</sup>

The analyses in the following sections are based on data from the MET Survey on Italian firms.

#### **The MET database**

The MET database is based on a survey conducted by the MET private research centre in four waves (2008, 2009, 2011 and 2013). The survey has been specifically designed to analyse the structure as well as the behaviour of all the Italian firms belonging to the industrial sector (NACE Rev. 2 sections B to E) and to the production services sector (NACE Rev. 2 sections H, J and M). The sample is rigorously selected and stratified according to three firms' characteristics: size, sector and regional distribution. Sample weights are then computed in order to guarantee representativeness of the results. Each wave comprises up to 25,000 respondents (via CATI and CAWI interviews), ranging from micro enterprises (1 to 9 employees) to large enterprises ( $\geq 250$  employees).

A significant portion of the survey questionnaire is devoted to gathering information regarding firms' dynamic attitudes, above all in terms of investment, innovation, R&D and internationalisation strategies. In particular, firms are asked whether in the reference period they have attempted to: (i) carry out investments, (ii) introduce any kind of innovation (product, process or organisational), (iii) undertake R&D and (iv) tap foreign markets.

#### **2.3.2.1 Investment**

Firms' investment behaviour was hardly affected throughout the 2008–2013 period. According to ISTAT data, corporates' gross investments in real terms dropped by EUR 82.2 billion (-23%) over the period, with the biggest drop in the industry sector (-EUR 20.7 billion).

Although the share of firms carrying out investments decreased by 3.75% from 34,7% in 2008 to 33.4% of total in 2013, the actual fall in absolute terms of investing firms was much sharper. The number of firms investing fell by 43% from 543,580 units in 2008 to 310,029 units in 2013.

These aggregate dynamics were the result of heterogeneous behaviour across different size classes. In fact, the share of investing enterprises appears to be proportional to the size class: large firms show the highest values while micro enterprises display the smallest ones. Nevertheless, the share of investing firms within the micro and small enterprise size classes should not be undervalued. In 2013, almost one micro enterprise in three and one small enterprise in two carried out investments (Figure I.4).

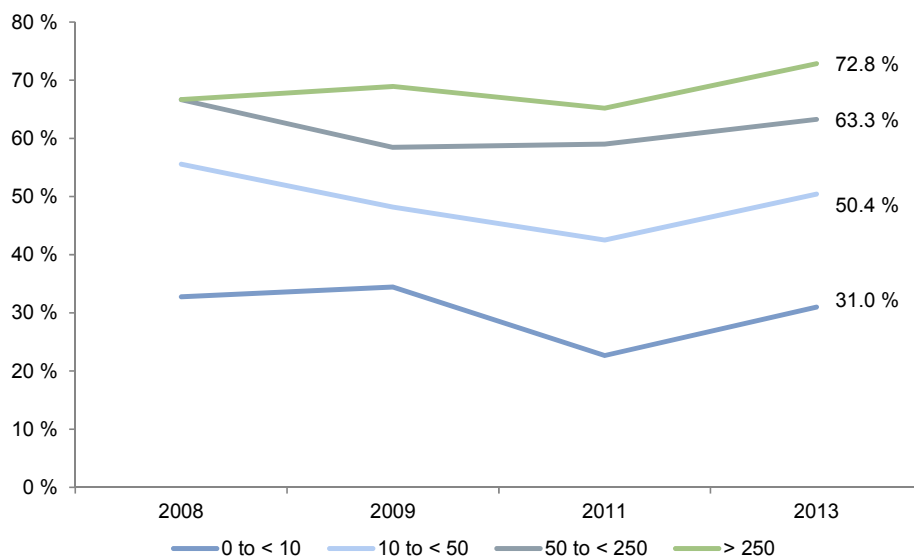
More interestingly, data show a sort of structural break between micro enterprises and the rest of the firm population. In fact, for micro enterprises the rebound was mainly driven by a decrease (-20%) in the absolute number of investing enterprises from 2011 to 2013, coupled with an even higher (-42%) fall in the size class population. By contrast, the general

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<sup>56</sup> See Audretsch et al. (2014) for a comprehensive review of the literature on the topic.

reduction of the population for all other size classes was always coupled with an increase in the absolute number of investing firms. This could probably imply that the size of 10 employees represents a critical threshold for investment resilience: only enterprises with more than 10 employees reacted pro-actively to the crisis by keeping on investing.

**Figure I.4: Development of investment activities of Italian firms**



Note: Share of Italian firms which invested, by size class and year.

Source: MET Survey.

### Types of investment

Figure I.5 below shows the investments carried out in 2013 by Italian firms, broken down by type and firm size. At first glance, the bulk of investments were made to upgrade firms' technological level.

Machinery, ICT technologies and human capital investments represent the most common investment decisions across firms and sectors, while investments in land and buildings were less relevant.

Clearly, the relative importance of specific types of investment is based on sectorial features. In particular, investment in machinery is obviously the prevailing type of investment within the industry sector since it represents the main source for embodied technological change,<sup>57</sup> while investment in ICT technologies, as well as employee education, lag behind. By contrast, in the production services sector, investments in ICT technologies appear to play a more important role as they are more frequent.

<sup>57</sup> Embodied technological change refers to improvements in the design or quality of new capital goods or intermediate inputs.

**Figure I.5: Types of investments of Italian firms**

	Micro enterprises (1 to 9)	Small enterprises (10 to 49)	Medium enterprises (50 to 249)	Large enterprises (≥ 250)
<b>Industry</b>				
Land and buildings	5.7 %	9.4 %	14.3 %	11.8 %
Machinery	82.4 %	84.9 %	85.8 %	87.9 %
ICT technologies	10.9 %	18.9 %	24.9 %	25.1 %
Patents	0.6 %	1.5 %	2.6 %	4.6 %
Employee education	2.5 %	10.0 %	10.8 %	23.1 %
Energy saving investments	2.9 %	9.7 %	7.4 %	17.1 %
Marketing and advertising	2.2 %	5.7 %	7.0 %	14.2 %
<b>Production services</b>				
Land and buildings	5.8 %	5.3 %	9.5 %	8.0 %
Machinery	54.3 %	63.1 %	62.4 %	66.3 %
ICT technologies	45.0 %	32.1 %	32.8 %	46.0 %
Patents	0.9 %	1.3 %	1.0 %	4.9 %
Employee education	3.1 %	10.6 %	13.1 %	21.6 %
Energy saving investments	0.9 %	3.3 %	3.8 %	7.1 %
Marketing and advertising	3.4 %	2.4 %	3.1 %	3.4 %

Note: Data show the shares of enterprises undertaking each specific type of investment broken down by size class. The types of investment are not mutually exclusive. For example: among medium-sized enterprises which invested in 2013 within the industry sector, 24.9 % invested in ICT technologies.

Source: MET Survey 2013.

Along with these sectoral differences, there are of course differences related to firm size as well. The share of large firms in the industry sector investing in machineries, for instance, is 87.9%. The share of investing SMEs in the industry sector which acquired new machinery ranges from 82.4 % for micro enterprises to 85.8 % for medium-sized enterprises.

As far as investments in ICT technologies are concerned, the gap between large and medium-sized enterprises in the industry sector is basically irrelevant, thus highlighting in our opinion the dynamic attitude of medium-sized firms. On the contrary, the gap between medium-sized and smaller firms is much wider, ranging from 6 to 14 percentage points.

A significant difference between large firms and SMEs in the industry sector concerns human capital upgrading strategies. Among large enterprises which carried out investments during the 2011–2013 period, more than the 22 % have invested in employees' education and training. This share shrinks sharply for SMEs, reaching about 10 % for medium-sized and small enterprises and only 2.5 % for micro enterprises.

### Investment financing

The way firms decide to finance their own investments depends on both the business cycle and financial market conditions. In Italy, banks play a more important role than in other advanced economies. Due to this peculiarity, the contraction in bank credits, which amounted to 5% in 2013,<sup>58</sup> had a disproportionate effect on SME financing conditions. As a consequence, Italian firms have to heavily rely on their own funds to finance investments and innovation.

In the case of micro and large enterprises, the average shares of investment expenditures financed by own resources amount to 70 and 64% respectively (Figure I.6). By contrast, small and medium enterprises tend to rely slightly less on self-financing strategies and more on alternative ones. In particular, leasing appears to be one of the preferred sources of financing for small as well as medium-sized enterprises in both industry and production services sectors. Long-term debt issuance ranks third in terms of importance, whereas short-term debt and public credit facilities lag behind. Data on public credit facilities show that these are fairly residual with respect to other means of financing, thus potentially pointing out a sort of policy shortage.

**Figure I.6: Financing of investments of Italian firms**

	Micro enterprises (1 to 9)	Small enterprises (10 to 49)	Medium enterprises (50 to 249)	Large enterprises (≥ 250)
Self-financing	70.0%	52.9%	52.6%	63.8%
Short term debts	5.7%	6.7%	5.9%	5.3%
Medium-long term debts	11.5%	16.3%	17.2%	17.6%
Recapitalisation	0.2%	0.2%	0.3%	0.5%
Leasing	9.0%	19.6%	15.9%	7.4%
Public credit facilities	1.3%	2.6%	3.8%	2.8%
Others	2.3%	1.7%	4.3%	2.6%

Source: MET Survey 2013.

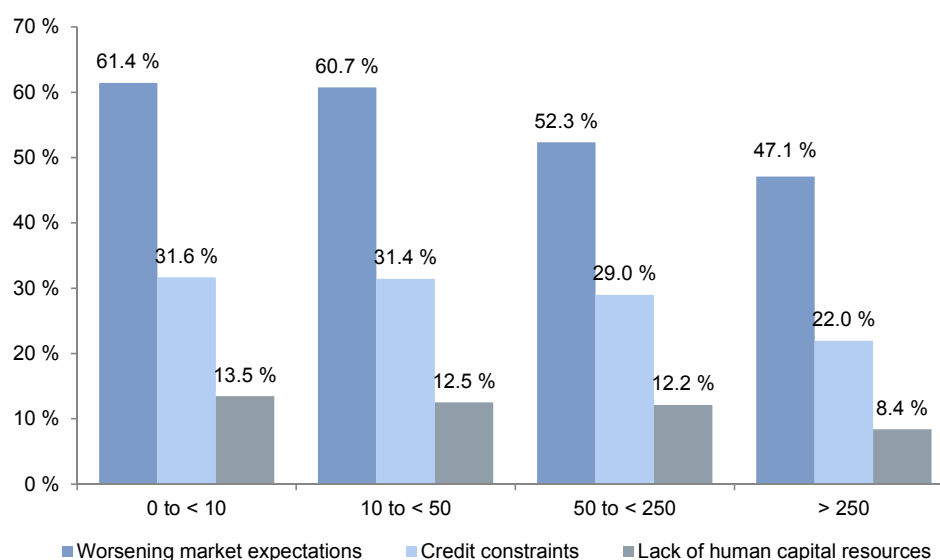
### Limits to investments

Market expectations play a key role in holding firms back from investing (Figure I.7). For instance, within the industry sector at least one firm in two claims that negative economic outlooks hampered its decision to invest. Small and micro enterprises have been hit even harder by negative forecasts.

<sup>58</sup> Bank of Italy (2014).

Furthermore, the role of credit constraints seems relatively minor at first sight. However, it is important to point out that this measure is affected by a self-selection problem. In other words, if enterprises do not apply for any credit line because they anticipate rejection, this measure is downward biased. In addition, worsening economic outlooks might prevent firms from applying for new credits. Finally, it is noteworthy to highlight that some firms have claimed that their inability to invest during the 2011–2013 period was due to the lack of necessary human capital resources both to implement and manage new investments.

**Figure I.7: Limits to investments of Italian firms**



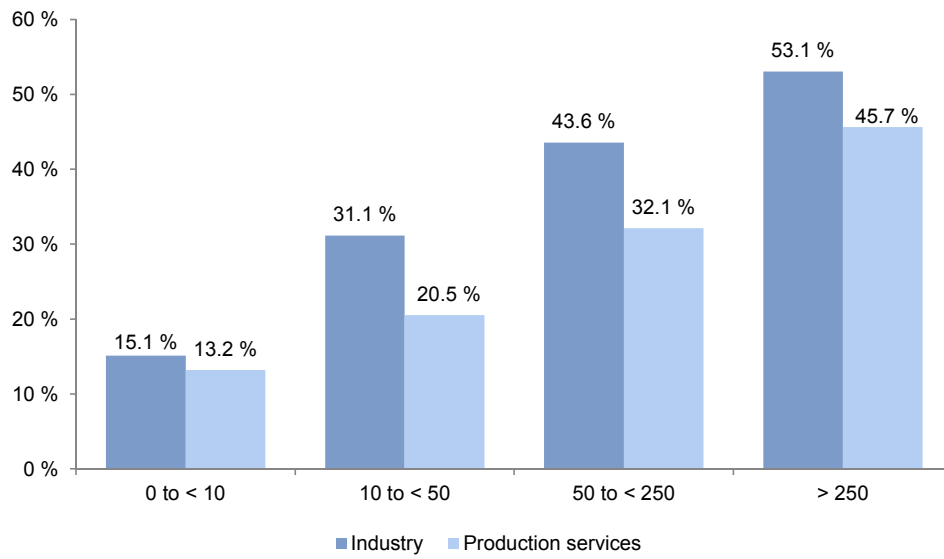
Note: Data show the share of total Italian firms within the industry and production services sectors in a given size class which suffer from a specific type of hindrance to their investment behaviour. The three types of hindrances are not mutually exclusive.

Source: MET Survey 2013.

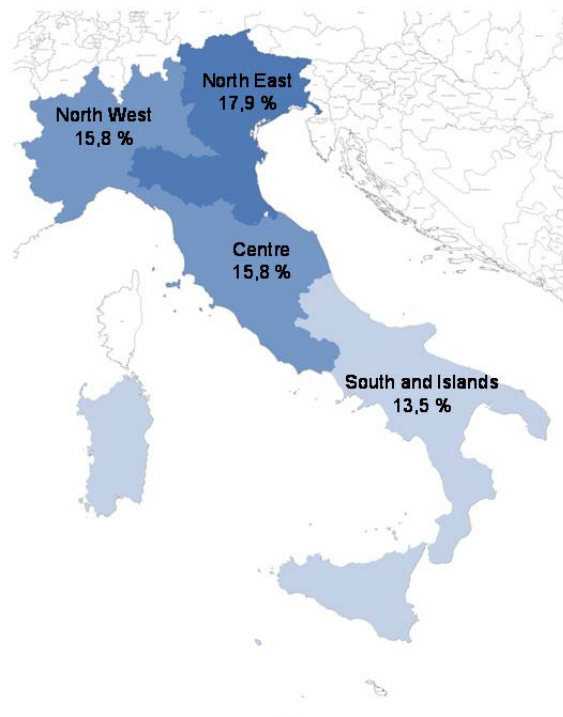
### 2.3.2.2 Innovation

Innovation activity is positively related to firm size (Figure I.8). In terms of regional distribution, the highest share of innovating enterprises can be found in the North East (Figure I.9).

Recently, innovation was the activity hit hardest among all strategies suggesting dynamism in firms' development approach (i.e. investments, R&D, internationalisation processes). As a matter of fact, over the 2008–2011 period, the share of firms implementing any kind of innovation fell from 35.6 to 11.7% in the industry sector and from 29 to 9.7% in the production services sector (Figure I.10).

**Figure I.8: Share of Italian firms innovating by sector and size class**

Source: MET Survey 2013.

**Figure I.9: Share of Italian SMEs innovating by region**

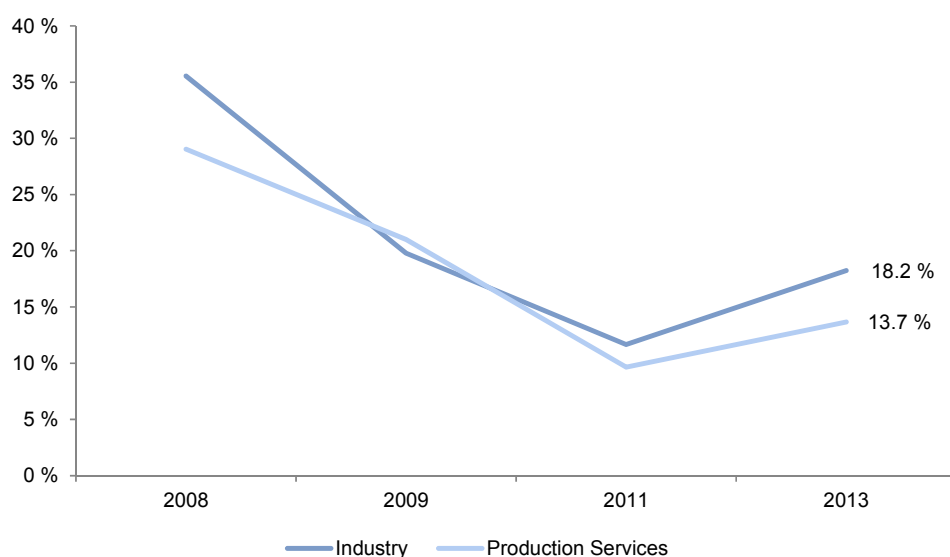
Note: Micro firms included.

Source: MET Survey 2013.

In 2013, despite the rebound in innovation activities, the share of innovating firms reached 18.2% in the industry sector (a sharp 49% decrease compared to 2008 data) and 13.7% in the production services sector (a 53% fall compared to 2008 data). This trend can be linked to negative market expectations and the duration of research activities. Indeed, R&D activities which started between 2011 and 2013 may not have produced an innovative outcome yet.

Of course, aggregate results shown in Figure I.10 are strongly influenced by the rather weak performance of micro enterprises, as they dominate in numbers. Small (10 to 49 employees) and medium-sized (50 to 249) enterprises have performed overwhelmingly better. For instance, in 2013, the average share of innovating firms in the industry sector reached 18.2% of all firms, whereas for small and medium-sized enterprises it reached 31.1 and 43.6% respectively.

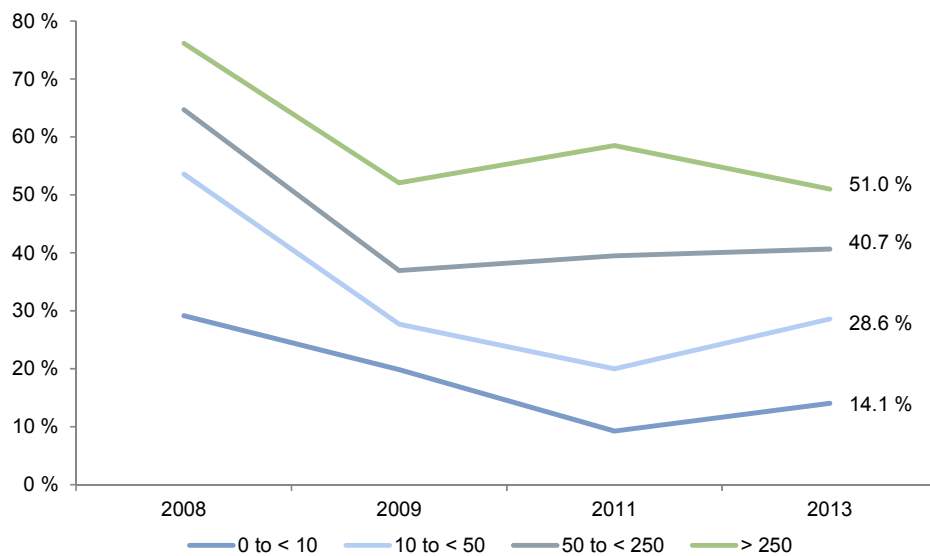
**Figure I.10: Development of innovation activities of Italian firms by sector**



Note: Share of Italian firms with innovation activities, by sector and year.

Source: MET Survey.

Looking at the evolution of innovation activities for different size classes (Figure I.11), it is remarkable that the share of innovating SMEs increased over the 2009–2013 period, while the share of innovating large firms increased only from 2009 to 2011 but decreased afterwards (Figure I.11). Thus, small and medium-sized enterprises can be regarded as the most dynamic groups in terms of innovation within the Italian industrial system.

**Figure I.11: Development of innovation activities of Italian firms by size class**

Note: Share of Italian firms with innovation activities, by size class and year.

Source: MET Survey.

### Types of innovations

Innovation activities can be divided into three categories: product, process and organisational.<sup>59</sup> Product innovation represents the most common type of innovation in the industry sector. While process innovation is almost evenly distributed between the two sectors, organisational innovations are more prevalent in the production services sector (Figure I.12).

As previously mentioned, innovation activities are positively related to firm size, even when looking at the three different innovation categories separately. Nevertheless, Italian firms generally lean more towards product innovation than to process or organisational innovation, above all in the industry sector and especially among SMEs. On the contrary, large firms in the production services sector are particularly focused on organisational innovation.

<sup>59</sup> Marketing innovations are included in the organisational innovation data. As a matter of fact, the MET Survey questionnaire collects information about "organisational, managerial as well as commercial innovations" without differentiating among these three types.



**Figure I.12: Types of innovation introduced by Italian firms**

	Micro enterprises (1 to 9)	Small enterprises (10 to 49)	Medium enterprises (50 to 249)	Large enterprises (≥ 250)
<b>Share of firms introducing product innovation</b>				
Total	8.7 %	18.9%	27.5 %	34.0 %
Industry	10.6 %	21.5 %	31.2 %	37.1 %
Production services	7.2 %	10.6 %	16.8 %	25.8 %
<b>Share of firms introducing process innovation</b>				
Total	5.4 %	13.8%	21.5 %	31.0 %
Industry	6.1 %	15.9 %	23.9 %	34.5 %
Production services	4.9 %	7.2 %	14.3 %	21.9 %
<b>Share of firms introducing organisational innovation</b>				
Total	6.1 %	13.1%	21.9 %	32.5 %
Industry	5.1 %	13.1 %	21.8 %	29.5 %
Production services	6.9 %	13.2 %	22.4 %	40.2 %

Note: The same firm may have introduced more than one type of innovation. The reference group also includes non-innovating firms.

Source: MET Survey 2013.

### Revenues from innovations

The ratio between innovation turnover<sup>60</sup> and total turnover measures the relevance of the innovation activity for firms' performance and competitiveness. On average, the share of revenues stemming from innovation is higher in the industry than in the production services sector (Figure I.13). This seems consistent with previous findings, showing that industry firms tend to focus on product innovation. Moreover, on average, original innovations contribute more than imitative innovations<sup>61</sup> to overall corporate turnover. Indeed, breakthrough technologies such as original innovation are critical to boosting firms' competitive advantage, while catching-up processes such as imitative innovations are required to fill potential technological gaps.

<sup>60</sup> Innovation turnover refers to revenues stemming from new products introduced thanks to innovation activities.

<sup>61</sup> Original innovations refer to products new both to the firm and to the market, whereas imitative innovations refer to products new to the firm but not to the market.

**Figure I.13: Share of revenues of Italian firms from product innovations**

	Micro enterprises (1 to 9)	Small enterprises (10 to 49)	Medium enterprises (50 to 249)	Large enterprises (≥ 250)
<b>Share of revenues from product innovations</b>				
Total	4.2 %	9.1 %	14.0 %	14.6 %
Industry	5.0 %	10.8 %	16.2 %	15.0 %
Production services	3.5 %	3.9 %	7.5 %	13.6 %
<b>Share of revenues from product imitative innovations</b>				
Total	1.8 %	4.0 %	5.4 %	6.3 %
Industry	2.1 %	4.7 %	6.5 %	7.3 %
Production services	1.5 %	1.6 %	2.3 %	3.6 %
<b>Share of revenues from product original innovations</b>				
Total	2.4 %	5.2 %	8.6 %	8.3 %
Industry	2.9 %	6.1 %	9.7 %	7.7 %
Production services	2.0 %	2.2 %	5.2 %	10.0 %

Note: Data show the average share of revenues stemming from product innovation. Non innovative firms are included in the computation with value equal to 0%. Original innovations refer to products new both to the firm and to the market, whereas imitative innovations refer to products new to the firm but not to the market.

Source: MET Survey 2013.

### 2.3.2.3 Research and development

R&D investments play a critical role within firms' innovation strategies since the allocation of specific budget resources to R&D underlines the firm's commitment to innovation in general. R&D activities carried out by Italian SMEs were in the past often regarded as informal R&D<sup>62</sup>. For instance, many firms belong to specific handcraft sectors strictly related to Made-in-Italy, where innovation was historically driven by learning-by-doing processes. Moreover, formal R&D activities could be very expensive, thus requiring a minimum turnover level to be efficiently borne.

#### R&D diffusion

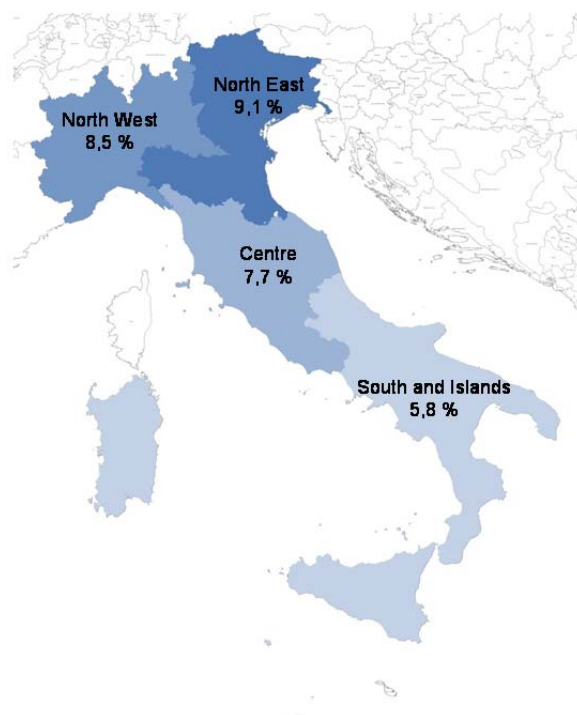
As a matter of fact, the share of firms undertaking R&D investments is positively related to firm size. In 2013, about 52 % of large firms invested in R&D. This figure decreases to 38 %

<sup>62</sup> „When small and medium-sized enterprises carry out their innovative activities they often do so without specific financial and managerial resources and, in particular, without formalised procedures. Thus, SMEs tend to undertake a significant amount of innovative activities in their design, production and sales departments rather than in their R&D departments (which often do not exist at all).“ (Santarelli and Sterlacchini, 1990).

for medium-sized enterprises and further to 20.7 and 6% for small and micro enterprises, respectively.

In terms of regional distribution, the North East displays the highest share of SMEs undertaking R&D investments (9.1%), while the South of Italy (including the islands Sicilia and Sardegna) show the lowest share (5.8%) (Figure I.14).

**Figure I.14: Share of Italian SMEs carrying out R&D by region**



Note: Micro firms included.

Source: MET Survey 2013.

Comparing sectors, the industry sector shows a higher share of firms investing in R&D than the production services sector, apart from micro enterprises which seem to lean more towards R&D in the production services sector (Figure I.15).

Notwithstanding the prolonged and severe downturn, Italian SMEs were strongly committed to innovation and R&D activities in order to weather difficulties and preserve competitiveness. This is also proved by an increase in the absolute number of domestic and internationalised SMEs undertaking R&D investments from 2011 to 2013, which grew by 15,257 units (26.5%), despite of a 40% drop in the SMEs population (605,494 units) over the same period.

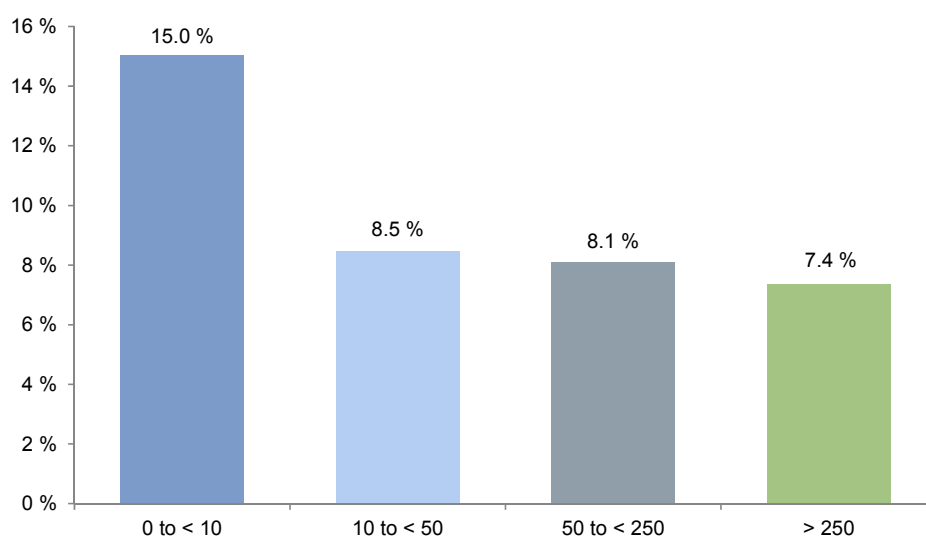
The largest part (87.3% or 13,317 units) of the increase in the number of SMEs undertaking R&D investments is attributable to the industry sector. The remaining 12.7% of the increase are attributable to the production services sector and are mainly driven by micro enterprises.

**Figure I.15: Share of Italian firms carrying out R&D by sector and size class**

Source: MET Survey 2013.

**R&D intensity**

In order to appreciate the actual commitment of firms to R&D strategies, the R&D intensity (i.e. R&D expenditure over total turnover) represents a key performance indicator. In this regard, there seems to be an inverse relationship between R&D intensity and firm size when focusing only on firms with positive R&D investments. On average, micro enterprises allocate the highest portion (15%) of their revenues to R&D activities (Figure I.16).

**Figure I.16: R&D intensity of Italian firms**

Note: Average ratio between R&D expenditure and total turnover by size class. Firms with positive R&D investments.

Source: MET Survey 2013.

These results highlight the dynamism of Italian SMEs in terms of commitment to seek growth strategies by means of R&D investments for the development of new technologies. In particular, small and medium-sized enterprises show high levels of R&D diffusion (up to 44 % of firms carry out R&D in the industry sector) while micro enterprises are particularly focused on the search for a market breakthrough (up to 15 % of total revenues spent on R&D).

### **Innovative activity and new markets**

There seems to be a positive correlation between R&D investments and a firm's propensity to internationalise their businesses.<sup>63</sup> The internationalisation process of a firm can usually follow two different paths, not necessarily mutually exclusive: commercial and/or production internationalisation.

While the commercial internationalisation process merely refers to the sale of domestically produced goods and services on foreign markets, the production internationalisation process encompasses all those strategies involving investments and direct production abroad.

As far as the positive correlation between R&D investments of a firm and its degree of internationalisation is concerned, in 2013 the share of Italian firms undertaking R&D investments,

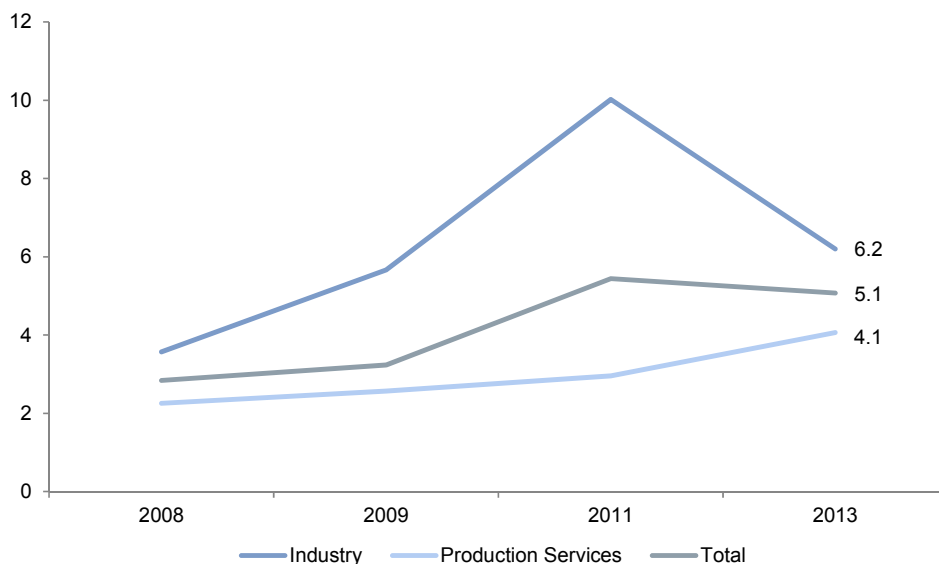
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<sup>63</sup> The question is, however, whether there is also a causal relationship between R&D or innovation activities more generally and the firms' export decision. For further review of the literature on this topic, please refer to the "Exporting and R&D" box in the German chapter of the report.

as well as operating on foreign markets, is 5.1 times higher than the share of firms carrying out R&D but operating only on the domestic market (Figure I.17).

The ratio of these two shares is constantly higher in the industry than in the production services sector and showed a steady increase over the 2008–2013 period. In our opinion, this implies that R&D activities are becoming increasingly pivotal for ensuring firms' competitiveness, as well as successfully entering and consolidating foreign markets. Moreover, a closer look at the development of this ratio between 2008 to 2011 highlights that firms reacted to the domestic demand crisis by exponentially increasing their R&D and internationalisation efforts. As a matter of fact, the link between internationalisation and R&D activities became tighter during the crisis.

**Figure I.17: Development of R&D activities and internationalisation of Italian firms**

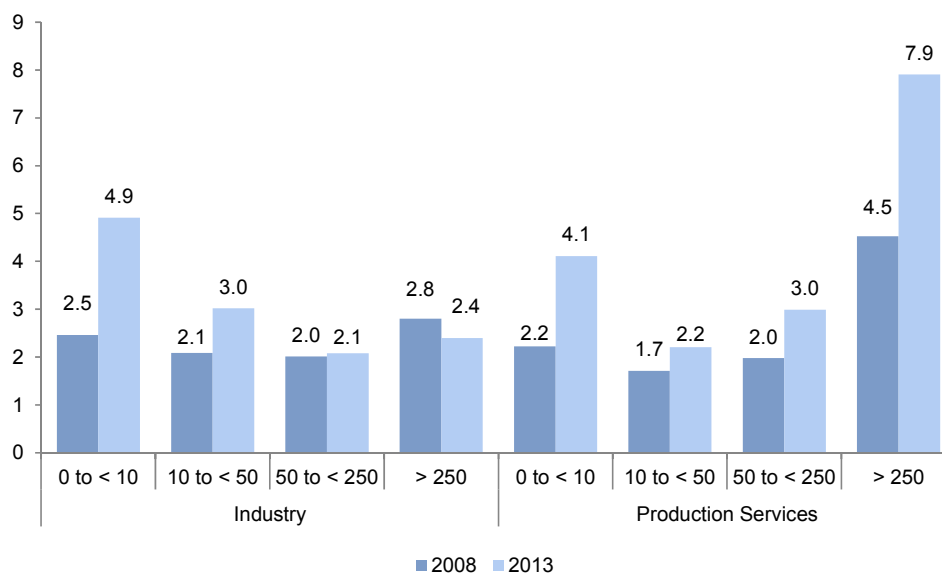


Note: Ratio between the share of firms carrying out R&D and operating on foreign markets and the share of firms carrying out R&D but operating on the domestic market only, by sector and year.

Source: MET Survey.

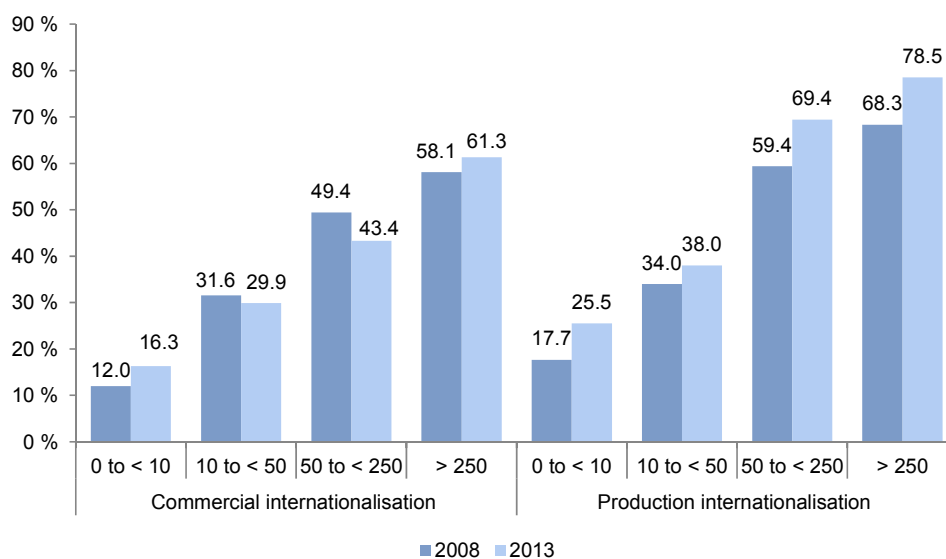
Figure I.18 below shows the ratio's values broken down by size classes in 2008 and in 2013. It can be noted that while in the production services sector the increase was widespread among all size classes, in the industry sector only SMEs proactively reacted to the crisis by seeking internationalisation also through R&D investments.

As far as the kind of internationalisation process is concerned, the share of Italian firms undertaking R&D investments as well as operating on foreign markets and deploying production internationalisation is higher among all size classes when compared with firms deploying only commercial internationalisation (Figure I.19).

**Figure I.18: R&D activities and internationalisation of Italian firms by sector and size class**

Note: Ratio between the share of firms carrying out R&D and operating on foreign markets and the share of firms carrying out R&D but operating on the domestic market only, by sector and size class for 2008 and 2013.

Source: MET Survey.

**Figure I.19: R&D activities and internationalisation of Italian firms by type of internationalisation and size class**

Note: Share of internationalised firms undertaking R&D activities broken down by size class and type of internationalisation activity. Two types of Internationalisation activities are accounted for: commercial internationalisation and production internationalisation. The former refers to all those activities relating to trade carried out by the firm on foreign markets. The latter encompasses foreign direct investments (FDI), offshoring and joint ventures on foreign markets.

Source: MET Survey.

In other words, focusing on the relationship between the internationalisation process and R&D activity, firms involved in production internationalisation generally show a higher propensity to invest in R&D compared to firms involved only in commercial internationalization.

Furthermore, while the share of internationalised firms undertaking R&D investments and pursuing a production internationalisation strategy grew among all size classes between 2008–2013, this seems not to be the case for small and medium-sized enterprises deploying only commercial internationalisation. This could be potentially related to an ongoing upgrade of the internationalisation strategy, with small and medium-sized firms (10 to 249 employees) moving increasingly from commercial only to commercial and/or production internationalisation.



## 2.4 Spain

Miguel Fernández and Blanca Navarro (ICO)

Spain has historically been highly reliant on SME performance. The main findings related to investment, innovation and R&D in this crucial group are:

- (1) After five years of negative growth, real GDP increased in Spain by 1.4 % in 2014. This development was mainly led by domestic demand. An increase in consumption and investment has clear positive consequences for innovation.
- (2) The relative importance of SMEs in terms of numbers, employment and value added is greater in Spain than in the European Union on average. As smaller firms tend to innovate less, the prevalence of SMEs impacts negatively on overall innovation activity.
- (3) The sectorial distribution of Spanish companies is biased in favour of services. As innovations are relatively less prevalent in this sector, this also leads to the relative low level of innovation in Spain.
- (4) Overall investment in Spain started to recover in 2014 following the severe losses suffered during the financial crisis.
- (5) In 2013, SME investment in innovation (intangible assets intensity) in Spain had recovered from the crisis and even overtook the relative levels of 2007.
- (6) During the last few years, the main objective when innovating has been the improvement of products.
- (7) In 2013, SMEs perceived more limitations to innovation than larger firms, with cost being the main one.
- (8) Moreover, there is a deficit of private sector funds for innovation. This affects the capacity of private firms to innovate directly and diminishes their ability to benefit from knowledge spillovers generated elsewhere.<sup>64</sup>
- (9) Expenditure on both internal and external R&D is increasing, which is key to having a competitive exporting sector.
- (10) In 2013, SMEs accounted for around a third of the overall spending of private companies in R&D, while their contribution to the overall value added was about two thirds.

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<sup>64</sup> See Cohen and Levinthal (1990), Geroski (1995).

(11) In general, data show that the North and the East are the most innovative areas in Spain.

### 2.4.1 The relevance of SMEs for the Spanish economy

As already stated in chapter 1.1, Spain, has experienced a structural shift towards the external sector over the last few years. Hence, although the domestic market remains the key target for Spanish firms, there is a growing tendency towards internationalisation. This change is illustrated impressively by the number of exporting companies, which rose from 97,418 in 2007 to 147,731 in 2014.<sup>65</sup>

Firms with an exporting volume of less than EUR 50,000, that is 108,492 firms, represent the majority of exporters. Nevertheless, most of them are just occasional exporters. Only 23,188 of them regularly sell their goods abroad.

More generally, the performance of the Spanish corporate sector is, as in the other countries covered in this report, highly dependent on the performance of SMEs. The percentage of SMEs in the total number of firms has remained quite stable at around 99.9% since 2008. 2,229,582 out of 2,232,230 firms were SMEs in 2014. Most SMEs are micro enterprises with less than 10 employees (2,109,045 in 2014). During the crisis, their share increased even further, as illustrated in Figure S.1. Moreover, most of the firms do not have any employees. In 2014, this was the case for 53.6% of all firms.<sup>66</sup> This study will be focused on the 120,537 SMEs in 2014 with more than 10 employees.

**Figure S.1: The relevance of SMEs for the Spanish economy**

	2008	2009	2010	2011	2012	2013	2014
Micro enterprises (< 10)	93.1%	93.8%	93.8%	94.0%	94.3%	94.4%	94.5%
Small enterprises (10 to 49)	6.0%	5.4%	5.4%	5.2%	4.9%	4.8%	4.8%
Medium enterprises (50 to 249)	0.8%	0.7%	0.7%	0.7%	0.6%	0.6%	0.6%
Large enterprises (≥ 250)	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%

Note: Percentage of the total number of firms that fall into a given size class.

Source: European Commission (2014c).

The evolution of Spanish firms is closely connected to the general evolution of the Spanish economy. Accordingly, the overall number of firms has been shrinking in recent years (Figure S.2). 2007 was the last year with a positive net creation of firms, amounting to 88,447.

<sup>65</sup> Data from ICEX.

<sup>66</sup> According to data of the Firm Central Directory (DIRCE) of the Spanish National Statistics Institute (INE).

Since 2008, all years have brought a net loss of companies. This loss was highest in 2009 and smallest in 2013 since the beginning of the crisis.

**Figure S.2: Yearly net creation of firms in Spain**

	2007	2008	2009	2010	2011	2012	2013
Net creation of firms	88,447	-64,157	-77,926	-45,681	-56,754	-66,734	-33,804

Source: DIRCE (INE).

Regarding the regional distribution of SMEs, about 34.6% of all Spanish SMEs are located in the Mediterranean regions (Balearic Islands, Valencia, Murcia, and Catalonia, which hosts most of them), followed by the 26.9% which operate in the central region (Castile and Leon, Castile-La Mancha, Extremadura and Madrid). The Southern (Andalusia, Canary Islands, Ceuta and Melilla) and Northern (Aragon, Asturias, Basque Country, Cantabria, Galicia, Navarre and Rioja) regions host 19.4 and 19.1% of all Spanish SMEs, respectively.<sup>67</sup>

SMEs employ around 75% of the total Spanish labour force. More specifically, the share of employees working for a firm with more than 250 employees increased from 23.6% in 2008 to 26.8% in 2014, while the share of employees working for companies with less than 10 employees grew slightly from 38.8 to 40.5% (Figure S.3). On the contrary, the share of employees working for small firms decreased from 22.79 to 19.4% and the number of employees in medium sized enterprises dropped from 14.8 to 13.4%.<sup>68</sup> These figures show that larger companies were more resilient to the crisis compared to smaller ones. Additionally, they show a general reduction in size of Spanish companies between 2008 and 2014.

**Figure S.3: Distribution of employees across different size classes of Spanish firms**

	2008	2009	2010	2011	2012	2013	2014
Micro enterprises (< 10)	38.8%	40.6%	40.2%	39.8%	40.2%	40.4%	40.5%
Small enterprises (10 to 49)	22.8%	21.3%	21.4%	20.7%	20.0%	19.6%	19.4%
Medium enterprises (50 to 249)	14.8%	14.1%	13.8%	13.7%	13.5%	13.3%	13.4%
Large enterprises (≥ 250)	23.6%	24.0%	24.6%	25.8%	26.3%	26.6%	26.8%

Source: European Commission (2014c).

This distribution of employment differs from the average distribution in the EU in several aspects. Firstly, while there was quite some variation in Spain between 2008 and 2014, the average size distribution in the EU did not vary significantly. Secondly, the percentage of

<sup>67</sup> Data for 2013 from the General Secretariat for Small and Medium Enterprises.

<sup>68</sup> These numbers originate from a report about the evolution of the number of employees by firm size published by INE in spring 2014 and European Commission (2014c).

workers in smaller firms in Spain is slightly bigger than in the EU on average: in the EU, only around 67 % of the overall employment took place in SMEs in 2014 (around 6–7 % less than in Spain) and only 28.6 % of employment in the EU was created by micro enterprises in 2014 (12 % less than in Spain). On the contrary, with 17.4 %, medium-sized enterprises represent a larger part of overall employment in the EU than they do in Spain.

In Spain, SMEs contributed to 65 % of total value added in 2013.<sup>69</sup> This also supports the finding that the weight of SMEs in the Spanish economy exceeds their weight in the EU, where they contribute about 7 % less to total value added. Analysing the value added per worker for different firm size classes reveals that Spanish medium size enterprises are more productive than the European average (Figure S.4), while micro enterprises are clearly less productive.

**Figure S.4: Value added per worker of Spanish firms by size class**

	Micro enterprises (< 10)	Small enterprises (10 to 49)	Medium-sized enterprises (50 to 249)	Large enterprises (≥ 250)	Average value added
Spain	28,898	40,804	55,595	56,652	42,180
European Union	35,911	42,188	50,754	60,109	47,865

Note: Figures for 2013, in EUR.

Source: European Commission (2014c).

A vast majority of Spanish SMEs work in the services sectors, that is 79.3 % of all SMEs in 2013, compared to only 77.3 % in 2011. Manufacturing accounts for 8.2 % of all SMEs and construction for 12.4 %.

At this point, prior to making some comments regarding the regional distribution of SMEs, it is worth mentioning that although data are available for each of the 17 Autonomous Communities (ACs) and the two Autonomous Cities of Ceuta and Melilla, regional data will be aggregated into 4 main regions following geographical criteria, North, Centre, Mediterranean and South,<sup>70</sup> to follow a harmonised method in all four country reports.<sup>71</sup> However, some specific mentions will be made to ACs to illustrate the observed regional differences.

The distribution of SMEs does not coincide with the distribution of population or GDP across regions. In particular, the Mediterranean region hosts a larger number of SMES that one

<sup>69</sup> Data from the Survey on Entrepreneurship Strategies (ESEE) carried on by the SEPI Foundation.

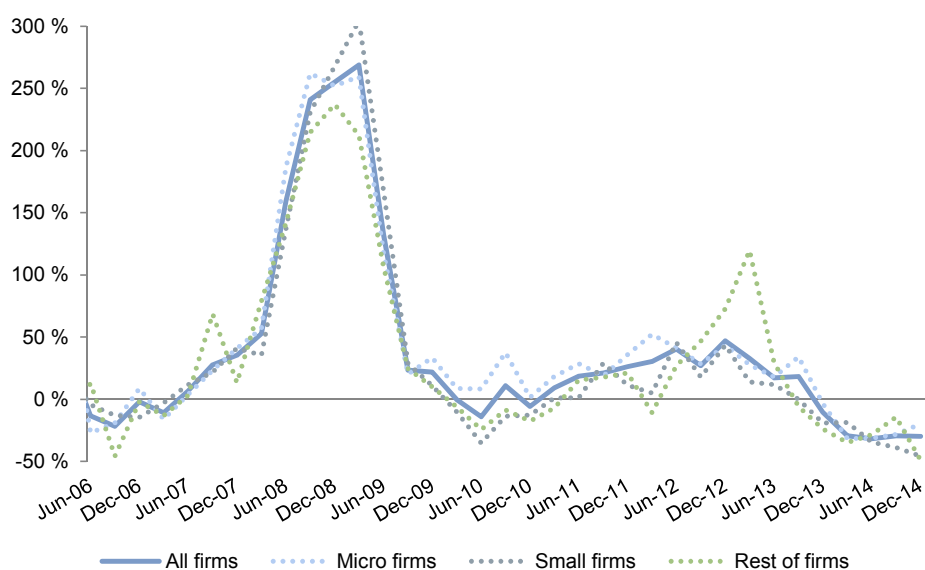
<sup>70</sup> Northern region: Aragon, Asturias, Basque Country, Cantabria, Galicia, Navarre and Rioja. Mediterranean region: Balearic Islands, Catalonia, Murcia and Valencia. Central region: Castile-La Mancha, Castile and Leon, Extremadura and Madrid. Southern region: Andalusia, Canary Islands, Ceuta and Melilla.

<sup>71</sup> The NUTS 1 aggregation made by Eurostat would lead to seven regions altogether.

would expect (33.5% of GDP vs 34.6% of all SMEs), as is also the case for the Southern region (17.7% of GDP vs 19.4% of SMEs). The opposite appears to be the case for the Northern region (20.5% of GDP vs 19.1% of SMEs) and for the Centre of Spain (28.3% of GDP and 26.9% of SMEs). In any case, Spanish SMEs are quite concentrated in three main regions (Andalusia, Catalonia and Madrid), which host almost half of all SMEs and account for a similar percentage of GDP.

The evolution of bankruptcy proceedings<sup>72</sup> provides yet another perspective on the performance on SMEs. It is closely related to the development of production aggregates, in particular GDP. The number of bankruptcies augmented from 1,033 in 2007 to 2,894 cases in 2008, when the economy experienced a sharp decline, and reached 9,143 in 2013. Recent data show that in 2014, bankruptcy proceedings started to fall by around 29% compared to 2013. The number of procedures, however, still remains well above the levels experienced before the crisis (Figure S.5).

**Figure S.5: Bankruptcy proceedings in Spain**



Note: Quarterly data, seasonally adjusted.

Source: INE.

As stated in sections 1.1 and 1.2, business conditions have started to improve recently. This is also reflected in the growing business confidence of Spanish firms as measured by the

<sup>72</sup> Data on bankruptcy proceedings is provided each quarter by INE.

Harmonised Economical Confidence Index (ICEA)<sup>73</sup>. It shows a continuous and pronounced improvement from the first quarter of 2013, when this indicator was released, and has stabilised recently, confirming that economic conditions for Spanish SMEs have improved considerably in the last two years.

Several legislative reforms have benefitted SMEs. Further, a fiscal reform being implemented stepwise between 2014 and 2016 aims to incentivise investment, mainly through fiscal rebates. Several labour market reforms have also made it easier to contract and licence employees and have introduced more flexibility in collective bargaining. More policy reforms are worth mentioning, such as the Market Unity Act, which aims at alleviating investment across Spain by reducing impediments resulting from institutional frictions between regional administrations. Aside from this, maybe the biggest effort is the Entrepreneurship Act, which, like the Market Unity Act, was adopted during 2013 with the aim of helping firms do business in Spain. It stipulates a comprehensive set of measures, such as a change of the Value Added Tax regime, in order to facilitate firms' fulfilment of fiscal obligations. This Entrepreneurship Act streamlines the legal structure of companies and simplifies the procedures to negotiate a company's debts before entering a bankruptcy process, in line with the "fresh start" concept which is currently under development in other legislative projects. It also facilitates funding for entrepreneurs by simplifying new mechanisms such as the Internationalisation Bills<sup>74</sup>. Last but not least, the Entrepreneurship Act provides for an inter-ministerial committee to monitor the performance of the new law and suggest new measures when required.

#### **2.4.2 The investment and innovation behaviour of SMEs in Spain**

This section is mainly based on data from national sources such as the National Statistics Institute (INE) and the Bank of Spain. When comparing the results with the findings for other countries in this report, some methodological aspects must be taken into account. For instance, the composition of sectors in the Spanish data differs from that of the Community Innovation Survey (CIS) of the European Commission.<sup>75</sup>

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<sup>73</sup> The ICEA is a new index created by INE in Spain based on the methodology of the German IFO and the Japanese TANKAN. It is based on a survey of managers of establishments of all sectors, assessing their perception regarding the state of their business. Data series started in January 2013 with a value of 100 for both SMEs and larger firms. Accordingly, this index does not provide information about the position of SMEs relative to large firms.

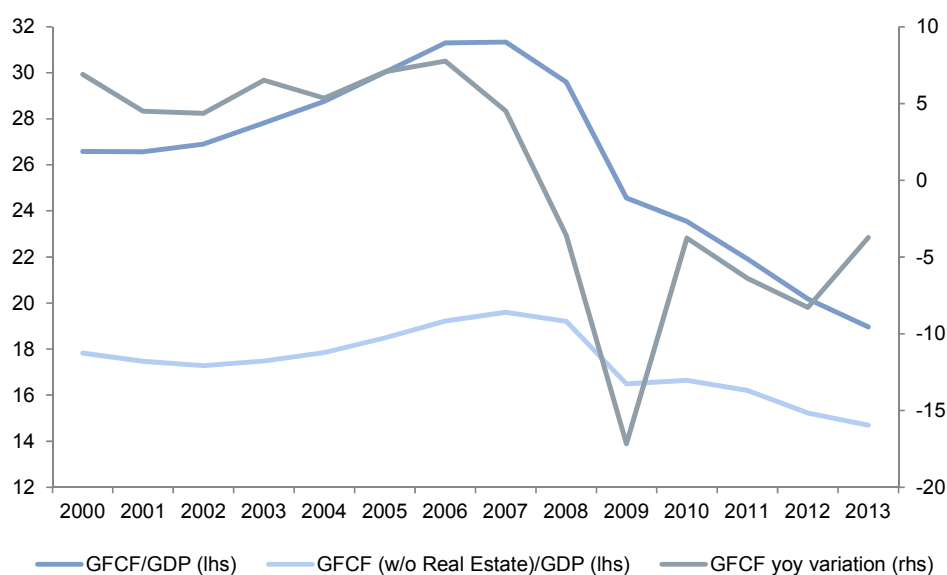
<sup>74</sup> Internationalisation Bills are financial securities issued by credit institutions. Their principal and interest are backed as collateral by loans related to internationalisation activities (financing of export contracts or international investments).

<sup>75</sup> See the appendix for more details.

### 2.4.2.1 Investment

Generally, national accounts data show that overall investment in Spain has followed the pattern of economic activity. Figure S.6 shows that investment, measured as gross fixed capital formation (GFCF) over GDP rose from about 26 to about 32 % between 2000 and 2007, to fall afterwards to a low of 19 % in 2013. This behaviour is strongly influenced by the real estate sector. Investment without real estate also follows a downward trend from 2008 onwards but the drop is smaller. The yoy variation shows a dramatic drop of investment in 2009 that continued afterwards but at a much slower pace.

**Figure S.6: Investment in Spain**



Source: INE.

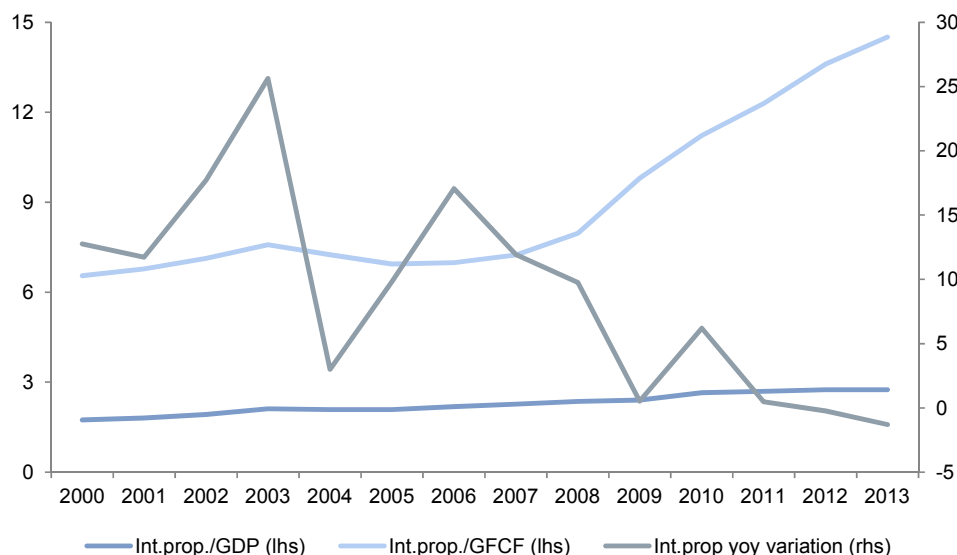
Gross fixed capital formation includes investments in real estate, other construction, machinery and equipment, transportation goods and intellectual property. The latter may be taken as a proxy for investment in innovation. Investment in intellectual property follows an upward trend (Figure S.7), both relative to GDP and relative to total investment. This is because the yoy variation of intellectual property has been declining, but remained positive in all years.

Unfortunately, evidence on the investment behaviour of SMEs in particular is scarce for Spain. Available data<sup>76</sup> point out that by the end of 2012, 21 % of SMEs asked for banking financing to finance investments. However, this is a lower bound, as it does not include SMEs that finance their investments through other means. The picture of investment

<sup>76</sup> Survey on Access to External Finance of SMEs carried out by the Spanish Chamber of Commerce (2012).

activities of Spanish SMEs can be complemented by using an additional data source, although this has its limitations as well.<sup>77</sup>

**Figure S.7: Investment in intellectual property in Spain**



Source: INE.

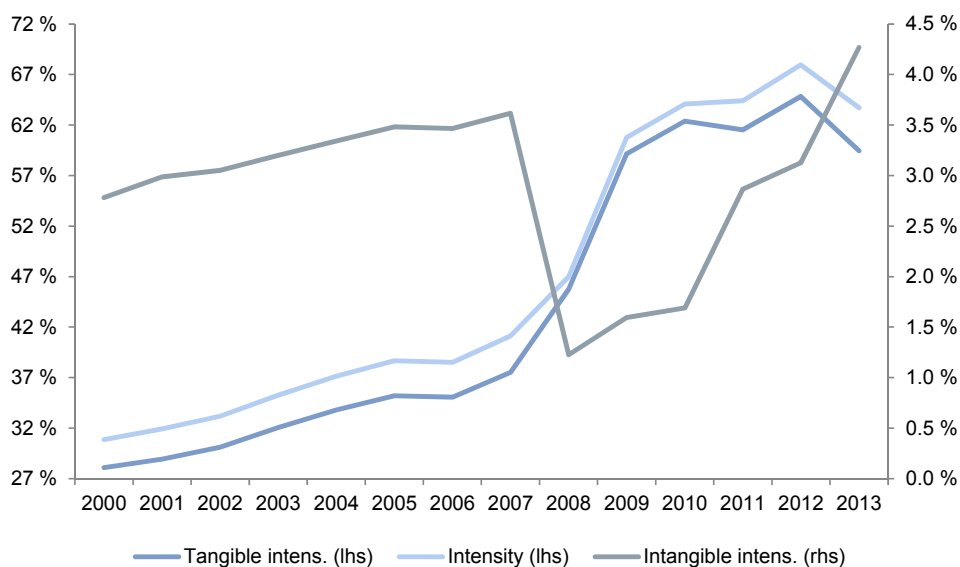
### Investment intensity

Investment intensity of SMEs in Spain (defined for this purpose as assets over turnover) showed a slightly upward trend during the period 2000–2007<sup>78</sup> (Figure S.8). This is true for both components of assets, investments in tangible and intangible assets. However, these components started to behave very differently after the financial crisis, with a sharp drop in intangible assets investment intensity from 3.6% in 2007 to 1.2% in 2008, and an increase in investment intensity in tangible assets from 37.5% in 2007 to 59.1% in 2009. This last development was driven both by an increase in investments and a sudden deterioration of turnover. After 2010, tangible investment intensity has been unsteady, standing at 59.4% in 2013. At the same time, investment in intangible assets has recovered, reaching a new historical high of 4.3% in 2013.

<sup>77</sup> The dataset used in the following originates from the Central Balance Sheet Data Office elaborated by the Bank of Spain for the years 2000 to 2013. This dataset provides information on the economic and financial situation of Spanish non-financial corporations (both SMEs and large firms) from the manufacturing and service sector. The main limitation of this database is that the composition and the number of companies change every year, as data submission is optional for firms. However, it is the best available approximation of investment behaviour in Spain at the micro level.

<sup>78</sup> This ratio considers the stock of investment.



**Figure S.8: Development of investment intensity of Spanish SMEs**

Note: Investment intensity, defined as tangible/intangible/total assets over turnover. The number and composition of companies in the sample changes every year.

Source: Bank of Spain.

### Investment financing

Access to investment financing has toughened for SMEs during the financial crisis.<sup>79</sup> While 68.6% of SMEs tried to obtain some kind of bank financing during 2010 and 2011, by the end of 2012, only 24% tried to obtain such financing. This reduction of firms trying to obtain bank financing was due to the harsher financial environment. Among the survey respondents that applied for bank finance in 2012, around 40% tried to obtain ICO financing.

The rate of success among SMEs that applied has remained quite stable, though, with around 68% of all applicants for bank finance being successful between 2010 and 2012 (almost 77% of all applicants for ICO financing). Put differently, less SMEs tried to obtain financing in 2012, but among the ones that applied the success rate remained stable.

At the same time, the share of applicants that received a direct refusal of their application grew sharply between 2010 and 2012, from 10.3% refusals on average in 2010 and 2011 to 25.5% refusals on average in the last three quarters of 2012.

Additionally, those SMEs which obtained financing suffered from worse financial conditions. By the end of 2012, nearly 64% of SMEs that received bank financing pointed out that the conditions had deteriorated. In 2010 and 2011, 65.1% of SMEs indicated that they suffer

<sup>79</sup> According to the Survey on Access to External Finance of SMEs carried out by the Spanish Chamber of Commerce (2012). This survey was carried out by phone among SMEs with 1 to 249 employees.

from a rise of financing costs, while by the end of 2012, the percentage of SMEs which experienced an increase of financing costs rose to more than 80%.

#### 2.4.2.2 Innovation

The main source of information on company innovation in Spain is the Innovations in Companies Survey.

##### **The Innovations in Companies Survey**

The Innovations in Companies Survey is published by the Spanish National Statistics Institute (INE) each year. The most recent results, referring to the reporting year of 2013, were released in January 2015. More than 39,000 companies with more than 10 employees (both SMEs and larger firms) from a wide range of sectors (industrial, services, construction, agriculture, hunting, forestry and fishing) responded in the last wave of the survey, the main goal of which was to provide information about the entire innovation process, including both technological innovation and non-technological innovation. The survey is carried out following the methodological recommendations included in the Oslo Manual.<sup>80</sup> The main economic activity of the above mentioned firms corresponds to sections A to N, P (except 854), Q, R and S (except branch 94) of the National Classification of Economic Activities (CNAE-2009).

In some cases, the survey questions refer to activities carried out in 2013, while in other cases they refer to the three years between 2011 and 2013. As mentioned in the methodological comments of the survey, "In general terms, the information is required during the reference year of innovator activity, although for those variables related to innovator products and processes, information is required for a period of three years". Whenever using this data source in the following, the exact period it refers to will be specified to avoid confusion.

The representativeness of this sample of around 39,000 companies is guaranteed through the combination of companies which can potentially develop R&D activities (either because they have been registered to do so in previous years or because they have requested public funds for own research projects) and by another random section drawn from the Central Company Directory (DIRCE).

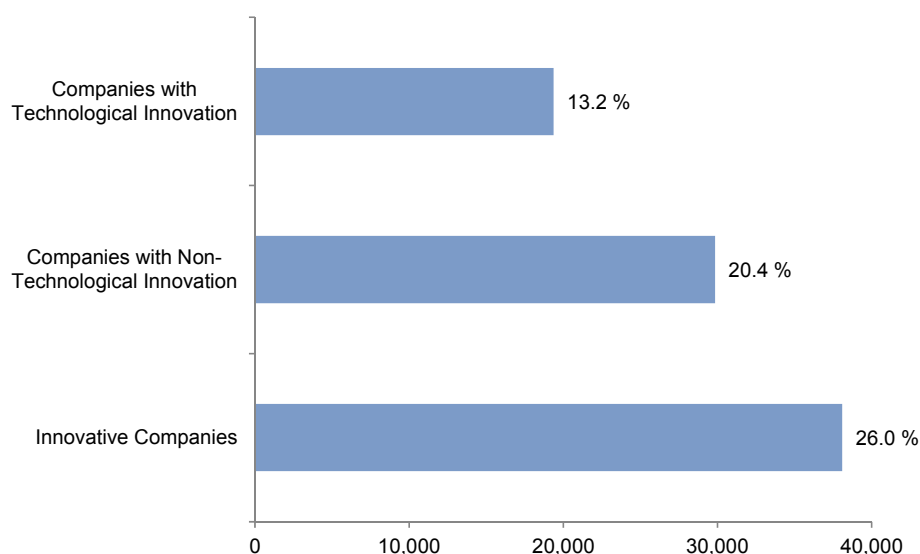
According to this survey, the concept of innovation includes all kind of scientific, technological, organisational, financial or commercial activities that a company carries out in order to launch all sort of updates. It covers both original as well as imitative product and process innovations, which can be summarised as technological innovations.

The survey also accounts for organisational and marketing innovations, which fall under the category of non-technological innovations (see section 1.3 for a definition).

Figure S.9 illustrates the share of SMEs that innovated in the period 2011–2013. In total, about 26% of Spanish SMEs with more than 10 employees have implemented at least one kind of innovation. 13.2% of SMEs carried out some kind of technological innovation while 20.4% of companies innovated in non-technological fields.

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<sup>80</sup> See OECD (2005).

**Figure S.9: Share of Spanish SMEs with technological and non-technological innovation**

Note: Number and share of Spanish SMEs with 10 to 249 employees with technological vs non-technological innovation in 2011-2013. The same company may be involved in both technological and non-technological innovation.

Source: INE.

Regionally speaking, SMEs in the Southern region are least innovative. Considering overall innovation (technological and/or non-technological), 27.9% of SMEs in the Mediterranean region innovated, while the share was of 26.4% in both the Northern and the Central region. In the Southern region, the share of innovative companies was slightly smaller, amounting to 21.5% (Figure S.10).

**Figure S.10: Share of Spanish SMEs innovating by region**

	North	Centre	Mediterranean	South
Total innovative companies	26.4 %	26.4 %	27.9 %	21.5 %
SMEs with technological innovation	15.9 %	13.3 %	13.9 %	8.9 %
SMEs with non-technological innovation	19.2 %	20.6 %	22.2 %	17.9 %

Source: INE.

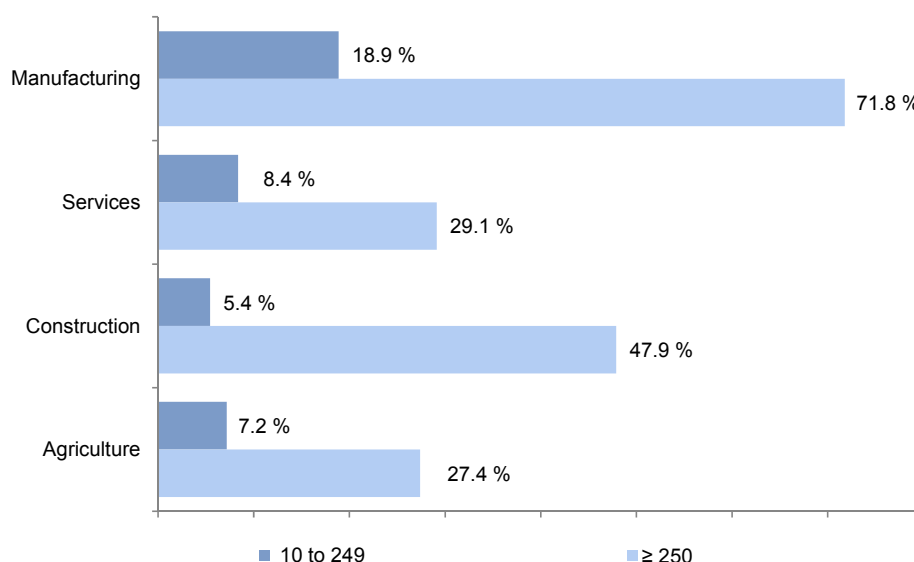
### Technological Innovation

Technological innovation includes internal R&D (carried out by the company); external R&D (carried out by a partner or under the supervision of the company); acquisition of machinery, equipment, hardware or advanced software and buildings; acquisition of external knowledge for innovation; training for innovative activities; launching innovations onto the market, as well as design, other preparations for production and/or distribution. It is hence the most important type of innovation.

Regarding technological innovation in 2013<sup>81</sup>, the differences between large firms and SMEs are remarkable. On average, 11.0% of all Spanish companies with ten or more employees had product or process innovations in 2013. The respective figure is 10.3% for companies with up to 250 employees and 41.0% for companies with more than 250 employees.

An analysis sector by sector reveals that, as in France, Germany and Italy, manufacturing is the sector with the highest share of innovators (18.9% for SMEs and 71.8% for large companies), followed by services (8.4 and 29.1%), agriculture (7.2 and 27.4%) and construction (5.4 and 47.9%). In all sectors, innovations are considerably less frequent in the small companies, with the gap between large firms and SMEs being more accentuated in manufacturing and construction (Figure S.11).

**Figure S.11: Share of Spanish firms with technological innovation by sector and size class**



Note: Figures for 2013.

Source: INE.

In the case of technological innovation, the most innovative region is the North, where the share of technologically innovative SMEs is 15.9%. It is 13.9% in the Mediterranean region, 13.3% in the Centre and 8.9% in the South. For Spain as a whole, the share of technologically innovative SMEs is 10.3%.

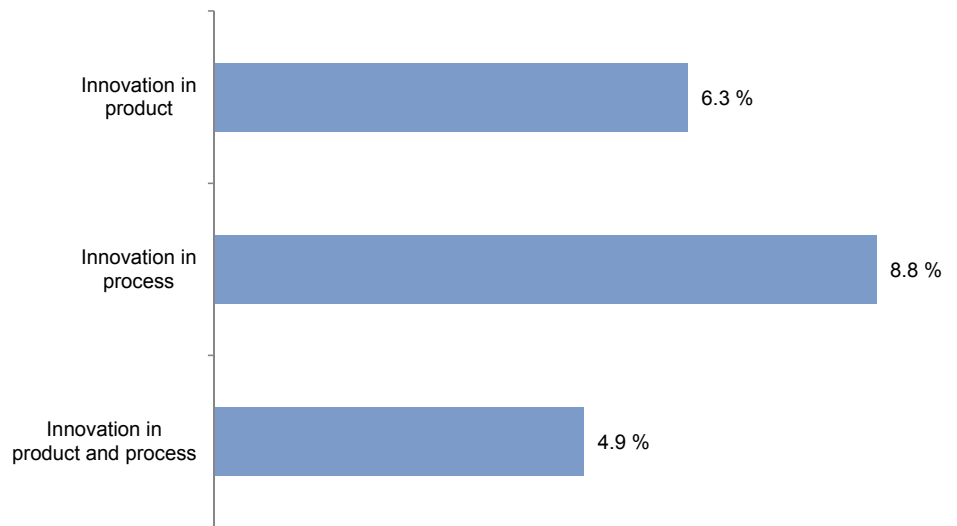
### Product versus process innovation

Figure S.12 shows the percentage of companies with 10 to 249 employees that innovated in products, processes or in both kinds of technological innovation between 2011 and 2013. According to the graph, just 6.3% of SMEs innovated in products, whereas about 8.8%

<sup>81</sup> According to the survey, this data only refers to 2013.

innovated in processes. Only 4.9% of these companies introduced both product and process innovations between 2011 and 2013. The share of SMEs which introduced at least one kind of technological innovation is about 13.2%.

**Figure S.12: Share of Spanish SMEs with product and process innovation**



Note: Share of all Spanish SMEs with 10 to 249 employees with product vs process innovation in 2011-2013. The same company may be involved in both product and process innovation. Categories are not mutually exclusive. Sample includes all companies, innovative or not.

Source: INE.

Evidence by Caldera (2010) suggests a positive effect of firm innovation on the probability to export.<sup>82</sup> This is also related to firm size, as stated by García-Tabuenca et al. (2015), who suggest a positive relationship between firm size and the capacity to export.

López-Rodríguez and García-Lorenzo (2010) demonstrate that product innovations, patents and process innovations have positive and significant effects on both the probability to export and the intensity of exports. In addition, Cassiman and Martinez-Ros (2007) show that product innovations are a more important determinant of export growth, while process innovations are a more important driver of export propensity.

So, even causality is not entirely clear, the literature has found that export propensity and firm innovation usually increase with firm size. Consequently, fostering both product and process innovations may be an appropriate way to help firms grow and export.

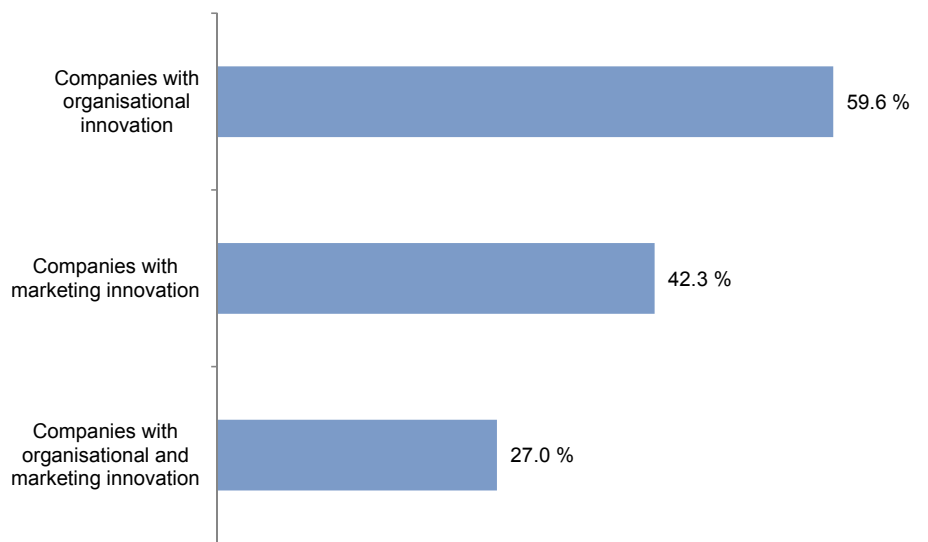
### **Non-technological innovation**

Figure S.13 shows the percentage of companies with innovation in organisation, marketing (changes in design or packaging, new methods of price setting, new positioning methods

<sup>82</sup> See also the box on exporting and R&D in the German country chapter.

etc.) or both between 2011 and 2013. From all companies that innovated non-technologically, almost 60% of the companies innovated in terms of organisation while only 42.3% innovated in marketing. More than 27% of companies innovated in both non-technological aspects.

**Figure S.13: Share of Spanish firms with organisational and marketing innovation**



Note: Share of Spanish firms with 10 to 249 employees with organisational vs marketing innovations in 2011-2013. The same company may be involved in both organisational and marketing innovation. Sample restricted to firms with non-technological innovation.

Source: INE.

### Revenues from innovations

In 2013, 86.9% of total turnover generated by Spanish companies (including those that did not innovate) originated from goods and services that remained unchanged between 2011 and 2013, while only 5.6% came from goods and services introduced to the market between 2011 and 2013. 7.5% of total turnover was generated by products that the companies incorporated into their portfolios but that already existed in the market, i.e. imitative product innovations (Figure S.14).

Again, there are important differences between large and small companies, with the percentage of turnover due to innovations being higher for large companies ( $\geq 250$  employees) than for SMEs (10 to 249 employees).

Looking just at firms which introduced technological innovations, that is innovation in product and/or process (13.2% of all firms), the share of turnover generated by goods and services which were new to the market was 10.1%, while the share of turnover due to goods that were new to the firm, but not to the market, amounted to 13.3%. The remaining 76.6% of turnover came from products which remained unchanged. Unsurprisingly, the share of

turnover generated by new goods or services increases further as we shift our focus to product innovators only. In this group, only 66.0 % of sales came from unaltered products.

As Spanish firms' investments in innovation are currently increasing, the percentage of turnover relating to innovations is likely to increase in the next years.

**Figure S.14: Share of total turnover of Spanish firms originating from innovative products**

	Percentage of turnover due to goods and services that ...	SMEs (10 to 249)	Large enterprises (≥ 250)	Total
All companies	... were new only to the firm	4.0	10.6	7.5
	... were new to the market	2.1	8.7	5.6
	... remained unchanged	93.9	80.7	86.9
Companies with technological innovations	... were new only to the firm	12.7	13.6	13.3
	... new to the market	6.8	11.2	10.1
	... remained unchanged	80.5	75.3	76.6
Companies with product innovations	... were new only to the firm	25.1	18.1	19.4
	... were new to the market	13.5	14.9	14.6
	... remained unchanged	61.5	67.0	66.0

Note: Share of total turnover in 2013 originating from original and imitative product innovations implemented in 2011–2013.

Source: INE.

### Objectives of innovation

The Innovation in Companies Survey also asks annually about SMEs objectives when they invest in innovation. According to this survey, when SMEs carry out some kind of technological innovation, improving the product (67.1 %) is the top priority. More specifically, when SMEs improve the product, firstly they pursue to improve the quality of goods and services, secondly they try to enhance the range of goods and services and thirdly they try to replace outdated products and processes. Improving the process is also an important objective for 51.1 % of SMEs which innovate technologically. A greater capacity to produce or provide services and the flexibility to improve them score particularly high among these process objectives. Other objectives, such as the maintenance of employment, compliance with regulations and health and safety or environmental concerns are considered important by less than 30 % of the companies.

Regarding to the objectives of SMEs carrying out non-technological innovation, 56.5 % of them see the better quality of goods and services as a key target (as is the case for technological innovators), followed by the reduction of the response time to the customers' needs and by the improvement of the market share.

### Limits to innovation

Figure S.15 below shows the share of companies that highly rate various factors which may have inhibited innovation during the period 2011–2013.

When being asked “During the 2011–2013 period, what role did the following factors play in hindering the innovation activities or projects or influencing the decision not to innovate?”, the share of companies that feel hampered in their innovation activities by any factor is higher among SMEs than among larger companies.

**Figure S.15: Limiting factors to innovation for Spanish firms**

Percentage of companies that consider very important:	SMEs (10 to 249)	Large firms (≥ 250)	Total
<b>Costs factors</b>	41.9	32.4	41.7
Lack of funds in the company	30.6	20.5	30.3
Lack of external funding sources	26.3	20.7	26.2
Too high costs	29.5	19.0	29.3
<b>Knowledge factors</b>	21.3	12.2	21.1
Lack of qualified staff	12.1	5.5	11.9
Lack of technology information	10.1	4.0	10.0
Lack of market information	9.1	4.1	9.0
Difficulties in finding partners to innovate with	12.2	6.6	12.1
<b>Market factors</b>	25.1	17.3	24.9
Dominated market by well positioned companies	15.7	9.9	15.6
Uncertainty about innovative goods and services demand	19.9	13.1	19.7
<b>Reasons to not innovate</b>	30.0	18.3	29.8
It's not necessary due to previous innovations	9.9	5.9	9.8
It's not necessary because there is no demand	26.8	15.6	26.5

Note: The same company could consider more than one limiting factor to be important. Sample includes all companies, innovative or not. Figures refer to 2011-2013.

Source: INE.

Across the board, cost related factors seem to be the most important ones, with 41.9% of SMEs and 32.4% of larger companies considering them as hindrance to their innovation activities. As a matter of fact, the main problem that companies have to cope with in this regard is the lack of internal funds and the high costs, which are considered as a limiting factor to innovation, especially by SMEs.

Another important factor that affects nearly 30% of companies is the belief that there is no demand for their innovations, followed by a lack of qualified staff and difficulties in finding partners.



### **Intellectual property and patenting behaviour**

The number of patent applications in Spain displays an upward trend that started in 2010, after a drop in 2009 when the financial crisis unfolded. In 2013, the number of applications grew by 2.6%, after a growth of 5.4% in 2012. Regional distribution of applications closely follows the regional distribution of GDP.

Regarding the number of patent concessions, there was a sharp fall in 2010. An increasing trend started afterwards but stopped in 2013, when the number of concessions was slightly below that of 2012. More specifically, after yoy growth of 3% in 2012, 2013 saw yoy growth of -2.2%.

The ratio of concessions to applications remained quite stable during the last four years and ranged between 8 and 8.5%.

#### **2.4.2.3 Research and Development**

It has been pointed out that the Spanish economy experienced a shift towards external demand in the last years. Given the correlation between R&D activities and exporting (although a causal relationship is not clear as discussed previously in this document), more R&D could help to consolidate a growing reliance on foreign sector.

The total R&D expenditure of Spanish firms on R&D has followed a negative trend since 2009. It fell by 5.6% in 2012 and by another 2.8% to EUR 13,012 million in 2013. In 2013, overall spending amounted to 1.2% of GDP. However, while total expenditure on R&D (public and private) is currently at similar levels as in 2008, R&D carried out by the private sector is still below the level reached in 2008.<sup>83</sup>

#### **Is investment in R&D pro or anti-cyclical?**

The question of whether investment follows a cyclical or anti-cyclical pattern is a continuous debate in the literature. In 2012, the Bank of Spain published a paper (López-García et al., 2012) where it used data from the Central Balance Sheet Office to demonstrate that the evolution of private companies' investment in Spain highly depends on credit restrictions. When there are no credit restrictions, companies tend to invest more in R&D during recessions with the aim of improving their future productivity. However, credit restrictions are very likely to occur during an economic crisis and they are the main reason why so many companies actually tend to reduce their R&D investments during recessions. Thus, the pattern of R&D investments in Spain is supposed to be anti-cyclical but, due to credit restrictions, it actually appears to be pro-cyclical.

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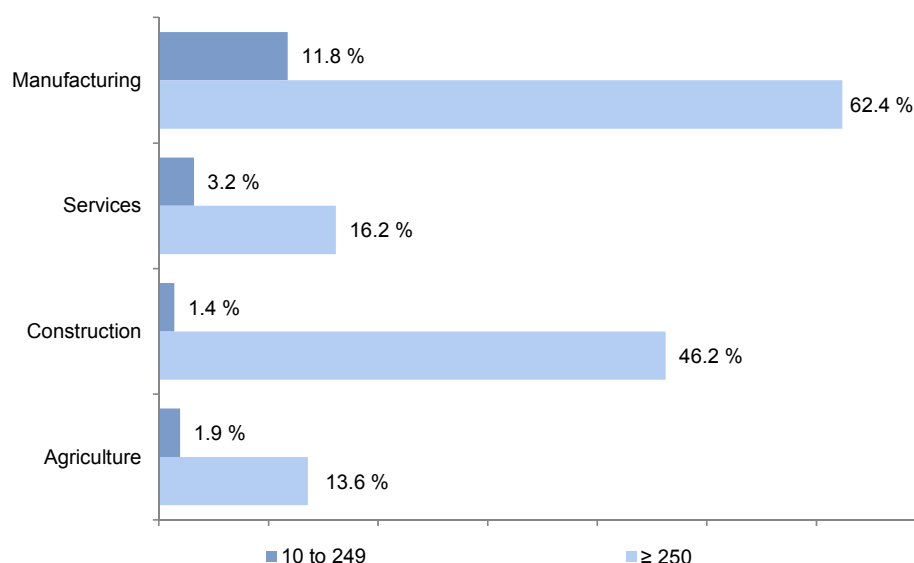
<sup>83</sup> These data originate from the Statistic on Scientific Research and Technological Development Activities 2013, a statistic carried out annually by INE.

### R&D diffusion

Figure S.16 shows the share of companies carrying out R&D by sector and size class. In 2013, the total share of companies with R&D activities was 5.4% (4.8% for SMEs and 29.3% for large firms). Limiting the sample to companies that innovated, the share of companies carrying out R&D was 48.9% (46.8% for SMEs and 71.6% for large firms). The differences between companies of different size are again quite remarkable, with the share of firms engaged in R&D being lower for SMEs than for large companies.

Large differences also exist between sectors. With 13.1%, manufacturing is the sector with the highest share of firms carrying out R&D activities (11.8% of SMEs, and 62.4% of large companies); followed by services with 3.5% of all firms (3.2% of SMEs and 16.2% of large companies); agriculture with 2% of all firms (1.9% of SMEs and 13.6% of large companies) and construction, where only 1.8% of all firms were involved in some R&D in 2013 (1.4% of SMEs and 46.2% of large companies). A regional disaggregation of the data with regard to the share of firms carrying out R&D is unfortunately not possible.

**Figure S.16: Share of Spanish firms carrying out R&D**



Note: Figures for 2013. Shares of Spanish firms with 10 to 249 and 250 or more employees carrying out R&D.

Source: INE.

### R&D intensity

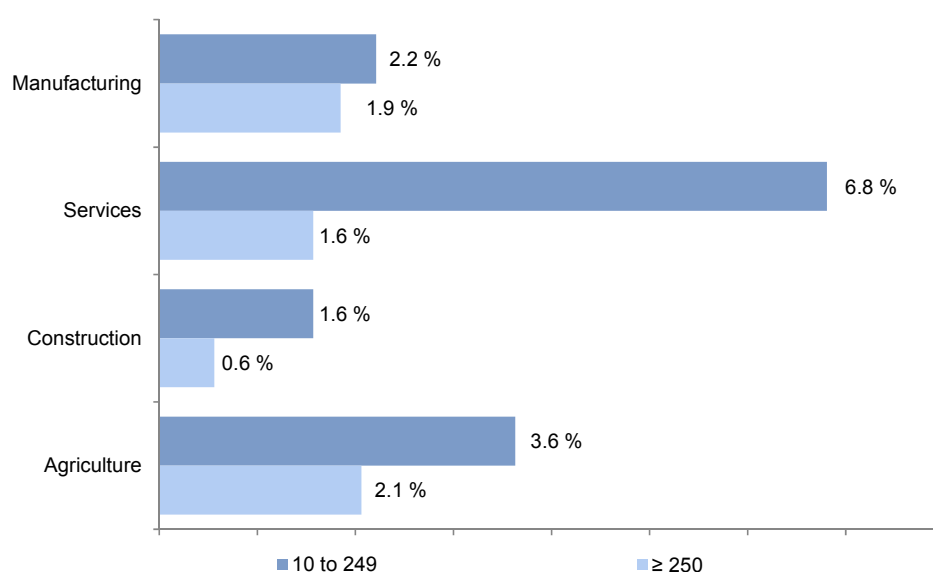
R&D intensity is measured as R&D expenditure over total turnover. In 2013<sup>84</sup>, R&D intensity across all companies was 0.91% (0.67% in SMEs and 1.12% in large companies). Looking only at companies with innovative activities, R&D intensity was 1.85% (2.76% in SMEs and

<sup>84</sup> The data on R&D intensity only refer to the year 2013 and are supplied by the Innovation in Companies Survey 2013 (INE).

1.57% in large companies). Restricting the sample to companies with R&D activities, R&D intensity was 2.09% (3.63% in SMEs and 1.71% in large companies). The large share of R&D intensity of SMEs carrying out R&D activities may be related to some kind of composition effect, with a bigger presence of start-ups and other firms with a high innovation propensity.

Figure S.17 displays the R&D intensity of the companies with R&D activities by sector and size class. The largest gap between SMEs and large firms prevails in the service sector, followed by construction.

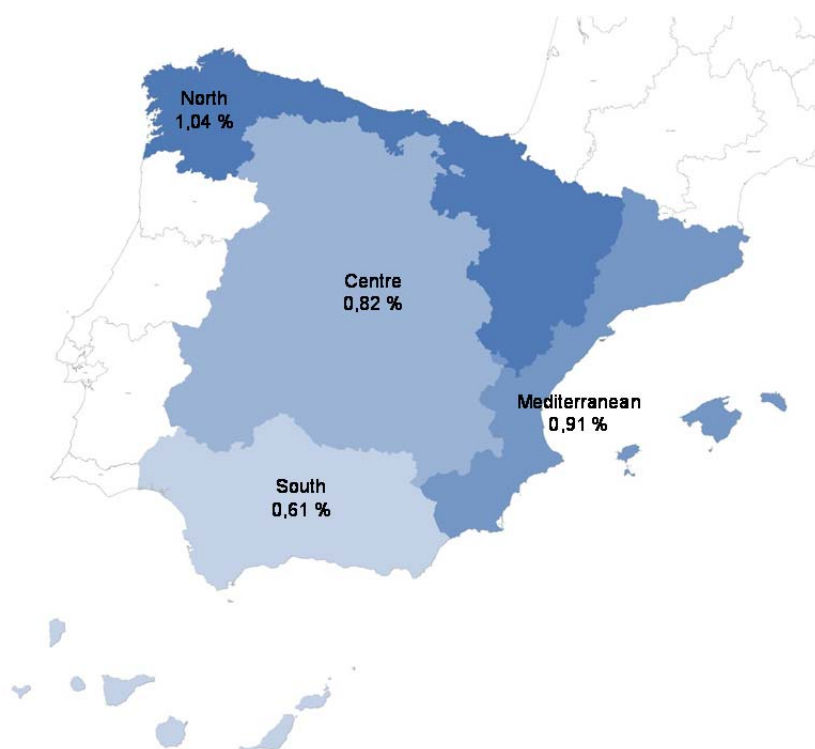
**Figure S.17: R&D intensity of Spanish firms conditional on carrying out R&D**



Note: Figures for 2013. R&D expenditure over total turnover of Spanish firms with 10 to 249 and 250 or more employees carrying out R&D.

Source: INE.

The R&D intensity of SMEs including all firms, which is about 0.7% in Spain on average, varies slightly across the four main regions (Figure S.18). R&D intensity in the North is 1%, well above the Spanish average, as is the case in the Mediterranean region, where R&D intensity is 0.9%. R&D intensity in the Centre is 0.8%, while the South displays a figure of 0.6%, hence being the only region below the Spanish average. If we consider the ACs, the Basque Country ranks clearly as the region with the highest intensity (1.6%), while the opposite is true for the Balearic Islands (0.2%).

**Figure S.18: R&D intensity of Spanish SMEs by region**

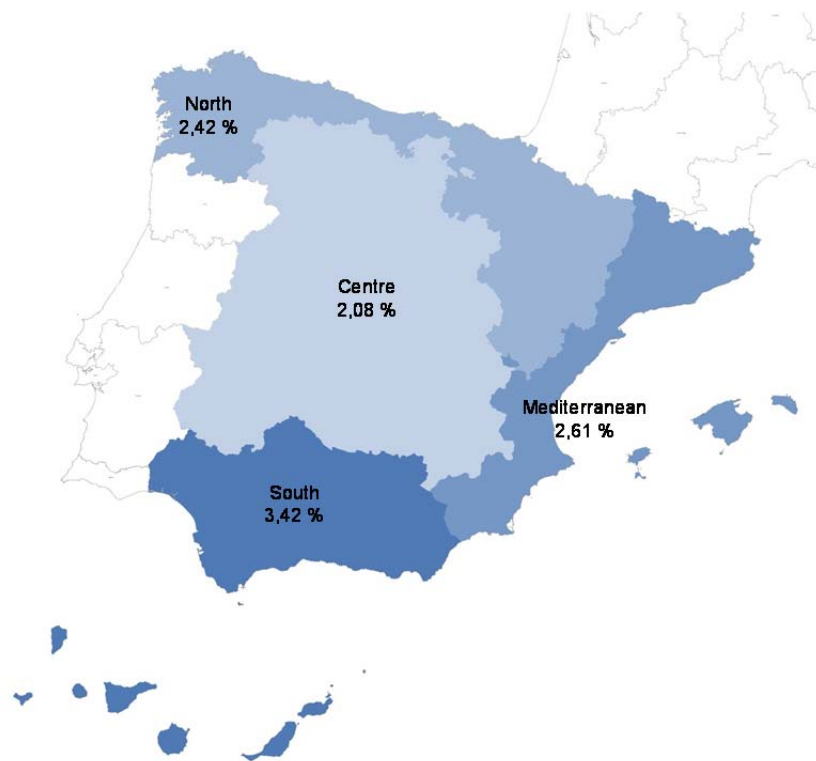
Note: Average of R&D expenditure over turnover including all Spanish SMEs by region. Figures for 2013.

Source: INE.

Continuing with R&D intensity, but focusing on SMEs that carry out innovative activities, there are again some regional differences (Figure S.19). In this case, it is the Southern region which displays the highest R&D intensity (2.4%), followed by the Mediterranean and the Northern regions (2.1% each). The region with the smallest intensity is in this case the Centre (1.8%). Hence, it appears that SMEs in the Southern region invest less on average than in other areas of Spain but those SMEs that do invest actually make a higher effort than SMEs in the rest of the country.

The previous comment about Southern SMEs is corroborated by data of R&D intensity of SMEs with R&D activities. Again, southern SMEs are more R&D intensive (3.5%), well ahead of Mediterranean SMEs (2.6%), northern SMEs (2.4%) and central SMEs (2.1%).

Looking again into ACs, the total expenditure on R&D was very concentrated in two regions, Catalonia and Madrid, which account for nearly half of the overall R&D expenditure in Spain. Adding the Basque Country, these three regions represented nearly two thirds of overall private investment in R&D between 2011 and 2013.

**Figure S.19: R&D intensity of Spanish SMEs conditional on investing in innovation by region**

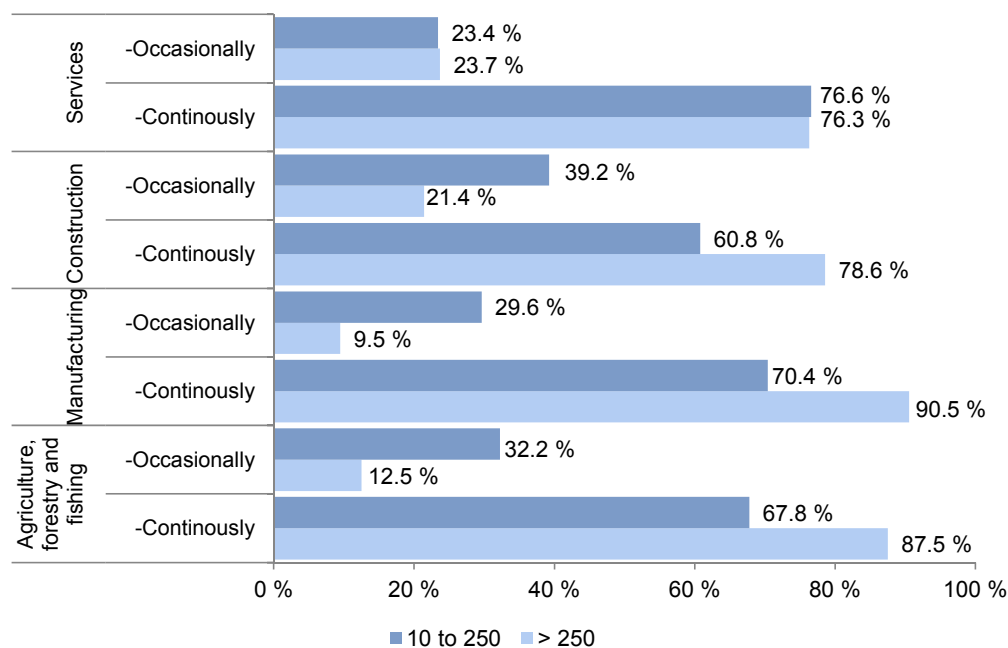
Note: Average of R&D expenditure over turnover for SMEs that implemented some kind of innovation (technological or non-technological, that is product, process, marketing or organisational innovations) by region. Figures for 2013.

Source: INE.

### Continuous versus occasional R&D

As we can see in Figure S.20, most companies engaged in R&D continuously rather than occasionally during 2013. To be more specific, in 2013, 70.4% of SMEs and 90.5% of large companies in the manufacturing sector were carrying out R&D continuously, while only 29.6% of SMEs and 9.5% of large companies carried out R&D occasionally. Perhaps unsurprisingly, continuous R&D activities are more prevalent in large than in small firms.

It is only in the service sector where there are almost no differences between SMEs and large companies in this respect.

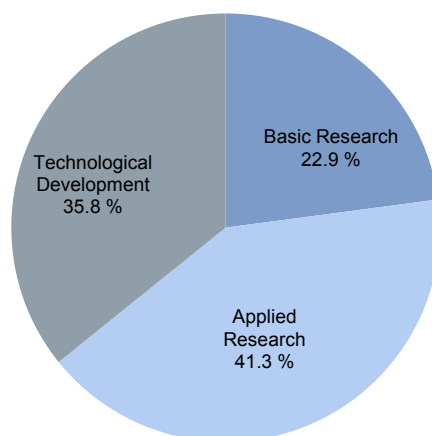
**Figure S.20: Continuous versus occasional R&D activities of Spanish firms**

Note: Share of Spanish firms that carried out R&D activities occasionally or continuously by sector and size class. Sample restricted to firms with R&D activities. Figures for 2013.

Source: INE.

### Type of R&D

The predominant type of R&D activity carried out by Spanish companies in 2013 was applied research (Figure S.21). It represented 41.3% of the overall amount dedicated to R&D activity.

**Figure S.21: Types of R&D activities of Spanish firms**

Note: Share of the total amount of R&D expenditures by Spanish firms allocated to different types of R&D. Figures for 2013.

Source: INE.

Technological development played an important role as well, representing 35.8% of the total amount allocated to R&D activity. With 22.9%, basic research played a much smaller role.

### R&D funding and implementation

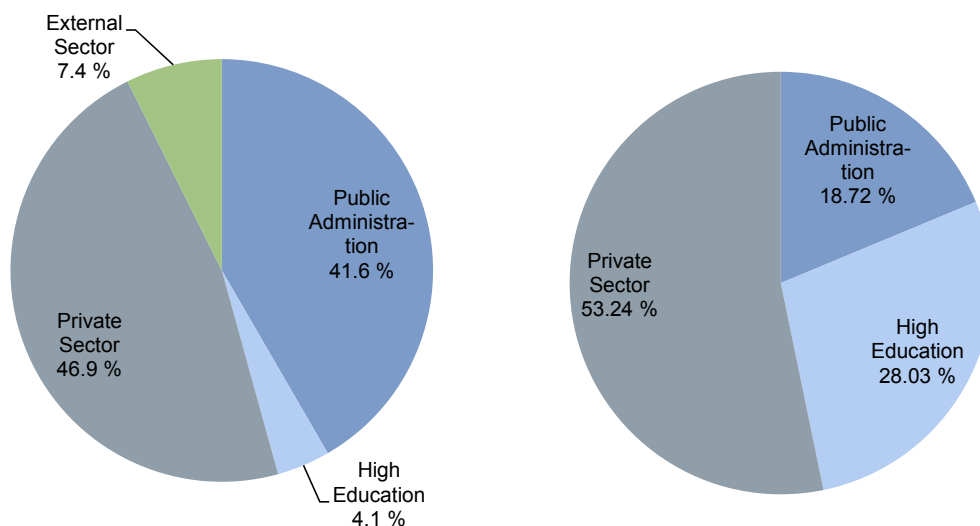
Regarding R&D, it is important to differentiate between the funding (who pays) and the implementation (who carries out the activities). Regarding the funding, private companies provided 46.9% of all financing of R&D in 2013, followed by public administration (41.6%), foreign funds (7.4%) and higher education institutions (4.1%) (Figure S.22, left hand side).

There is an upward trend of private funding of R&D, with an increment of 1.2% in 2011, 1.4% in 2012 and 0.6% in 2013. At the same time, there is a downward trend regarding funding from the public administration.

Related to the implementation of R&D in 2013, private companies spent 53.2%, higher education institutions (mainly universities) were responsible for 28% and public administrations made 18.7% of the overall Spanish R&D expenditure (Figure S.22, right hand side).

According to this data, the private sector still has a lower weight in Spain than in the EU-28 or OECD countries, both in terms of funding and implementation of R&D. Furthermore, the downward trend in sectors such as public administration or education in Spain contrasts with the upward trend in the EU-28 and OECD countries.

**Figure S.22: Funding and implementation of R&D in Spain**



Note: Share of total funds provided by a specific institution (left hand side) and share of total R&D expenditure made by specific institutions (right hand side). Figures for 2013.

Source: INE.

More specifically in relation to financing, the share of SMEs in the Spanish private companies' R&D contribution was 34.3% (15.9% in overall Spanish R&D). Differentiating between

sectors, SMEs were responsible for 81.2% of the overall R&D spending of private companies in agriculture but only 44.3% in construction, 42% in services and 26.6% in the industrial sector.

At this point it is important to note that the marginal effect of knowledge spillovers on a firm's probability of innovation increases six-fold when the firm carries out its own R&D activity.<sup>85</sup> Thus, if firm productivity should increase, the level of R&D carried out by the private sector should grow over the next few years, independent of its funding.

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<sup>85</sup> López-García and Montero (2010).



# Appendix

## Overview of national data sources

	France	Germany	Italy	Spain
		<b>Investment</b>		
Diffusion	SME Survey (Bpifrance)	KfW SME Panel 2007–2014 (KfW Research)		Survey on Access to External Finance of SMEs 2012 (Spanish Chamber of Commerce); National Accounts (INE); Central Balance Sheet Data (Bank of Spain)
Intensity	FIBEN Dataset (Banque de France)		MET Database 2008, 2009, 2011 and 2013	
Type	SME Survey (Bpifrance)	-		
Objectives	Investment in Industry Survey (INSEE)	-		
		<b>Innovation</b>		
Diffusion		KfW SME Panel 2009–2014 (KfW Research)		
Intensity	CIS 2012 (Eurostat)		MET Database 2008, 2009, 2011 and 2013	Innovations in Companies Survey 2013 (INE)
Type		KfW SME Panel 2014 (KfW Research), CIS 2012 (Eurostat)		
Revenues		-		
		<b>R&amp;D</b>		
Expenditures				Survey on R&D Activities 2013 (INE)
Intensity	R&D Survey 2012 (Eurostat/MENESR)		MET Database 2008, 2009, 2011 and 2013	Innovations in Companies Survey 2013 (INE)
Diffusion	CIS 2012 (Eurostat)	KfW SME Panel 2014 (KfW Research)		Survey on R&D Activities 2013 (INE)

## Details on national data sources

### France

FIBEN Dataset (Banque de France):

- Exhaustive dataset with balance sheet information on French SMEs with an annual turnover or a bank debt larger than EUR 750,000 and EUR 380,000 respectively.
- Based on French official statistical definition of SMEs as a group of juridical entities financially linked with less than 250 employees and, in most cases, EUR 50 million turnover or EUR 43 million balance sheet size.
- Global coverage of 75 % of total employees of French non-financial corporations
- Weak coverage of micro enterprises (less than 10 employees)

SME Survey (Bpifrance):

- Biannual survey on SMEs activity
- Around 4,000–5,000 respondents per wave
- SMEs defined as business legal entities with less than 250 employees; half of the sample is composed of firms with less than 10 employees

Investment in Industry Survey (INSEE):

- Quarterly survey on investments of industrial firms
- 4,000 industrial firms with more than 20 employees
- No results by size class

Community Innovation Survey, CIS (Eurostat, INSEE):

- Representative of all business companies in industry and services with at least 10 employees
- SMEs defined by business legal entities with less than 250 employees

European R&D Survey (Eurostat, MENESR-SIES):

- Representative of companies with at least one R&D employee (full-time equivalent)
- SMEs defined as business legal entities with less than 250 employees

## Germany

KfW SME Panel (KfW Research):

- Yearly representative survey on SMEs, defined as business legal entity with an annual turnover of up to EUR 500 million
- Carried out since 2003, with about 10,000 to 15,000 participants per wave
- Covers SME of all sizes from nearly all sectors except the public sector, banks, and non-profit organisations
- Topics include but are not limited to business performance, investment and innovation activities as well as financing issues.

## Italy

MET Survey (MET):

- Representative survey of Italian firms conducted by the MET private research centre
- Carried out in 2008, 2009, 2011 and 2013 with about 25,000 respondents per wave
- Covers firms with one or more employees (thus excludes self-employed) from the industrial sector (NACE Rev. 2 sections B to E) and production services sector (NACE Rev. 2 sections H, J and M)
- Topics include investment and innovation as well as R&D and internationalisation strategies of firms.

## Spain

Innovations in Companies Survey 2013 (INE):

- Yearly representative survey on innovation activities of companies with 10 or more employees.
- About 40,000 companies from all Spanish regions participate each year
- Extends to all agriculture, industrial, construction and service companies whose main economic activity corresponds to sections A to N, P (except branch 854), Q, R, and S (except branch 94) of the National Classification of Economic Activities CNAE-2009.
- Generally, the information given refers to the year of innovation activity. However, for those variables related to product and process innovation, information is given for a period of three years in order to ease international comparison.
- Conducted since 1994

Survey on Access to External Finance of SMEs 2012 (Spanish Chamber of Commerce):

- Quarterly survey on SMEs, defined as companies with 1 to 249 employees, that tried to obtain external financing during the last quarter
- Carried out by means of 400 telephone interviews with random selection taking into account the size of the SMEs according to DIRCE data.
- The survey was not continued after 2012.

Statistic on Scientific Research and Technological Development Activities 2013 (INE):

- Survey conducted jointly with the Innovation in Companies Survey since 2002
- Includes also firms with less than 10 employees.
- The final sample comprises about 57,000 companies each year
- Aimed at companies, public institutions, universities and private non-profit institutions that carry out scientific research and technological development activities in any scientific field, including social sciences and humanities, provided that they are located within national territory
- The collection method is a mixed system based on postal mailings and interviews.

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