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by Matteo Bugamelli, Francesca Lotti (eds.), Monica Amici, Emanuela Ciapanna, Fabrizio Colonna, Francesco D'Amuri, Silvia Giacomelli, Andrea Linarello, Francesco Manaresi, Giuliana Palumbo, Filippo Scoccianti and Enrico Sette

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PRODUCTIVITY GROWTH IN ITALY: A TALE OF A SLOW-MOTION CHANGE

by Matteo Bugamelli, Francesca Lotti (eds.), Monica Amici, Emanuela Ciapanna, Fabrizio Colonna, Francesco D'Amuri, Silvia Giacomelli, Andrea Linarello, Francesco Manaresi, Giuliana Palumbo, Filippo Scoccianti and Enrico Sette *

Abstract

Productivity is the main factor holding back long-term economic growth in Italy. Since the second half of the 1990s, productivity growth has been feeble both by historical standards and compared with the other main euro area countries. Understanding the reasons for such a performance and finding the most effective policy levers is crucial to increase Italy's potential growth rate. Against this background, we provide a detailed analysis of the data and a critical review of the available empirical evidence to identify both the structural weaknesses limiting productivity growth and the strengths of the Italian productive system that may support it looking forward. Since the end of the 1990s and more intensively since the second half of 2011, the reform effort has been particularly effective in the regulation of product and labor markets and industrial policy. On other factors which are very relevant for productivity dynamics, the reform action has been less effective so far.

JEL Classification: D0, E0, F0, G0, H0, J08, K0, L0.

Keywords: productivity, growth, business dynamics, innovation, human capital, labor, finance, regulation, policies.

Contents

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Executive Summary

Productivity is the main factor holding back long-term economic growth in Italy. Since the second half of the 1990s, productivity growth has been feeble both by historical standards and compared with the other main euro area countries. Understanding the reasons for such a performance and finding the most effective policy levers is crucial to raise Italy's potential growth rate.

Against this background, we provide a detailed analysis of the data and a critical review of the available empirical evidence, to identify both the structural weaknesses constraining productivity growth and the strengths of the Italian productive system that may support it looking forward. With an eye on the reforms implemented since the end of the 1990s, and more intensely after the 2011 Sovereign Debt crisis, we conclude by enlisting some policy priorities for the near future.

The dynamics of productivity differed across macro sectors. Until 2003 productivity was stagnant both in manufacturing and in private non-financial service sectors, with a negative growth gap with respect to France, Germany and Spain. Thereafter, manufacturing productivity picked up, displaying, since 2010, higher growth than in France and Spain: the heightened global competitive pressures supported significant structural adjustments with a reallocation of resources to the best performers; the long recession triggered further improvements in allocative efficiency, the exit of the worst performers, the entry of more selected firms and an increase in R&D expenditure. In the private non-financial service sector, however, productivity growth remained weak, both in absolute and relative terms; some improvements in terms of reallocation emerged only since 2010.

In explaining the underperformance of Italy's aggregate productivity, the heterogeneity across firms within each sector is a crucial element, relatively more important than the heterogeneity across sectors. This is the consequence of a very polarized productive system. On the one hand, there are many micro and small enterprises, which are on average old, have a limited attitude to innovation, to the adoption of advanced technology and to internationalization, are ineffective in their management skills and practices and have a vulnerable financial structure; due to such weaknesses these firms were severely hit by globalization (the entry of China and emerging economies into global markets) and, during the Great Recession, the collapse in demand and the credit crunch. Such a large share of micro and small firms curbs aggregate productivity growth not only via a composition effect (given the typical correlation between size and productivity), but also because in Italy these firms are on average less productive and dynamic than their euro-area counterparts (an observation that does not apply to medium and large enterprises).

On the other hand, there is a small set of firms, mostly medium- and large-sized, whose efficiency, performance and strategies (in terms of innovation, technology and exports) are comparable to the most successful European competitors; these firms have been able to react to the shocks that hit the Italian economy and to cope with the many institutional frictions by strengthening innovation, upgrading technologies and product quality, and opening up the financial structure to equity capital. It is these firms that are currently supporting growth. However, these high-performance firms' average size and share of value added are smaller in Italy than in other countries.

Before the crisis the banking system sustained aggregate productivity growth: with no convincing evidence of capital misallocation, the significant expansion of credit supply supported input accumulation and R&D expenditure favoring improvements in firms' productivity. In the subsequent years the credit crunch triggered by the financial and sovereign debt crises had negative effects on

investment and efficiency instead. Some cases of 'zombie lending' were observed, but they have not been such as to significantly weaken allocative efficiency; rather, the opposite happened, through the cleansing effect of the tightening of credit standards.

Overall, the long recession triggered by the financial and sovereign debt crises appears not to have caused a permanent loss in terms of trend productivity growth. Indeed the negative, and potentially persistent effects due to the significant contraction of economic activity and capital accumulation have been somewhat offset by improvements in allocative efficiency and growth in R&D intensity.

***

An economy that is populated by a group of firms on the cutting edge of technology and competitive on a worldwide scale, and that is going through a non-negligible restructuring process, has the potential to reduce the growth gap accumulated in the past. To help this potential to emerge, though, economic policies have to act in four ways: i) by increasing firms' efficiency, by supporting product, process and organizational innovations, the adoption of new technologies and improvements in the skills of the workforce; ii) by improving the capacity of the system as a whole to allocate capital and labor towards the more productive firms, including some of the micro and small ones which have the potential to succeed on a larger scale; iii) by strengthening the 'up-or-out dynamics' according to which newborn firms should either grow to a reasonable size or exit the market early on; and iv) by favoring the exit of inefficient firms to free up resources for better uses.

Turning to policies, the ten years before the Great Recession can be considered a 'lost decade' when assessed against the objective of raising productivity growth – although in the same period policies were successful in reducing unemployment to historically very low levels. Important exceptions were the competition-enhancing measures in retail – with visible effects in terms of higher efficiency and lower prices – and in the main network industries (electricity, gas and telecom).

The reform effort has intensified since the second half of 2011. Further interventions have been adopted in the realm of product market regulation (extended to sectors such as professional services, retail and transport); the labor market and industrial policy to support innovation have been profoundly reformed. Labor market reforms have enhanced firms' flexibility in the use of labor and offered workers more generous and universal support in case of job loss; the redesign of Active Labor Market Policies is also a step forward, even if they are yet to be fully implemented. Other measures aimed at supporting innovation and technology adoption (R&D tax credit, patent box, Industry 4.0), a more equity-based financial structure for firms (Allowance for Corporate Equity) and the development of a financial industry specialized in the early phases of a firm's life (tax incentives for the financing of start-ups). These interventions have the potential to raise employment and growth, although by their very nature their effects can only be quantitatively assessed over time.

To date, the reforms have been less effective with regard to the removal of tax and regulatory disincentives to firms' entry and growth, the ability to provide the economy with efficient infrastructures – both digital and institutional –, a sound public administration, an efficient judicial system, an education system able to supply a higher quality and quantity of human capital, and an industrial relations system favoring decentralized wage bargaining with a strong focus on firm-level productivity. The empirical evidence we survey in this paper suggests that lack of progress in all these areas has major negative implications for allocative efficiency and firm dynamics; such findings suggest that these areas also identify the main policy priorities. The inefficiency of the public administration may not only have direct effects on the growth potential, but also decrease the effectiveness of the reforms already implemented.

1. Introduction*

At the 2017 ECB's Sintra Forum, Chad Jones said that *"Perhaps the most remarkable fact about economic growth in recent decades is the slowdown in productivity growth that occurred around the year 2000"* (Constancio et al., 2017). The phenomenon has become definitely more pronounced in the aftermath of the Great Recession and more diffused across emerging, developing and advanced economies. Some scholars have seen in these developments worrying signals of a "secular stagnation": Gordon (2012) claims that future economic growth may slow further owing to a number of structural issues related to the supply-side and common to most developed countries like demography, inequality, globalization, and the overhang of consumer and government debt.

Within this global trend, Italy stands out: productivity has been the main determinant of the dismal GDP growth recorded in the last 20 years (Giordano et al., 2015). A growth accounting exercise whereby the evolution of GDP is decomposed in its main components, i.e. productivity vs input growth, helps to make the point (Table 1). Over the period 1995-2016 the performance of the Italian economy was poor not only in historical terms but also and more importantly as compared with its main euro-area partners. Italy's GDP growth – equal to 0.5 per cent on an average yearly basis against 1.3 in Germany, 1.5 in France and 2.1 in Spain – was supported by population dynamics, entirely due to immigration, and the increase in the employment rate, while labor productivity and in particular TFP gave a zero (even slightly negative) contribution, contrary to what occurred in Germany and France and, only for labor productivity, in Spain.

Italy's negative productivity growth gap characterized both the pre-crisis (1995-2007) and the crisis periods (2007-13). In the latter, the collapse of TFP growth in Italy (-0.9 per cent per year on average) contrasts with the experience of the other European economies that managed to maintain a constant level of TFP (Germany and Spain) or limit its decline (France) during the crisis. The collapse of Italy's productivity since 2008 has added to the sharp reduction in the employment rate and to the declining contribution of capital intensity in determining a contraction of GDP in the order of 1.5 per cent per year on average.[1] Italy's growth gap with respect to the other main euro-area countries remained negative also during the recovery (2013-16), when TFP resumed to a moderate growth rate

* We wish to thank Fabrizio Balassone, Federico Cingano, Sergio de Nardis, Eugenio Gaiotti, Fabiano Schivardi, Paolo Sestito, Federico Signorini, Roberto Torrini, Ignazio Visco and participants to the seminars at the European Commission, the IMF and New York University-Casa Italiana for their insightful comments. We are very grateful to Marco Chiurato for his very accurate editorial assistance. Any error remains the authors' responsibility.

[1] In Spain, where GDP contracted as well, although less in absolute terms, hourly productivity and capital deepening partially compensated the negative employment dynamics.

while labor productivity remained stagnant also as a reflection of measures aimed at supporting employment. These figures and the application of an Hodrick–Prescott filter to the time series to net out productivity dynamics from its cyclical component point to a long-dated, persistent and therefore structural problem (Figure 1) .

Against this background, this paper provides a detailed analysis of the data and a critical review of the available empirical evidence. The aim is to identify the main structural and Italy-specific weaknesses that have been constraining productivity growth for such a long time, along with the acknowledgment of quite a few strengths of the Italian productive system. This is to say that we do not contribute to the "secular stagnation" debate from the Italian perspective, but on the contrary we just keep it on the background of our analysis since we are convinced that Italy's performance has country-specific causes that are dominating the impact of other worldwide-relevant factors.

Our starting point is the thesis advanced by Brandolini and Bugamelli (2009) in a report on the Italian productive system written at the onset of the 2008 international financial crisis. Their idea is summarized in the following citation: '*The growth deficit of the Italian economy […] is attributable to structural characteristics of the productive system, many aspects of which have remained unchanged for decades, and which have proved ill-suited to addressing the new competitive pressures and fully exploiting the opportunities offered by technological innovation and European and global economic integration'*. The structural characteristics that the report considered to be the most important obstacles to growth were the lack of competition in some service sectors, the limited size of financial markets, the ineffectiveness of industrial policy measures, the heavy fiscal burden on firms combined with a corporate tax system unfavorable to growth, and a labor market regulation aimed at increasing employment to the detriment of firm-level productivity and allocative efficiency. The report also emphasizes the transversal role of firm size: '*[s]maller firms find it difficult to absorb the fixed costs connected with the launch of an export activity or production abroad and the informational asymmetries related to the modes of access to foreign markets; nor are they able to exploit the economies of scale inherent in technological innovation and in all those other activities upstream and downstream of production – marketing, advertising, distribution networks – that […] are fundamental for the competitive capacity of firms'*.

Since that report was published many things have happened, above all, the 2007-2008 global financial crisis and the 2010-11 European sovereign debt crisis which caused a GDP loss of about 11 percentage points. Many analyses on the years of the crisis confirm and often strengthen the idea that because of its pre-dated structural weaknesses, the Great Recession was longer and more intense in Italy than in the other main euro-area economies. After the abrupt and unexpected failure of Lehman Brothers when world trade and production sharply dropped, it is found that the performance in terms of turnover, employment and investment was relatively better for those firms that had started a

restructuring process in the period 2000-06 to cope with the above mentioned increased competitive pressures (Bugamelli et al., 2009; Bugamelli et al., 2010). Unfortunately, these 'good' firms were a small minority, as all the others suffered greatly from the gradual tightening of lending conditions by banks and the sharp contraction in domestic demand, often stemming from the drying up of subcontracting relationships. This dichotomy constantly characterized the crisis years and the subsequent recovery (see various Bank of Italy Annual Reports and Istat Competitiveness Reports; see also Bugamelli et al., 2017 on the recovery of exports).

The observation that the firm characteristics constraining Italy's growth and competitiveness before the crisis were the same as those explaining the divergent performance during the crisis is consistent with the idea that the 1998-2007 period was a 'lost decade' in terms of policy actions (Bassanetti et al., 2014): Italy's public finances experienced a phase of steady deterioration[2] and policy actions largely failed to tackle the country's structural problems.[3] The only exceptions were in the product market regulation area where in different phases (1998 and 2007) important sectors such as network industries and retail were liberalized.

We add new elements in three areas to this picture. First, we take a more focused and more detailed look at productivity. In this regard, we dig into the data by breaking down productivity dynamics by sector and firm characteristics (Section 2) and distinguishing the contribution from three different mechanisms: productivity growth at the firm level, reallocation of resources to more productive uses (allocative efficiency), and firm demographics, that is, entry into and exit from the market (Section 3). Second, we review the economic literature related to a wide range of possible determinants of productivity growth so as to single out the most important ones in the case of Italy. For clarity we distinguish between factors that are internal (Section 4) and external (Section 5) to the firm. For each determinant, we try to identify the main channels so as to build a clear link with the analysis carried out in the previous sections. Our approach is dominated by a firm-level perspective in

[2] After 1997, Italy's public finances entered a phase of rapid and continuous deterioration; the primary surplus, which stood at 6.6 per cent of GDP in 1997, was virtually nil in 2005. In 2006-07, following the opening in 2005 of the Excessive Deficit Procedure for Italy, fiscal policy turned restrictive again and in 2007 the primary surplus reached 3.4 per cent of GDP, benefiting from the cyclical upturn.

[3] Labor market reforms successfully increased employment and reduced unemployment, but were not part of a comprehensive redesign aimed at improving reallocation across sectors and firms (Brandolini et al., 2007). With regard to company law, important measures concerning shareholders' rights and transactions subject to conflicts of interest have brought Italian legislation broadly into line with the prevailing international standards. However, ownership and control structures have changed to a limited extent, especially among unlisted companies: the still high private benefits of control may have helped preserve a model centered on family ownership. Major reforms have been made to the bankruptcy law to ensure a more efficient management and encourage earlier recognition of ailing companies. Although the range of subjects allowed to declare bankruptcy has been extended, at the end of that reform process the access to bankruptcy proceedings was still denied to a large number of small-sized enterprises and debtors (Bank of Italy, 2008).

line with the most recent developments in the productivity literature[4] and with the idea of exploiting and explaining the very wide firm-level heterogeneity in Italy.

Third, having identified the relevant determinants and mechanisms we turn to policies and ask what the most effective levers are that still need to be activated to increase Italy's potential output and growth perspectives. This requires an assessment of the effects of the wide-ranging reforms that have been introduced by Italian governments since the second half of 2011 and have touched many aspects of the Italian economy. For this, we make use of the available evidence that can help to better identify the direct effects of policy measures and the mechanisms. In Section 6 we draw our conclusions and discuss what, in our view, the remaining policy priorities are that can improve Italy's productivity and potential growth in the medium-long run.

Before turning to the results, three caveats are necessary. First, the focus of this paper is on structural and supply-side issues. This does not mean that demand is not important for productivity developments. Demand surely played an important role during the recent double recession: the negative figures we reported above are the result of an abrupt collapse in foreign demand in 2008-09 and in domestic demand after 2011. In particular, demand issues (both levels and uncertainty) have determined a prolonged weakness in investment by private firms, thereby delaying supply responses. However, we think that structural features play an important role as proved by the persistently sluggish growth independently of the cyclical phase and in comparison with the other main euro-area economies.[5] To use Governor Visco's words from his July 2017 speech at the Italian Banking Association's assembly: '*But to erase the legacy of the most severe economic crisis in our nation's history […], we need more than just a cyclical recovery. In Italy economic development is still hampered by the rigidities and inefficiencies of the environment in which firms operate and by weak productivity growth. The process of reform must continue, requiring a collective commitment, far-sightedness and measures to mitigate the costs of the transition'*.

Our second caveat refers to 'the costs of the transition' which must be kept in mind when drawing policy conclusions. In fact, while the goal of raising productivity is justified for economic reasons, policy making should always consider the general equilibrium effects that measures aimed at strengthening efficiency may have on other economic variables. These effects could be particularly significant in the short run and, more importantly, affect welfare for example by increasing inequality,

[4] There is plenty of evidence showing that heterogeneity in productivity across firms within a sector is much more pervasive than that across sectors. For US data Syverson (2004) shows that establishments at the 90th percentile are almost twice as productive at those at the 10th percentile within the same narrowly defined industry.
[5] This comparison is key for the analysis in that it allows us to net out, at least conceptually, the effects of a unique monetary policy, common fiscal rules, and somehow synchronized business cycles at the euro-area level.

unemployment or reducing the quality of employment (Bassanini and Cingano, 2017). In strictly analytical terms, these aspects go beyond the scope of this paper, but when needed we will recall them when drawing our policy conclusions.

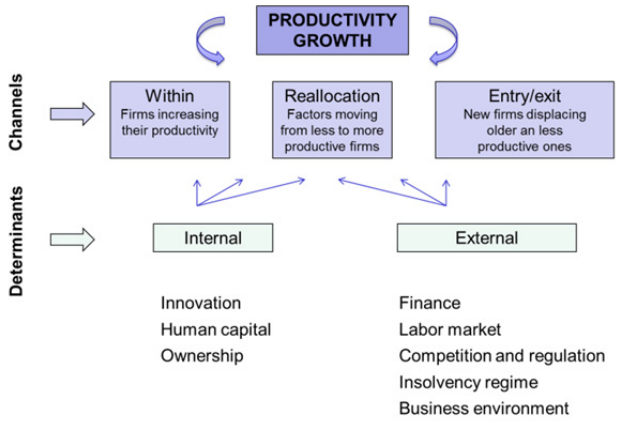
Finally, along with the many issues we do not deal with, the North-South gap merits to be mentioned since it is still very large along many dimensions and also growing (Bank of Italy, 2017). While the Southern economy deserves a dedicated analysis (Bank of Italy, 2010), we believe that it is worthwhile to focus on the many relevant hurdles and frictions limiting the growth of the Italian economy as a whole.

The main insights from our analysis of the data can be summarized as follows.

- The dynamics of productivity differed across macro sectors. Until 2003 productivity was stagnant both in manufacturing and in private non-financial service sectors, with a negative growth gap with respect to France, Germany and Spain. Thereafter, manufacturing productivity picked up, displaying, since 2010, higher growth than in France and Spain: the heightened global competitive pressures supported significant structural adjustments with a reallocation of resources to the best performers; the long recession triggered further improvements in allocative efficiency, the entry of more selected firms and an increase in R&D intensity. In the private non-financial service sector, however, productivity growth remained weak, both in absolute and relative terms; some improvements in terms of reallocation have only emerged since 2010.
- Firm heterogeneity within a sector is more important than that across sectors in explaining the underperformance of Italy's aggregate productivity. This is the consequence of a very polarized productive system:
  - On the one hand, there are many micro and small enterprises, which are on average old, have a limited attitude to innovation, to the adoption of advanced technology and to internationalization, are ineffective in their management skills and practices and have a vulnerable financial structure; these firms were severely hit first by globalization (the entry of China and emerging economies into global markets) and then, during the Great Recession, by the collapse of demand and the credit crunch. Such a large share of micro and small firms restrains aggregate productivity growth not only via a composition effect (given the typical correlation between size and productivity), but also because in Italy these firms are on average less productive and dynamic than their euro-area counterparts (an observation that does not apply to medium and large enterprises).

- On the other hand, there is a small set of firms, mostly medium- and large-sized, whose efficiency, performance and strategies (in terms of innovation, technology and exports) are comparable to their most successful European competitors; these firms have been able to react to the shocks that have hit the Italian economy in recent years and to cope with the many institutional frictions by strengthening innovation, investing in new technologies, upgrading product quality, and opening up the financial structure to equity capital. It is these firms that are currently supporting growth (Figure 2). Still, these high-performance firms' average size and share of value added are smaller in Italy than in other countries.

Then we turn to the determinants and try to understand how each of them is linked to the channels of productivity growth as depicted in the diagram below.



Our studies lead us to the following conclusions.

- Italy's *innovation and technology gap* is one of the main determinants of its unsatisfactory growth performance. The analyses suggest that, apart from a few highly innovative, productive, and internationalized firms on the 'productivity frontier', the negative gap reflects underinvestment by a great majority of firms, especially those of a micro and small size. The latter firms are less able or less willing to face the risks and costs of undertaking innovative projects, hire and train skilled workers, adopt organizational innovations, benefit from knowledge spillovers, adopt new technologies developed on the market. The recently redesigned industrial policy setting, which covers the whole innovation chain (start-up firms, R&D-intensive firms and multinationals) should help to close the Italian productive system's gap.
- *Human capital* is another key driver of growth which is also closely connected to innovation capabilities. Italy has a quantitative and qualitative shortage of it when compared with other advanced economies which is the result of negative feedbacks between demand and supply. On the one hand, a firm's propensity to invest in new technologies, provide on-the-job training, and demand skilled labor is

checked by difficulties in finding and recruiting adequately skilled workers; on the other hand, the resulting low returns to education and, more in general, to investment in human capital limits the incentives of young people to accumulate human capital within the education system and of older ones while they are already working. Some difficulties in efficiently matching supply and demand within the Italian labor market further lower the returns to education.

- The decisions on the quality and quantity of input, on technology adoption, on innovation strategies and on the size of the firm are taken by managers that answer to the owners of that firm. So it is particularly important to understand which *ownership and management* features affect a firm's performance. While the share of Italian companies owned by a family is comparable to that of other EU countries, those where most of the management belong to the owner family account for a remarkably high share in Italy. We show that overly pervasive family management is associated with worse management practices, less efficiency, and a lower propensity for internationalization and innovation.

- Most of the productivity-enhancing choices a firm makes need finance which in Italy usually means *bank credit*. Empirical firm-level evidence concludes that the expansion of credit supply before the crisis supported not only the accumulation of input but also productivity improvements through a higher propensity to R&D expenditure; by the same token, the credit crunch recorded during the recession had negative effects: it curbed the growth potential of new entrants and reduced the investment and efficiency of credit-constrained firms.

- As to the link between *credit and misallocation*, the strong growth of credit in the decade before the financial crisis did not appear to have worsened the allocation of inputs across firms and sectors. During the crisis, tighter credit constraints and distorted incentives for banks only had limited negative effects on allocative efficiency which were then more than offset by recession-induced cleansing effects.

- The lack of development of alternative forms of financial intermediation, such as *venture capital and private equity*, keeps on impinging negatively upon the starting-up of new innovative entrepreneurial initiatives and the growth of incumbent firms with unrealized potential. The recent incentives to invest in venture capital funds and in innovative start-ups should help to strengthen the contribution of new projects and enterprises to Italy's innovation and productivity growth.

- The degree of allocative efficiency also depends on *labor market regulation*, in particular on employment protection legislation, and passive and active labor market policies. An examination of cross-country evidence shows how Italy was lagging behind in these dimensions, though a comprehensive reform strategy, started in 2012 and continued in 2015, has significantly improved the functioning of the Italian labor market, thereby increasing its contribution to allocative efficiency.

- Further support for growth in productivity and competitiveness requires a change in the *industrial relations system* so as to guarantee a greater differentiation of wages across and within firms to allow for a closer link between remuneration on the one hand and the local labor market and productivity conditions on the other.
- While recent globalization forces have boosted exports and imports and had positive effects on Italian manufacturing productivity via both reallocation effects and as part of firm adjustments, cumbersome *regulations related to the start-up* of new entrepreneurial projects – especially lengthy registration and startup procedures – has a strongly negatively effect on the average quality of entrepreneurial projects, firms' incentives to innovate and grow in size, and therefore productivity growth. *Product market regulation* is still too restrictive and limits firm size and efficiency in some service sectors like local public services and professions.
- *Insolvency procedures* should encompass fast and effective liquidation procedures that are key to productivity growth because they prevent assets from being used unproductively and favors their reallocation to more productive areas. In Italy, such procedures are still lengthy and uncertain and their efficacy is hindered by the inefficiency of the civil justice system.
- Efficient resource allocation requires the effective *enforcement of contracts* and protection of property rights: court proceedings are very slow in Italy, both in absolute terms and by international standards.
- Finally, the *rule of law*: the widespread presence in the market of firms that 'do not respect the rules' because they evade taxes, pay bribes to government officials or operate in connection with politicians distorts market selection and has a negative impact on aggregate efficiency.

Last but not least, it must be noted that the long recession triggered by the financial and sovereign debt crises appears not to have caused a permanent loss in terms of trend productivity. Indeed the negative, and potentially persistent, effects due to the significant contraction of economic activity and capital accumulation have been counterbalanced by improvements in allocative efficiency – the contraction and sometimes the exit of the least efficient firms and the expansion of the most efficient ones – and increased R&D expenditure, especially by the most productive firms which were able to improve their efficiency.[6]

[6] A somewhat similar result is found by Blanchard (2017) for the US.

2. Productivity dynamics: what the data say

Before looking at the data, it is necessary to clarify that we make use of all the possible measures of productivity – value added per employee, hourly productivity, total factor productivity (TFP), in real or nominal terms, depending on their availability. This is because we do not want to constrain the scope of our analysis to the set of studies, inevitably very small, that use a strictly comparable measure. However, in the case of Italy this is not a major issue since the assessment on productivity does not change much with the measure used as shown in Figure 3. This is reassuring when we take the analysis at the firm level given all the technical issues (see Box 1) impeding to estimate true technology and management efficiency with Italian firm-level data (so called TFPQ).

Since the second half of the nineties hourly labor productivity displayed very different dynamics across the main four euro-area countries (Figure 4), while the contribution of the capital intensity has a common pattern (rising until the beginning of the recession and subsequently falling until reaching negative values in Italy and Spain in the years 2013-16). Over the whole period 1995-2016 productivity grew by 0.3 per cent on average per year in Italy, a very low figure as compared to Germany (2.0 per cent) and France (1.8 per cent); the performance of Spain was slightly better than Italy's (0.5 per cent). The negative gap in Italy's productivity dynamics as compared to the other countries has been large both before and after the burst of the international financial crisis in 2008. Between 1995 and 2007 hourly labor productivity increased at an annual average rate of 2.9 per cent in Germany, 2.3 in France while only by 0.4 per cent in Italy; in Spain it decreased by 0.2 per cent. After 2008 and until 2015, all countries recorded a significant slowdown but the Italian gap with respect to Germany and France remained negative (0.1 per cent in Italy, 0.8 in France, 0.5 in Germany); Spain's productivity recovered significantly increasing on average by 1.6 per cent per year. Productivity dynamics has been mirrored by the evolution of profit margins which increased in most euro-area countries, particularly in Germany and Spain, but decreased in Italy and France (Amici et al., 2017).

Breaking down this aggregate dynamics by macro sectors of activity uncovers an important difference between manufacturing and services in Italy (Figure 5). Productivity stagnated in both macro sectors until the beginning of the 2000 decade. After that productivity started increasing in the manufacturing, more decisively so after 2003[7]: in particular it increased by 1.6 per cent per year on average between 2003 and 2007, and accelerated to 1.9 per cent after 2009. In the services as a whole productivity remained stagnant over the whole period. In the private non-financial services, hourly

[7] The figures for manufacturing have been repeatedly revised upwards by the Italian National Institute of Statistics (Istat), see Bank of Italy (2012).

productivity has declined by 0.4 per cent on average over the last fifteen years, mainly because of the declining developments in the professional, scientific, and business technical support activities and the stagnation recorded in the 2000s in retail, transportation and accommodation services. Similar results emerge when isolating productivity dynamics from its cyclical component using a Hodrick–Prescott filter: while in manufacturing productivity has been growing, with a slight slowdown in the first years of the Great recession, non-financial services recorded a steady decline since 2000, which is mostly driven by the extremely poor performance of the professional services (Figure 6).

However, in both macro sectors Italy has performed worse than the other main euro area countries. Between 1995 and 2015 manufacturing productivity grew at an average annual rate equal to 4.7 in France, 2.9 in Germany, 1.8 in Spain, and 1.2 in Italy. In the service sector, the figures are: 1.1 in France, 1.6 in Germany, 0.1 in Spain and -0.1 in Italy.

Having said that, there are some sector-specific issues that deserve some attention. As to manufacturing, is the recovery observed since 2003 the result of a structural transformation or instead is it a euro-wide cyclical pattern? If it is a structural transformation, how did it occur? What triggered it? As to services, are there sector-specific regulatory distortions that may negatively impact on aggregate productivity above the sector's weight due to some negative externalities on the rest of the economy?

Another dimension to be investigated is firm size. It is well known that Italy is the country with the most fragmented productive system as compared to other EU economies. In Italy microenterprises, i.e. those with less than 10 employees, account for 95 percent of the total number of firms, for 29 percent of total value added. On the other tail of the distribution, large companies, with more than 250 employees, do not reach 0.1 per cent in terms of number of firms, against 0.5 and 0.2 in Germany and France, respectively (Figure 7). This feature does not reflect Italy's productive specialization in the so-called "traditional" sectors, like textile, leather, shoes, and clothing, where economies of scale matter less. A standard shift-share decomposition shows how the main contribution to such a different market structure originates within sector, that is to say that in any sector Italian firms are on average smaller than foreign ones (Table 2).

What is the problem with this structure? By simply looking at productivity, both levels and dynamics, across firm size classes and countries, it is quite clear that Italy's peculiarity is a serious drag on aggregate productivity. On one side, in all countries and for reasonable technological reasons the correlation between productivity and size is positive: in Italy the productivity level in larger firms more than doubles that of companies with fewer than 10 employees. This implies that the predominance of small and micro firms in Italy negatively affect aggregate figures for a simple composition effect. But there is more. Comparing productivity levels and dynamics across countries but within size class, it

emerges that Italian smaller firms are relatively less efficient than their European counterparts: the same gap between larger and smaller firms in Germany is only 48 per cent (Figure 7).

So this evidence calls for explaining why there are so many small and micro firms in Italy and why these firms are low productive as compared to similar firms in other countries. When raising the issue of firm size, one should not take a cross-sectional and static perspective but rather focus on the capacity and willingness of successful firms to grow and gain market shares.

Box 1: The measurement of firm-level productivity

While the concept of technical efficiency is relatively simple – the amount of output per unit of inputs – its measurement at the firm level can be quite problematic, since it relies on assumptions about the production function, the environment in which the firms operate (i.e., the market structure) and the and the availability of suitable data. To make clear this point, let us consider a simple Cobb-Douglas production function:

$$Q_{it} = TFPQ_{it} L_{it}^{\alpha_l} K_{it}^{\alpha_k} M_{it}^{\alpha_m}$$

where Q_{it} is output measured in physical units, $TFPQ_{it}$ is a measure of productivity or technical efficiency, and L,K,M are inputs used in production (labor, capital and materials). One popular approach used in the profession to measure productivity is to estimate the output elasticities of the production function using a control function approach (Levinsohn & Petrin, 2003; Olley & Pakes, 1996) and then recover productivity as a residual:

$$\widehat{tfpq_{it}} = y_{it} - \widehat{\alpha_l} l_{it} - \widehat{\alpha_k} k_{it} - \widehat{\alpha_m} m_{it}$$

where lower case denotes logs (see Syverson (2011) for a survey of the literature on productivity estimation). When turning to firm-level data, they do not typically contains output quantities, but rather data on revenues. Given this limitation, the resulting measure of productivity is a combination of output prices and physical productivity:

$$\widehat{tfpr}_{it} = p_{it} + tfpq_{it} \quad (1)$$

where the term $\widehat{tfpr}_{it}$ is also known as revenue productivity (Foster et al., 2008). From equation (1) it is evident that output price heterogeneity at the firm level affects productivity: if not appropriately accounted for, productivity in the proper sense of technical efficiency cannot disentangled from costs and markups. Put differently, the estimates of revenue productivity confound true technical efficiency ($tfpq_{it}$) with prices (p_{it}) which in turn reflect other factors like input prices, product differentiation, market structure and market power. As pointed out by De Loecker and Goldberg (2014), most of the studies on productivity *"[…] has been loose in its use of the term productivity. What it actually delivers is a measure of firm performance or profitability*".

The same critical issues apply to the measurement and analysis of productivity dynamics. Taking the first difference of equation (1):

$$\Delta\widehat{tfpr}_{it} = \Delta p_{it} + \Delta tfpq_{it}$$

the change in TFPR for a firm experiencing a true productivity shock (i.e., a change in TFPQ) is an exact proxy of the latter if and only if output prices do not adjust to the productivity shock. If instead the firm reduces its output prices as a result of a greater productive efficiency, then the change in revenue productivity is smaller than the true change of technical efficiency. The opposite happens if price goes up because, for example, of a product quality improvement.

Recently, the empirical literature on productivity has proposed several solutions to overcome this problem. On Belgian data, De Loecker (2011) proposes a methodology that exploits the removal of trade barriers in the textile industry to control for demand shocks that affect price heterogeneity, so that he can recover a measure of productivity that reflects only technical efficiency. De Loecker and Warzynski (2012) estimates firm-level

markups from revenues data and document a substantial heterogeneity in markups across firms; importantly, while not estimating physical productivity, they show that markups are related to several firm characteristics that are in turn potentially correlated also with TFPQ. Smeets and Warzynski (2013) make a step forward since they directly observe output prices for Danish manufacturing firms: they find that productivity premia of exporting firms are larger once output price heterogeneity is appropriately controlled for.

Italy is one of the many countries where firm-level data on output prices are not available in a very detailed and consistent manner. To the best of our knowledge, the only work trying to disentangle the contribution to firms growth of true efficiency dynamics from demand changes is Pozzi and Schivardi (2016). Using data on a panel of Italian manufacturing firms with firm-level prices, they show that both productivity and demand heterogeneity are equally important in shaping firm growth.

3. A decomposition of productivity growth: the different margins

Aggregate labor productivity (Φ) in year t corresponds to the weighted average of the individual firm's productivity (ϕ_i), with the weights (ω_i) being the firms' share on total employees. Formally:

$$\Phi_t = \sum_{i=1}^{n} \phi_{it}\, \omega_{it} \qquad (1)$$

Aggregate productivity (Φ_t) can be further decomposed in the sum of the unweighted average firm productivity ($\bar{\phi}$) and the covariance between firm productivity and the share of employees $cov(\phi, \omega)$:

$$\Phi_t = \bar{\varphi}_t + Cov(\varphi_{it}, \omega_{it}) = \bar{\varphi}_t + \sum_{i=1}^{n} (\varphi_{it}, \bar{\varphi}_t)(\omega_{it}, \bar{\omega}_t) \qquad (2)$$

The covariance term is often referred to as "Olley and Pakes (OP) covariance". In Olley and Pakes (1996), this decomposition – applied to the US telecommunications industry – allowed the authors to distinguish between the efficiency gains deriving from a reallocation of resources towards the most productive firms (measured by the OP covariance), and those arising from the productivity growth of individual firms (captured by the average productivity term).

Equations (1) and (2) hide a third element, which is firm demographics that is the contribution to aggregate productivity dynamics coming from the entry of new firms and the exit of some of the existing firms: their different productivity levels and the resources they employ or release can affect productivity through the two channels described above. Considering two consecutive years (t-1) and t, entrant firms at year t (E) are those active at t but not at (t-1), exiting firms at year t (X) are those that were active at (t-1) but no more at t, incumbent firms (S) are those active in both years. Distinguishing these three groups (g), equation (1) can be written in the following way:

$$\Phi_t = \sum_{i=1}^{n} \phi_{it}\, \omega_{it} = \sum_{g \epsilon G} \Phi_{gt}\, \omega_{gt} \qquad (3)$$

where the weights ω_{gt} correspond to the share of employees in group g, Φ_{gt} represents the aggregate productivity of group g, and G = (E; X; S).

A dynamic version of equation (2) can be derived following the methodology — known as dynamic OP decomposition —proposed by Melitz and Polanec (2015). Considering two consecutive time periods, the aggregate productivity of the first period (Φ_1) can be expressed as the weighted average of the productivity of the surviving firms and that of the firms that will exit the market (g=X); analogously, the aggregate productivity of the second period (Φ_2) can be expressed as the weighted average of the productivity of the surviving firms (g=S) and that of the firms that entered into the market (g=E):

$$\Phi_1 = \Phi_{S1}\omega_{S1} + \Phi_{X1}\omega_{X1}$$

$$\Phi_2 = \Phi_{S2}\omega_{S2} + \Phi_{E2}\omega_{E2}$$

The difference between Φ_2 and Φ_1 gives the variation in aggregate productivity:

$$\Phi_2 - \Phi_1 = (\Phi_{S2} - \Phi_{S1}) + \omega_{E2}(\Phi_{E2} - \Phi_{S2}) + \omega_{X1}(\Phi_{S1} - \Phi_{X1})$$

where the first term $(\Phi_{S2} - \Phi_{S1})$ represents the productivity variation for the firms that are active in both periods (the incumbents); the second $(\Phi_{E2} - \Phi_{S2})$ is the contribution of entrants, which is positive (negative) if their productivity is higher (lower) than the incumbents' average; the third $(\Phi_{S1} - \Phi_{X1})$ is the contribution of firms that exit the market, which is positive (negative) if their productivity is lower (higher) than the incumbents' average. The term $(\Phi_{S2} - \Phi_{S1})$ can be further decomposed in the variation of the incumbents' average productivity ($\Delta\overline{\phi_S}$) and the one of the covariance between incumbents' productivity and the share of employees (ΔCov_S)., capturing the intensity of the reallocation process among the sole incumbents.

Putting altogether, the variation of aggregate productivity can be expressed as the sum of the following four components:

$$\Phi_2 - \Phi_1 = \underbrace{\Delta\bar{\varphi}_S}_{\substack{Average \\ productivity}} + \underbrace{\Delta \mathrm{Cov}_S}_{Reallocation} + \underbrace{\omega_{E2}(\Phi_{E2} - \Phi_{S2})}_{Entry} + \underbrace{\omega_{X1}(\Phi_{S1} - \Phi_{X1})}_{Exit} \quad (4)$$

where the sum of average productivity (so called "within" margin) and reallocation (so called "between" margin) adds up to the contribution of incumbent firms, while the sum of entry and exit gives the contribution of firm demographics.

Linarello and Petrella (2017) apply the decomposition of equation (4) to a dataset on the universe of Italian firms in the private non-financial and non-agricultural sector over the period 2005-13[8]. The results are reported in Table 3 and Figure 8 and can be summarized as follows:

- average productivity and reallocation are both pro-cyclical while the contribution of entry and exit is countercyclical pointing to a more stringent selection process during recessions;
- with very few exceptions, the within term is negative, more strongly so since 2008. This evidence signals some relevant structural weaknesses of the average Italian firm;
- both before and during the crisis the reallocation term has given a positive (and increasing) contribution to aggregate productivity growth, more strongly in the manufacturing sector than in services. Over the entire period 2005-13 this contribution has amounted to 10 percentage points;
- the net contribution of firm demographics is smaller but has strengthened over time, especially after 2008, due to a more intense selection process through the exit of low productive firms;
- the above results remain broadly unchanged when controlling for sectorial composition effects.

Three main messages can be inferred by these findings. Firstly, the lack of productivity growth is imputable to a large extent to the within firm component, to say that the average Italian firm, both in manufacturing and services, has not been able to improve its efficiency in the last 10 years. However, we know from the previous section that this average figures hides a lot of firm-level heterogeneity, as it is evident from Figure 9. While in the service sector labor productivity is stagnant for both the median and the top (10 per cent) firms and declining for the bottom 10 percent, the manufacturing sector is characterized but a much higher degree of heterogeneity in performance: productivity growth of the top 10 percent not only dominates the one of the median firm and the bottom 10 percent , for which we observe a clear productivity decline, but it also steadily increasing. This result supports the idea that the most efficient part of the Italian productive system has shown some important positive dynamics, contrary to what is found in Andrews et al. (2015) on a subsample of incorporated firms.

Secondly, there is a limited push coming from firm dynamics. The churning of firms and jobs is ubiquitous in all economies, and sustained mostly by new entrants during the early years of life. Although they represent a small share of total employment, young firms contribute disproportionally to

[8] The dataset covers all firms active for at least 6 months in a given business year from 2005 to 2013. The construction of the dataset is the result of a joint collaboration between the Bank of Italy and the Italian National Statistical Agency (ISTAT). Using the business registry and statistical, administrative and fiscal sources, the dataset contains information on firms' location, legal form, incorporation date, industry classification (Nace rev. 2), number of people employed, turnover and value added. The construction relied heavily on works done at ISTAT over the past few years for the construction of the FRAME-SBS dataset, an integrated firm-level census dataset that covers all active firms. While the census FRAME-SBS represents the source of information starting from 2012, the joint effort of Bank of Italy and ISTAT contributed to filling the gaps backwards and building a longer time series of data. See Linarello and Petrella (2016) for more details.

job creation (Calvino et al., 2015). Among young firms, high job creation rates are accompanied by high job destruction rates through firm exit (Haltiwanger et al., 2013): typically, this strong "up-or-out" dynamics of firms during their first years of life, which reflects a Schumpeterian creative destruction process that fosters long-term growth through selection of the most efficient firms, ends up in a largely positive net employment growth. According to recent evidence for the period 2001-2011, net employment growth of young firms is positive and ranging from 3.5 per cent of aggregate employment in Spain, to 3.2 per cent in France, 2.6 per cent in UK, and 2.2 in Italy; conversely, net employment growth by old firms is negative in all countries (Criscuolo et al., 2014). Several indicators point to subdued firm dynamics in Italy relative to other developed countries. First, Italian firms are on average older than their counterparts in all other OECD countries, with the exception of Japan and Finland (Criscuolo et al., 2014). Second, there are several pieces of evidence of a limited "up-or-out" mechanism among young Italian firms. Indeed, Italian firms display a flatter hazard rate of exit over their life relative to most developed countries (Bartelsman et al. 2005). Moreover, recent analyses show that Italian firms enter the market with a smaller size, and grow less and for a smaller number of years with respect to their U.S. counterparts (Manaresi, 2015). As to the exit process, it is true that it strengthened over time supporting productivity growth, but it must be acknowledged that this happened only after an exceptionally long recession (Figure 10).

A third point relates to the role of reallocation. There is a growing literature on allocative efficiency and the companion concept of misallocation of resources that overall tends to attribute to this channel a significant part of country differences in terms of growth. According to Andrews and Cingano (2014), who implement the static OP decomposition on samples of incorporated firms for OECD countries, in 2005 Italy had a comparatively low level of allocative efficiency. Linarello and Petrella (2017)'s evidence of improved allocative efficiency before the crisis is in contrast with other works which use the methodology developed by Hsieh and Klenow (2009) – based on the idea that misallocation increases with the degree of dispersion in measured TFP (TFPR in Box 1's language) – and subsamples of incorporated firms. This is the case in Calligaris (2015)[9], Calligaris et al. (2016)[10] and Gamberoni et al. (2016)[11] on CompNet data[12].

[9] She finds that misallocation in Italy is large and increasing over time in the period 1993-2001 and that the removal of the distortions preventing TFPR to be equalized across firms (that would be, according to this literature, the ideal situation with no misallocation) aggregate productivity gains would be very large, from 58 per cent in 1993 to 80 per cent in 2011. These gains get reduced to something around 15 per cent if, as suggested by Hsieh and Klenow (2009) to control for measurement problems, one normalizes the Italian figure with the equivalent TFPR dispersion in the US.

[10] They extend Calligaris (2015) to the business services sector and to a longer time series (1993-2013). They find higher dispersion in TFPR in service sectors than in manufacturing and a reduction of overall misallocation since 2008.

[11] Using comparable data for firms with more than 20 employee both in the manufacturing and in the service sector, they report measures of dispersion for the marginal revenue product of both capital (MRPK) and labor (MRPL) for Belgium,

Apart from the methodological differences (OP decomposition vs dispersion in TFPR) that surely affect the conclusions[13], it is interesting to notice the role played by the sample. Linarello and Petrella (2017) show that their results crucially depend on the dataset: indeed when they apply the OP covariance only to incorporated firms or to firms with more than 20 employees they find that the contribution of allocative efficiency to aggregate productivity is significantly smaller and that there is no more improvement before the crisis.

All in all, from the decomposition we take home that all the three margins are important for Italy. There are clearly relevant factors limiting productivity growth at the firm level: this calls for having a look inside the firm and focusing on the constraints, which could be both internal and external to the firm, to input accumulation, efficiency improvement and firm growth. Allocative efficiency has improved in the last decade or so, more significantly in the manufacturing sector that have been exposed to globalization for a very prolonged period (Linarello and Petrella, 2017; Adamopoulou et al., 2016). Due to the measurement problems surrounding the concept of misallocation and the ensued difficulty of making cross-country comparisons over time, it is difficult to gauge how allocative efficiency can be further improved in Italy. However, we think that these margins should still be large enough to deserve the policy makers' attention, not least because the high polarization of the Italian productive system creates per se scope for further productivity-enhancing reallocation processes. Finally, the market selection via entry and exit of firms can be definitely improved and provide large benefit in terms of aggregate productivity growth, exerting stronger competitive pressures on incumbent firms and easing the reallocation of resources out of their least productive users.

France, Germany, Italy and Spain over the period 2002-2012. They show that between 2002 and 2007 the dispersion in MRPK increased in all countries; afterward, it continued to grow but at a slower pace with the notable exception of Germany where it declined. On the contrary, the increase in the dispersion of MRPL was much less pronounced before the crisis while it declined afterwards in all countries but Belgium. These results suggest that the dispersion of MRPK is the main driver of misallocation in TFPR; moreover, the financial crisis seems to have triggered some improvement in the allocation of resources in all European countries.

[12] The Competitiveness Research Network (CompNet) is a hub for research and policy analysis on competitiveness and productivity. Founded in 2012, its activities also include updating a firm-level database for a number of EU countries, which is unparalleled in terms of coverage and cross-country comparability (a sample of manufacturing firms with 10 or more workers). See ECB (2016) for a user guide.

[13] The development of this literature reached the consensus that measures of dispersions of marginal revenue products alone cannot be taken as indicative of misallocation, because both measurement error and model misspecification are serious concern that can overstate aggregate productivity gains. Bartelsman et al. (2013) and Asker et al. (2014) propose alternative models – respectively, with overhead labor fixed cost and dynamic capital with adjustment costs – where dispersion is high even in the absence of distortions causing misallocation. Haltiwanger et al. (2017) question the assumptions imposed by the model of Hsieh and Klenow (2009) regarding the structure of technology and demand in the economy. Using detailed data on quantity and prices of inputs and outputs, they show that (contrary to the model assumptions) firm prices are not negative unit elastic in TFPQ and demand shifts affect prices and, thus, TFPR. They conclude that estimates of misallocation that impose such restrictive assumptions are biased upwardly.

4. The internal (to the firm) drivers of productivity growth

In the previous section we have provided a simple accounting decomposition of aggregate productivity growth. While allowing to identify the different mechanisms through which efficiency can grow or stagnate, the decomposition has nothing to say on the fundamental determinants of productivity dynamics.

This is where we do in this section. Using the empirical evidence available in the economic literature, both in general and specifically to Italy, we analyze the different drivers of productivity growth. Following Syverson (2011), we first focus on factors that are *internal* to the firm, like technology, innovation, human capital and management quality and practices, and then enlarge the scope of the analysis to the set of market regulations and institutional features that are external to the firm but influence and may distort firms' choices and strategies.

The literature review is done keeping a close tight with the previous section. Indeed, in analyzing the single factor we want to understand not only if it turns out to be empirically significant but also how (that is, through which mechanisms) it may strengthen or hinder productivity dynamics. Is it because it influences the intensity of the entry and the exit processes and the characteristics of the firms entering or exiting the market? Or is it because it affects the working of the resource reallocation mechanisms? Or does it bias firms' choice in terms of productive factors, technology and organization? Understanding the channel is very important in that different channels call for different policy measures.

4.1 Innovation and technology

In 1997 Griliches wrote *"[…] real explanations [of productivity growth] will come from understanding the sources of scientific and technological advances and from identifying the incentives and circumstances that brought them about and that facilitated their implementation and diffusion*". More than twenty years of research have turned this statement into a stylized fact: R&D expenditure, product and process innovation and the adoption of new technologies are central to ensuring efficiency gains at the firm level and hence the growth of the economy as a whole. Dealing with the productivity-enhancing effects of innovation and technologies requires a multi-faceted approach combining a micro and a macro perspective, using various measures that may capture different dimensions of the innovative process, searching for both direct and spillover effects.

There is a rich and robust empirical evidence showing a positive relationship – though characterized by decreasing returns (Klette and Kortum, 2004) – between R&D expenditure and productivity at the firm level.[14] However, R&D expenditure may not capture all the innovation effort carried out within a firm, especially among small and medium enterprises (SMEs) where innovation can follow more informal channels like knowledge management (Hall, Lotti and Mairesse, 2009; Kremp and Mairesse, 2004), scientific collaborations with other institutions or the chance and ability to benefit from spillovers (Griliches, 1992). Failing to consider this informal mechanisms may lead to an underestimation of the productivity effects of innovation, especially in countries with a remarkable share of SMEs (Kleinknecht, 1987; Blundell, Griffith and Van Reenen, 1993; Crépon et al., 1998). Innovation is beneficial to the firm that brings it to the market, but its positive effects can be more pervasive within an economy. Actually, as pointed by Hall and Khan (2003) *"[T]he contribution of new technology to economic growth can only be realized when and if the new technology is widely diffused and used*". A recent work by Andrews, Criscuolo and Gal (2015) confirms how technology diffusion, which is a rather complicated, uncertain and slow process, can be a key determinant of economic growth.

Technological innovation is strictly linked to capital accumulation. The mechanism is known as "embodied technological change": R&D and product innovation performed by some firms (or industries) diffuse to the rest of the productive system via the purchase of capital and intermediate inputs (Terleckyj, 1974).[15] Strong US productivity growth in the '90s has been the result of the productivity gains originating from ICT-goods and spread through ICT-capital deepening (Timmer and van Ark, 2005).[16]

In the XXI century technological innovation and adoption require the availability of high-speed Internet through broadband access (Crandall and Singer, 2010; Jespersen and Hansen, 2010; Akerman et al., 2015). Broadband technology facilitates the adoption of more efficient business processes (e.g., marketing, inventory optimization, and streamlining of supply chains), accelerates innovation by

[14] Lichtenberg and Siegel (1991) for the US; Hall and Mairesse (1995) for France; Harhoff (1998) and Bönte (2003) for Germany; Klette and Johansen (1996) for Norway; Lööf and Heshmati (2002), Janz et al. (2004) for Sweden; Lotti and Santarelli (2001), Parisi et al., (2006) for Italy. Most of these empirical exercises are based on the estimation of a production function, typically a Cobb-Douglas, modified so as to include R&D expenditure (or another proxy for innovative effort) among the productive inputs.

[15] Undoubtedly, embodied technological change is the main source of innovation for many industries and hence productivity growth (Pavitt, 1984). However, there is a relevant issue of quality of capital, and measuring it goes beyond the scope of this paper. For this reason, we assume that investment in capital goods entails a higher quality/efficiency of the acquired equipment with respect to the installed capital within the firm.

[16] Indeed, there are some methodology concerns when estimating capital stock. Bobbio et al. (2017) use newly estimated service lives to calculate the Italian net capital stock finding that the downward revision of service lives may temper the long run dynamics of capital stock estimates, resulting in higher TFP estimates. Mistretta and Zollino (2017) estimate that, by augmenting the standard depreciation rate with own estimate of technical depreciation, since 2007, TFP would be 1 percentage point higher over the whole period.

introducing new consumer applications and services (e.g. e-commerce, e-banking, e-government), leads to a more efficient functional deployment of enterprises by maximizing their reach to labor pools, access to raw materials, and consumers (e.g., outsourcing of services, virtual assistance, etc.).

How does Italy perform along these different dimensions of innovation and technology adoption? When considering the whole set of existing indicators in a synthetic way, Italy turns out belonging to the group identified as "moderate innovators" within the EU. While some component of the index have significantly improved over the last 5 years (human resources and the quality of the research system), it lags behind in terms of share of firms with R&D workers and private sector's R&D expenditure with respect to EU average (European Commission, 2017, Bugamelli et al., 2012; Benvenuti et al., 2013; Cerisola et al., 2013).[17] However, looking at the dynamics, some improvements are clear. Global competitive pressures and above all the long recession have induced firms to increase their R&D expenditure: business R&D to GDP ratio significantly increased since 2007, with a further boost in 2013 (Figure 11).

Gross fixed intangible capital formation as a percentage of gross domestic product is 2.7 per cent in Italy as of 2016, against 5.3 in France, 3.6 in Germany and 2.9 in Spain. Also knowledge-based capital accumulation is lower than in other developed countries.

Another factor preventing firms from adopting and developing new technologies is the lack of adequate digital infrastructures. Although the theme of fast broadband adoption has been very high on the agenda of the European Commission during the last decade, Europe is still lagging behind the US[18] with significant differences among EU countries: the UK displays has around 90 per cent coverage, Germany and Spain around 80 per cent, while France and Italy only have 45 per cent coverage, far below the EU average (70 per cent). The Digital Economy and Society Index (DESI), which summarizes relevant indicators on Europe's digital performance, shows that Italy ranks very low, being the 25th country among the 28 considered in terms of use of digital technologies (both in 2016 and 2017).

What are the main explanation for the Italian innovative and technological gap? The first question to ask is whether there is something broken in the innovation-productivity link of Italian firms that makes the returns of innovative investments lower than elsewhere? To tackle these questions, Hall, Lotti and Mairesse (2009) compare the parameters of a structural model estimated for Italy with those

[17] Italy performs in line with France and Germany in terms of intellectual property right adoption and product innovation.
[18] In 2011 and 2012, 82 per cent of US households were covered by NGA networks (with speeds equal to or above 25 Mbps), compared with only 54 per cent in the EU.

of France, Germany, Spain, and the United Kingdom. They conclude that the relationship between R&D, innovation and productivity is analogous across countries so that the lower level of aggregate R&D expenditure in Italy must reflect higher direct and indirect costs of the innovative activities. In other words, there is no evidence of innovation "underperformance", but rather of underinvestment.

Moreover, according to Andrews et al. (2015), in Italy is the so called "diffusion machine" seems to be relatively malfunctioning. On one side there are few highly innovative, productive, and internationalized firms belonging to the "productivity frontier", while on the other the great majority of firms lags behind, apparently unable to benefit from knowledge spillovers and adopt innovation developed by leading firms.

A highly fragmented productive system is prone to underinvestment in innovation and to limiting technology adoption. In fact, small firms are less likely to have the internal resource to bear the risk and the cost of innovative projects (Pagano and Schivardi, 2003) and they may also lack the absorptive capacity to adopt new technologies. According to the Community Innovation Survey data, in all the leading European countries the proportion of firms that conduct internal R&D increases with size: in Italy it is 5.9 per cent for firms with 10-49 employees, 15.9 per cent for those with 50-249 employees, and 33.9 per cent for the largest firms (Figure 12). As size increases, so does the share of firms with innovative projects, often in cooperation with other firms, universities and the public sector, and high R&D spending in proportion to sales. Moreover, firm size turns out to be a more important factor than sectorial specialization in limiting innovative activity in the comparison to the other euro-area countries: according to trivial back-of-the-envelope calculation, almost 30 per cent of the difference between Italy and Germany in the share of manufacturing firms with positive R&D expenditure is attributable to the different size structure, three times the contribution coming from the different sectoral specialization (Bugamelli et al., 2012).

Small firm size is not the only explanation for Italy's lagging behind in innovation. Clearly, firm size, innovation, technology and productivity are different sides of the same coin. We therefore need to search for those other structural features limiting at the same time the capacity of a great part of the Italian productive system to enlarge the boundaries of the firm, upgrading the quality of the products, improving the production processes also through the adoption of new and innovative technologies, that is adopting the whole set of efficiency-enhancing strategies. Surely, such factors include the supply of human capital, firms' governance and managerial structure, the functioning of financial markets and the financial structure of firms, the degree of competition, the regulatory environment, the labor market rules and the efficiency of the public administration.

Tackling the innovative and technological gap poses formidable challenges to policy making: actions should aim at counteracting market failures arising from the difficulties in appropriating knowledge, information asymmetries and financing gaps. The recently introduced measures to support the creation of innovative start-ups, to reduce the cost of R&D through tax credits and attract innovative multinational firms through the patent box go in the right direction. In 2015-16 this redesigned industrial policy setting has been further enriched by measures aimed at boosting investment in capital goods (super depreciation) and in advanced technology goods (hyper depreciation). The latter is part of a richer package, known as Industry 4.0, aimed at inducing a pervasive structural change of the Italian productive system.

4.2 Human capital

Like innovation and technology, human capital is key for productivity growth. From a macro prospective, starting from Barro (1991), many studies have found that average population educational attainments have a positive impact on per capita output growth, explaining a significant fraction of cross-country heterogeneity.[19] At the microeconomic level human capital increases firms' productivity both directly, by enhancing both workers and entrepreneurs' ability, and indirectly, by improving the socio-economic context in which firms operate. Educated workers display higher ability to perform job tasks, process information, acquire new competencies, and adapt to technological changes (Cipollone and Sestito, 2010). The role of the accumulation of knowledge and human capital for productivity growth is destined to grow in the view of the new challenges posed by the rapid and constant transformation spurred on by the new information technology revolution (Visco, 2015).[20]

Human capital is strictly connected to innovation. In a study on Italian manufacturing firms over the 1995-2006 period, Hall et al. (2013) show that R&D investment boosts innovation activity more intensively in skill-intensive firms. An empirical analysis run on firms of 7 European countries, including Italy, concludes that for a given level of R&D investment firms with a higher share of graduates are able to reap greater benefit from innovation (D'Amore and Iorio, 2017). Organizational changes, not necessarily linked to product or process innovation, are proved to be cost-efficient but requires a skilled labor force able to adapt to a new environment and process new information. A study conducted on a sample of manufacturing firms argues that the introduction of new work practices and a more intense use of ICT technology generate larger increase in productivity in firms with a higher share of skilled workers (Biagi and Parisi, 2012). A more qualified workforce encourages innovation

[19] With some notable exceptions: Levine and Renelt (1992), Benhabib and Spiegel (1994); Pritchett (2001).
[20] Visco (2015) refers in particular the so called "soft skills", i.e. critical thinking, aptitude for problem-solving, creativity and acceptance of innovation, the ability to communicate effectively, openness to cooperation and group work.

activities besides R&D since educated workers are also more prone to learn new production techniques (Nelson and Phelps, 1966). Finally, human capital can ease technological spillovers from a firm to another: indeed a company needs a skilled workforce even to replicate technologies developed by other firms, or to acquire and efficiently use higher quality intermediate inputs.

Italy has a relatively low supply of human capital when compared to other advanced countries. As of 2015 only 60 per cent of the population with 25-64 years successfully completed upper secondary education, and only 18 per cent hold a tertiary level degree, well below the average European attainments of 79 and 32 per cent. The gap reflects only partially past generations' choices: in the population aged 25-34 the share of college graduates is 25 percent, 7 points less than the EU average. Low participation in formal education seems to directly impact logical-analytical and cognitive skills of the adult population. According to the results of the PIAAC survey of adult skills for 2015 Italy ranked last in language skills and third to last in numeracy amongst the participating OECD countries.

The uneven pace of human capital accumulation likely curbed the productivity performance of Italian firms. Average years of schooling rapidly grew since the '50s, supported also by the secondary school reform that effectively enforced the compulsory school age at 14 years. However, in the '90s Italy started lagging behind other industrialized countries, especially in terms of tertiary education enrollment and graduation rates (Bertola and Sestito, 2011). Brandolini and Cipollone (2001) find a direct effect of these developments on productivity growth; indeed they estimate that a sizeable fraction of the productivity gains observed in the '80s can be explained by the increase in the workforce's average years of schooling, while the productivity slowdown registered in the '90s is partially due to the small contribution of tertiary education. These patterns are confirmed by Bronzini and Piselli (2006) who look at regional productivity dynamics in Italy.

But is Italy's low level of human capital used in production due to demand or supply side factors? We deem that both are important and reinforce each other.

On the one hand the ability of the Italian education and training system to adequately provide student with the necessary skills and competencies has been restrained by the limited amount of resources allocated and, often, by the overall organization of schools and universities. There is indeed evidence that supply matters. Schivardi and Torrini (2011) find that that a larger supply of college graduates at the local level ("exogenously" due to a reform of the university system) has determined an increase in firms' restructuring activities. At the regional level, the share of highly skilled occupations, which in Italy is on average significantly below the EU average (35 per cent versus 42), is partially explained by the relative abundance of graduates in the working age population (Colonna, 2017). If

more educated workers are also quick learners, low educational attainment can also explain firms' low propensity to provide on-the-job training: only 56 per cent of Italian firms provide continuing vocational training, 10 percentage points below the EU average.

On the other hand specialization in traditional, low skill and labor-intensive technology reduces the demand for skilled labor and the scope for positive human capital externalities, which are more likely to arise in high-tech sectors where the transmission of knowledge can play a pivotal role. In the manufacturing sector, local human capital seems to ease the spillover effect of innovation activities only in few industries (De Stefanis et al., 2012) with no significant effect on workers' productivity at the aggregate level (Bratti and Leombruni, 2014). Moreover, some studies suggest that Italy stands out also for the highest (within EU) levels of mismatch between the skills of the workers and those requested by the job market. Pellizzari and Fichen (2013) argue that over-skilling (workers highly educated employed in low qualified jobs) is due to the inability of formal qualifications to represent a good indicators of actual skills, while the (low) quality of vocational training might lead to under-skilling, if firms resort to educated workers for manual work.

Overall, these findings point to negative feedback effects between demand and supply of human capital (Cipollone and Visco, 2007; Visco, 2009). The propensity to invest in new technologies, to provide on the job training, and to demand skilled labor are restrained by firms' difficulty in recruiting adequately skilled workers; the resulting lower return to human capital investments then limits the incentives of young people to accumulate human capital (Depalo, 2017). A vicious circle emerges (Visco, 2015; Sestito, 2017).

Taking again a larger perspective over the Italian productive system, the quantitative and qualitative shortage of human capital must be surely added to small firm size and innovation gaps in codetermining the productivity puzzle.

4.3 Ownership and management

As pointed out by Syverson (2011), dispersion in productivity across firms remains large even after controlling for standard determinants like the stock and quality of productive inputs, as tangibles and intangibles assets (including R&D) and workers' skills. This brings to focus on ownership and management structure under the reasonable idea that owners and managers decide the quantity and quality of productive inputs, the technology to adopt and the strategies in terms of product, process and organizational innovation.

A firm's ownership structure is defined by the ways in which control is exercised and by the constraints, determined essentially by the institutional framework, on the exercise of such control. An old strand of theoretical and empirical economic studies underscores a nexus between an adequate governance structure and the performance of firms and of the economy as a whole (La Porta et al., 1997 and 1998). In general, a good governance system should ensure that firms are controlled by the most suitable persons, that they have access to the external financing required for growth, and that the controlling agents have sufficient incentives to invest in firm-specific capital. An important feature of ownership structure related issue is ownership concentration.

In the first half of the 1990s the ownership of unlisted firms in Italy was highly concentrated and characterized by a large prevalence of family and state companies; also among listed firms, the largest shareholder held, on average, the absolute majority (Brandolini and Bugamelli, 2009). While helping reduce information asymmetries and possible conflicts between ownership and control and thus fostering long term corporate strategies, concentrated ownership can have adverse consequences: an underdeveloped stock market, owing to the scant "demand" for listing; due to the large private benefits of control a low willingness of controlling agents to give up control even when they have become inadequate to the job of managing the company; overly cautious management with adverse effects on innovation, new technologies adoption and internationalization. These factors are particularly penalizing during the phases when a firm is growing in size and when changes in the external context call for changes in the firm's optimal response strategies; the overall ability of an economic system to shift towards sectors and projects offering higher returns (Michelacci and Schivardi, 2013).[21]

Partly as a consequence of the vast privatization program carried out since 1992, an extensive program of reforms has been implemented, focusing on listed companies but also involving company law, aimed at increasing investor protection in listed firms and allowing for more flexible governance structures in unlisted firms. The most important measures include the Consolidated Law on Finance in 1998, the introduction of a corporate governance code in 1999, the reform of company law in 2003, and the law on savings in 2005.

[21] Relying on the idea that family firms may be more oriented towards maintaining control in the long run than in strengthening profitability and growth, Cucculelli (2008) argues that they could be less responsive to demand and thus less able to exploit market opportunities and shows that in Italy over the period 1995-2004 the sales of family firms were less sensitive than those of non-family firms to variations in demand, especially if they were financially constrained. Bianco et al. (2013) analyze the investment decisions of Italian firms in the period 1996-2007 and find that investment in family firms are relatively more sensitive to uncertainty. This is partly due to a lower wealth diversification of the owners of family firms and a corresponding higher risk aversion, since the effect diminishes as the interest held in the firm decreases. A negative effect on investment by family firms could also come from laws that impose strict rules on intergenerational transfers by strongly protecting all the heirs even if not directly involved in management (Ellul et al., 2010).

Although these changes have brought Italian legislation broadly in line with the prevailing international standards, ownership and control structures have changed to a limited extent, especially among unlisted companies, the great majority of which were still family-owned at the end of the last decade (Brandolini and Bugamelli, 2009).

The owners choose managers and managerial practices which in turn determine a firm's efficiency. Carrying out a comprehensive study on managerial practices, Bloom and Van Reenen (2007, 2010) show that indeed higher scores in managerial practices are strongly associated to higher productivity and a significant role in explaining the observed heterogeneity in managerial practices is indeed played by the type of ownership. In particular, they show how family-owned firms, in which the chief executive officer (CEO) is chosen either by primogeniture or within the family, tend to be relatively more badly managed.

Connecting the family ownership and management to firms' performance is particularly relevant for a country like in Italy, where firms are often accused of excessive "familism" (Bugamelli et al. 2012; Visco, 2015; Giunta and Rossi, 2017), with highly concentrated ownership and control. According to the data of the research project 'European Firms in a Global Economy' (EFIGE) relating to a sample of manufacturing firms with 10 or more workers, the share of Italian companies that are owned by a family owner is 86 per cent, a figure higher than what is reported in France (80 percent), Spain (83) and the UK (81), lower than Germany (90 percent; Figure 13). Our calculations based on Chamber of Commerce data for the universe of corporations and partnerships indicate that between 2008 and 2015 the share of family firms – defined as those in which more than two-thirds of the members belong to the two main families – rose by 10 percentage points, from 55.5 to 65.6 per cent. The share is higher in agriculture, traditional manufacturing industries, hospitality services, retail trade and in the South of Italy.

The EFIGE survey offers an interesting snapshot on the management structure. Among the family firms, those having a chief executive officer belonging to the family are over 80 percent in Italy and Germany. But the Italian peculiarity becomes evident when isolating family businesses in which the *entire* management is an expression of the owner family: these are two-thirds in Italy, compared with a third in Spain, about a quarter in France and Germany, only 10 percent in the UK. Indeed family-owned firms, particularly Italian ones, tend to prefer an executive selection process based on closeness and fidelity to the owners rather than on specific expertise with regard to the company's business sector and strategies (Bandiera et al., 2015; Lippi and Schivardi, 2014). Also Pellegrino and Zingales (2017) have identified the lack of meritocracy and an excessive dose of familism as the most relevant

ingredients in the managerial selection of Italian firms. This negatively affects the quality of management and managerial practices and, consequently, productive efficiency (Bloom et al. 2012).

On the EFIGE data, Bugamelli et al. (2012) show that firms that are entirely managed by members of the owner family are less successful in terms of innovation. They calculate that in Italy the propensity to spend in R&D is 14.4 percentage points lower in such firms as compared to the others; the propensity to realize product or process innovation is 4.3 percentage points lower.

To enrich the link between ownership and management structure on one side and human capital on the other, there is evidence for most industrialized countries on private returns to entrepreneurial education in terms of both productivity and profitability (see Gennaioli et al., 2013). In Italy the importance of social connections and family background appear to be the main determinant of entrepreneurship, while the level of talent, skills and education is less relevant (Micozzi, 2013). A high share of small and family-owned firms seems to curb the positive effect of entrepreneur's formal education: a recent study investigating the so-called 'entrepreneurial imprinting effect', show that founder's characteristics and in particular pre-entry work experience impacts firms' dynamics on the long run while his or her education does not appear to have any significant effect (Grilli et al., 2014 and Rocha et al., 2016).

5. The external drivers of productivity growth

Building on the previous sections and recalling the recent evidence on the evolution of exports (Bugamelli et al., 2017), the puzzle begins to take a shape. The high polarization of the Italian productive system can be described as follows. On one side there are a few firms that are active and successful in international markets, hire skilled workers, have a high propensity to R&D and innovation output (and sometimes even patenting), display productivity level and dynamics comparable to European competitors. Unfortunately, these firms are not enough to support a satisfactory aggregate growth performance. This is because there is a great majority of laggards: mostly concentrated on the domestic market, not very innovative, often old firms with a long-dated low propensity to grow in size. Among these firms there is a strong prevalence of family-businesses which tend to choose their managers either within the family or according to principles, such as loyalty, that often are not prone to the adoption of efficient-enhancing management practices.

The one just described is a productive system with some interesting potential that the right policy measures can strengthen. There are three lines of action that deserve attention. Following the decomposition described in section 3, the first one is allocative efficiency: the structure above signals

that there is great scope for productivity-enhancing policies that favor the reallocation of resources toward the best firms. But at the same time the large population of laggards calls for policies capable of helping some of them to climb up the "quality ladder" by changing their internal structures appropriately, raising the quality of their inputs and technologies, strengthening their innovative capabilities. Last but not least, we need to take a broader dynamic perspective whereby more efficient mechanisms of entry of new firms and exit of the least productive ones should act as a permanent challenge to the incumbent firms, thus benefitting aggregate growth.

These are (again) the three interpretative lenses through which we now move to discuss the drivers of productivity growth that are external to the firms.

5.1 Finance

A large literature documents a positive influence of the development of the financial sector on economic growth (see the survey by Levine, 2005). A financial sector is regarded as more developed if it is sizeable relative to the domestic economy (as measured, for example, by the ratio of assets held by financial intermediaries to GDP), if it includes different types of intermediaries, and if firms and households can easily and cheaply access capital markets to obtain funding and allocate their savings. The impact of the financial sector on aggregate productivity may occur through all the margins discussed in section 3: by boosting within-firm productivity and by affecting entry and allocative efficiency.

The evolution of a firm's productivity is the result of strategic choices related to the ability to acquire new vintages of capital, hire skilled labor, adopt new technologies, innovate products and production processes, start exporting, expanding sales. All these activities needs finance.

Because of the relevance of bank credit in firm financing, a large literature has been devoted to measuring the impact of access to credit on firm's accumulation of productive inputs. The sensitivity of investment to credit constraints dates back to the seminal work of Fazzari et al. (1988) and is the subject of a vast literature (Kaplan and Zingales, 2000, Almeida et al., 2004). The financial support to innovation can materialize through different channels, two of which are particularly important. The first one works through capital accumulation whenever technological change is embodied in new machinery and equipment (Bencivenga and Smith, 1991). The banking system can be key player in this regard to the extent that it can help firms overcoming financial constraints deriving from informational asymmetries through the accumulation of soft information on borrowers. The second channel calls for the role of specialized financial intermediaries and is typically at work in highly developed financial systems where high diversification opportunities create the scope for and the willingness of non-bank

intermediaries to finance firms undertaking potentially more productive but riskier innovations (Caggese, 2016). The availability of different forms of finance is also important because, in a world where projects with a high return in terms of productivity (like innovative projects) are on average riskier, a higher reliance on debt may be detrimental to TFP growth, because debt finance often requires collateral and innovative firms usually hold fewer collateralizable assets[22] or because debt is too costly (inducing credit rationing, à la Stiglitz and Weiss, 1981).The available evidence suggests that that the access to venture capital or equity markets provide a better evaluation of innovators and specific financial resources for innovation (King and Levine, 1993); and that the financing by venture capitalists increases productivity by both raising the birth rate of fast-growing innovative firms and fostering innovation of incumbents (see Puri and Zarutskie, 2012, among many others). Venture backed firms also tend to adopt more effective management practices (Barry et al., 1990), which are positively correlated with firm productivity (Bertrand and Schoar, 2003, Lerner, 2009a).

The financial sector is crucial also to support the entry of new firms. Negative financial shocks are indeed associated with significant declines in start-up rates (Bergin et al. 2014) which, in turn, amplify and propagate over time the effects of those shocks on the economy (Clementi and Palazzo, 2016).

A well-functioning financial system is important not only to support the choices of individual firms, but also, from a more aggregate point of view, to improve the allocation of resources across firms. If financial intermediaries were only a veil between supply and demand of capital, they would have no impact on the efficiency of input allocation. Yet, there are several factors that make institutional characteristics of the credit market crucial for allocative efficiency. First, asymmetric information and limited liability induce intermediaries to request collateral by borrowers; as previously discussed, collateralizable assets may be less available to potentially more productive firms.

Secondly, other characteristics of credit markets (e.g., the degree of bank competition, the weakness of bank balance sheets, and poor governance) may induce a misallocation of credit in the economy. The seminal papers on misallocation – measured by the dispersion of the marginal revenue product (MRP) of inputs – find that that financial frictions may induce sizeable TFP losses (Hsieh and Klenow, 2009; Restuccia and Rogerson, 2008). Gopinath et al. (2017) show that in Spain, and somewhat to a lesser extent in Italy and Portugal, both the dispersion in MRPK and the loss in TFP due to capital misallocation increased in the early 2000s. In their view, size-dependent financial frictions may have induced banks to favor borrowers with high net worth: these firms increased capital in

[22] Patents are often used as collateral for debt financing (Mann, 2016), but rarely banks are endowed with the capability of correctly evaluating IP assets.

response to the interest rate convergence triggered by the adoption of the euro, while firms that had lower net worth did not benefit from the reduction in borrowing costs, despite being potentially more productive.[23] On the census of Spanish incorporated firms, they show that up to three-quarters of the observed decline in TFP induced by allocative inefficiencies can be traced back to financial frictions.[24] Midrigan and Xu (2014) suggest that the main effects of financial frictions on misallocation go through the inefficient entry and exit of firms, rather than through the allocation of capital across incumbent firms. Gilchrist et al. (2013), who measure misallocation by the dispersion in the marginal cost of capital (proxied by the firm-specific interest rate on bank credit), obtain much lower estimates than Hsieh and Klenow (2009). Misallocation of credit may also be induced by the distorted incentives of poorly capitalized banks.[25]

Empirical evidence for Italy. – The Italian financial system is highly developed in size (in 2016 the total assets held by financial institutions were about 4 times the GDP), but mostly bank-centered: banks and money market funds hold almost 70 percent of the total assets held by financial institutions, while the weight of market finance and that of specialized intermediaries such as private equity and venture capital funds are very low both in absolute value and in comparison to European peers. The pivotal role of banks is driven by a two-way feedback with the structure of the productive system: the preponderance of small firms makes bank credit more attractive than market finance and the limited development of alternative sources of finance contributes to constrain firms' ability to grow.

Prior to the 2007-08 financial crisis, there was a strong expansion of bank credit: domestic credit to the private sector as a share of GDP raised from 54 in 1995 to 82 per cent at the end of 2007, with most of the increase occurring after 1999. Credit to non-financial firms and to households increased at a fast pace, especially in 1999-2000 and after 2004, reaching double digit growth rates in several years (Bank of Italy). Firm leverage increased between 2000 and 2007, moving from 34 to 39 per cent.

The financial and the sovereign debt crises had an especially large and long-lasting impact on the real economy: the collapse in the amount of credit to the private sector was the result of a big and prolonged contraction in the demand for loans and, after the bursts of the two crises, some phases of

[23] The decline in TFP induced by misallocation would be attenuated if net worth were positively correlated with productivity.
[24] Similar conclusions are obtained also by Hassan et al. (2017) who study the correlation between credit and present and future productivity using micro-data from euro area countries. By bringing the implications of a simple OLG model of entrepreneurship to firm-level data from euro area countries, they find indirect evidence of misallocation of credit in Italy.
[25] Studying Japan during the '90s, Caballero et al. (2008) find evidence of loan-evergreening or zombie lending: low-capitalized banks kept lending to inefficient (unprofitable and unproductive) firms to avoid further losses which would have weakened their balance sheets, especially their capital, even more.

abrupt credit crunch. The latter had visible real consequences given firms' limited ability to resort to alternative sources of funds even once the turmoil calmed down.

In what follows we discuss the empirical evidence on the real effects stemming only from changes in the supply of credit, which are more directly linked to the efficient allocation of credit than demand-side drivers.

Manaresi and Pierri (2017) directly estimate the impact of idiosyncratic firm-level time-varying credit supply shocks on productivity growth. They do it for a large sample of Italian incorporated firms over the period 1998-2013, that is taking into account different economic and credit cycles. Results point to a positive impact of credit on productivity: a 1 percentage point increase in credit supply raises value added productivity growth by 0.14 percentage points. The estimated effect can be traced back to increases in R&D expenditure and in the probability of exporting.[26]

In assessing from a more general perspective the role of the banking system for productivity growth, the results by Manaresi and Pierri (2017) indicate that the availability of credit sustained firm's TFP growth prior the crisis, while the credit crunch contributed for around a quarter to the fall in TFP experienced by the sampled firms during the crisis. Also, because the elasticity of productivity to credit supply is asymmetric (being stronger for negative shocks than for positive ones), they point to the importance of reducing credit volatility overtime.

Due to the embodied technological change hypothesis, the impact of credit on productivity can be assessed also by studying the effects of credit constraints on investment. Bond et al. (2015) find that over the period 1995-2013 credit constraints had a negative impact on firm-level investment rates, but the effect was not sizeable in aggregate terms. During the financial crisis of 2007-2008, though, the aggregate impact of credit tightening has become more relevant: according to Cingano et al. (2016), the unprecedented negative credit supply shock explains around 20 per cent of the drop in aggregate investments. A significant negative impact of credit tightening on investments is also found by Bottero et al. (2015) during the early phase of the sovereign debt crisis, right after the downgrade of Greek debt in 2010.

As to the role of the banking system for the allocation of capital in the economy, the influential paper by Gopinath et al. (2017) point to a serious misallocation of credit before the crisis, as a result of the combination of low interest rate and exceptionally high credit supply to firms with high net worth but low productivity. This conclusion is too important and policy relevant not to be seriously

[26] In Section 5.3 we will show how there is empirical evidence showing that, in particular in the Italian case, a firm starting to export can realize later on productivity improvements. These can be the result of some learning on how to improve production processes and product quality or of the exploitation of scale economies.

challenged, especially in that it is based on the highly criticized Hsieh and Klenow (2009)'s measure of misallocation (see footnote 13 for a summary of ongoing critiques).

Starting from the Hsieh and Klenow's intuition that the marginal revenue products of capital and labor embeds some useful information on the "optimal" allocation of resource in the economy, Lenzu and Manaresi (2017) argue that a better measure of capital misallocation is given by the firm-level gaps between those marginal products and the input's user costs: a positive (negative) gap must be associated to an under- (over-) accumulation of inputs. In an economy where factor prices (interest rates and wages) tend to be relatively rigid, as in Italy, the authors show that the gaps can be used to estimate how frictions translate into distortions in input allocation across heterogeneous producers, and to measure the loss in aggregate output and TFP induced by such misallocation of resources.

On a very large sample of incorporated firms over the period 1997-2013, Lenzu and Manaresi (2017) find that inefficiencies in firm-level capital accumulation are correlated with credit market frictions: the MRP-cost gap is significantly higher among firms that do not have any bank credit and tends to decline steadily with the length of lending relationships: an additional year of relationship with the bank is associated with a 0.25 percentage points reduction in the gap between the firm's actual and optimal capital (mostly driven by an increased in installed capital rather than a reduction in its marginal cost).[27] They then analyze how the MRP-cost gap of capital responds to changes in the supply of credit[28] and conclude that, all else being equal, a positive supply shock reduces the MRP-cost gaps while a negative one increases them. The implied economic magnitude appear to be substantial: a one standard deviation increase in the growth rate of credit leads to an average reduction in the firm-level MRP-cost gap of 2.8 percentage points. This effect is almost entirely driven by firms operating with a sub-par capital endowment the period before the credit supply shock kicks in (-3.5 percentage points); moreover, within this latter group of firms, the magnitude of the effect is increasing in firm-level productivity (-7.76 vs -13.69 percentage points, comparing to firms located at the 25th and 75th percentile of the productivity distribution, respectively).

Using this methodology to assess the aggregate effects of misallocation, Lenzu and Manaresi (2017) estimate that minimizing the misallocation of capital and labor (i.e., holding fixed total available resources, and reallocating inputs according to a welfare-enhancing rule which takes them from firms

[27] These correlations suggest that informational asymmetries may play a relevant role in the allocation of capital across producers.

[28] In order to identify time-varying firm-specific credit supply shocks, they follow the methodology of Amiti and Weinstein (2016). Using a bank-firm matched panel database, they decompose the growth rate of credit for each bank-firm pair into bank-year (supply) and firm-year (demand) components, exploiting the widespread presence of firms that simultaneously borrow from several banks. They construct firm-level credit supply shifters as a weighted average of the shocks of the firm's lenders, weighting each lender by its lagged credit share.

with the lowest gap and productivity towards those with the highest gap and productivity) would generate aggregate TFP gains ranging from 3 (before the crisis) to 4 percent (over the period 2008-2013). Because aggregate gaps reflect all frictions, that is also frictions that cannot be removed by policy (like capital adjustment costs or informational asymmetries, these figures are meant to be an upper bound of the potential gains from reducing misallocation through policy interventions. Importantly, the aggregate measure of misallocation turned out to be stable before the crisis, thus contradicting Gopinath et al. (2017)'s conclusion in the case of Italy.

Schivardi et al. (2017) tackle the misallocation issue during the crisis from a restricted but very specific and policy-relevant perspective. In particular, they contribute to the "zombie lending" debate and test to what extent the conditions of banks, in particular their capital ratios, may have affected the allocation of credit. They use a very large sample of bank-firm relationships over the period 2004-2013 and find that, during the Eurozone financial crisis, under-capitalized banks were less likely to cut credit to non-viable ("zombie") firms. The resulting misallocation of credit increased the failure rate of healthy firms, while reducing the one of zombie firms. Despite the evidence of zombie lending in the Italian economy, the estimated adverse effects of credit misallocation on the growth rate of healthier firms are negligible, and so are the effects on TFP dispersion, i.e. on misallocation. Interestingly, Schivardi et al. (2017) also provide a methodological critique showing that the empirical approach typically used in the literature overestimates the impact of zombie lending on the growth of healthy firms. Last but not least, they find no evidence of zombie lending before the financial crisis, that is providing a further piece of evidence inconsistent with the narrative of Gopinath et al. (2017) for Italy.

Linarello et al. (2017) test the effect of industry-level of geographical-level credit supply shocks on the different components of aggregate productivity growth derived through the OP dynamic decomposition (see section 3 for a detailed explanation). Working on the universe of Italian firms, which allows to take full care of the entry and exit margins, they find that during the crisis labor has been reallocated from less productive to more productive firms in industries or provinces which experienced tighter credit conditions.

Finally, a few works focus on the impact of credit frictions on the entry rate of new firms. Manaresi and Scoccianti (2017) document a decline in the average growth and selection of newborn firms overtime during the double-dip recession, and argue that this phenomenon can be explained by tighter credit constraints to new firms in the aftermath of the financial crisis. While the recession induced a positive selection of the most efficient firms at entry, stronger credit market frictions severely

impaired their growth after entry.[29] Lotti and Manaresi (2015) show that stronger competition between banks in the local credit market increases access to credit and spurs the entry of new firms, improving the efficiency of input allocation.

So far we have dealt with the banking system. What do we know about the effects of non-banking financial intermediaries, in particular of venture capital? Bronzini et al. (2017) find that indeed Italian startups financed by venture capitalists (VC) experience a stronger size growth compared with other startups. Starting from the observation that the venture capital industry is highly under-developed in Italy, in 2013 the Government's Start-up Act introduced a set of benefits and incentives directed to innovative start-ups: these are firms aged 5 years or less with turnover lower than 5 million of euros, that either incur large R&D expenditures, employ a very high-skilled workforce, or are owners/licensees of patents. As of December 2016, more than 6,000 firms were registered as innovative start-ups, benefitting from lower red-tape costs, easier access to finance, tax incentives for investors, and larger flexibility of hiring than other firms.

All in all, the available evidence suggests that the Italian banking system has sustained productivity growth before the crisis both supporting firm-level innovation and exporting and improving (or at least, not worsening) the allocation of capital across firms. During the crisis, the credit crunch has dampened productivity growth via both the extensive and the intensive margins, that is by curbing the growth potential of new entrants and reducing productivity-enhancing activities – mostly investment – of incumbent firms. There have also been limited negative effects of tighter credit constraints and distorted banks' incentive on allocative efficiency ("zombie lending"), that have been counterbalanced by the cleansing of less efficient firms.

The underdevelopment of the non-banking segments of the financial system has limited and it is still limiting the growth-enhancing contribution that could come from start-ups and innovation more in general. The measures recently adopted by the Government to support the creation of new firms and innovation, though, go in the right direction.

5.2 Labor market and industrial relations

When looking at the determinants of productivity and growth, the relevance of a well-functioning labor market cannot be overemphasized. The main elements characterizing labor market institutions are the rules defining the way matches between workers and firms can be created and destroyed and the tasks modified (Employment Protection Legislation, EPL), the eligibility criteria and the generosity of

[29] However, preliminary results by the same authors show that the effects have been probably temporary. In fact, during the subsequent economic recovery these same firms were on average able to catch up thanks to a relatively higher share of high-return intangible investments.

the shock-absorbers (Passive Labor Market Policy), the provision of counselling and training to job-seekers (Active Labor Market Policy) and, finally, the system of rules concerning worker's involvement in production and bargaining over wages and work organization (Industrial relations). By influencing labor supply and demand and allocative efficiency these elements are expected to have an impact on productivity and growth whose sign, though, may change across countries and periods as a function of not only institutional factors but also individual preferences.

Labor market regulation. – A wide body of empirical literature has exploited the large cross-country variation in labor market regulation or reforms taking place in specific countries to estimate its impact on economic performance.

Reforms lowering EPL have generally been found to have a positive impact on productivity by facilitating allocative efficiency (Scarpetta and Martin, 2012). On a sample of OECD countries Bassanini et al. (2009) find that stricter dismissal rules reduce productivity growth, in particular in sectors where layoff restrictions are more likely to be binding. Analyzing 14 EU countries, Cingano et al. (2010) confirm the previous result and also find a depressing impact of EPL on capital and investment per worker. Bartelsman et al. (2016) show that in countries with stricter employment protection, high risk sectors, which are the largest contributors to productivity growth, are relatively less developed: according to their simulations, this explains the slowdown in productivity growth taking place in Europe relative to the United States since the '90s. They attribute this result to the fact that firms adopting a risky technology face an ex-ante greater uncertainty concerning their productivity and high EPL make the ex post adjustment costs higher, should realized productivity turn out to be lower than expected. All in all, the empirical literature generally finds that a reduction in EPL can be beneficial to productivity; however, its optimal level shall not be zero in that a positive level of EPL "forces" firms to appropriately screen candidates and induces both firms and workers to invest in match-specific skills (Belot et al., 2007).

Moving to Passive Labor Market Policies, unemployment benefits can impact on a country's growth through three channels. Generous income support during non-employment increases workers' bargaining power by reducing the cost of leisure and increasing equilibrium wages. On the labor demand side this element forces firms to substitute labor with capital and improve job-match quality, thus increasing productivity (Acemoglu and Shimer, 2000; Centeno, 2004; Tatsiramos, 2009). Nevertheless too generous income buffers can give way to opportunistic behavior, with dismissed workers reducing their job-search effort while covered by unemployment insurance and increasing it shortly around expiration (Krueger and Meyer, 2002). This would entail a reduction in labor market attachment, labor supply and thus potential growth. Such negative side effect can be larger if

conditionality is not appropriately enforced. To minimize such negative side effects, successful systems feature a strict coordination between Passive and Active Labor Market Policies (ALMP).

ALMP comprise the set of rules defining the availability, the functioning and the efficacy of services providing counselling, training, employment subsidies or direct job creation to job seekers. They are in theory important for productivity in that they strengthen the efficiency by which unemployed workers get reallocated to a new firm and improve job-match quality. Based on a meta-analysis of the results of 97 studies conducted between 1995 and 2007 Card et al. (2010) conclude that ALMP are effective in increasing re-employment probabilities, the more so over the medium run as compared to the short run. A more recent study by the same authors (Card et al. 2017) confirms and extends these results showing that ALMPs are particularly effective for women and long-term unemployed and if geared towards human capital accumulation.

Reflecting national preferences and historical patterns, ample variation persists in the way labor market institutions are shaped in European countries in all of the four domains. For a long time and until the 2008 Great Recession and the following sovereign debt crisis, Italy has been characterized by a quite flexible discipline concerning collective dismissals coupled with strict rules on individual ones; a major reform taking place in 1997 significantly liberalized fixed-term contracts, favoring labor market entry and external flexibility at the margin while at the same time creating – absent a comprehensive reform strategy – a dual labor market (Brandolini et al. 2007). The diffusion of fixed-term contracts, while importantly adding to labor market flexibility, may have had a negative impact on productivity via weaker incentives by both the employer and the employee to invest in firm-specific skills (Lotti and Viviano, 2012). At the same time, income stabilizers were based on universal benefits of limited duration and replacement rate and a highly fragmented system of sector-specific schemes (including short time work subsidies) offering different levels of coverage and durations with only a weak link between payments and contributions. As a consequence, a systematic transfer was taking place from more to less productive firms. Expenditure in active labor market policies was very low by European standards and their effectiveness questionable, in particular in the southern areas of the country. No surprise that such a system has been largely criticized for being a drag on productivity growth.

A comprehensive reform strategy started in 2012 with the Fornero reform and continued with the 2015 Jobs Act. Employment protection on individual dismissals was reduced, together with the fragmentation of the unemployment benefits system now based on a universal scheme whose generosity is comparable to the one of other European countries. Closer links between payments and contributions were introduced in short time work subsidies. The 2015 reform also enacted an overhaul of active labor market policies, by instituting a central agency responsible for maintaining a nationwide

information system with the aim to facilitate data exchange among regions, make sure that benefit recipients comply with the eligibility conditions, and monitor the services provided. The agency is also expected to support or even act on behalf of regions that are not able to provide essential services.

There is evidence (Sestito and Viviano, 2016) that the Jobs Act's reduction in EPL for individual dismissals contributed to a reduction in labor market duality by making firms less reluctant to offer permanent contract. The expected improvement in allocative efficiency can be indirectly assessed from Lenzu and Manaresi (2017) who relate the MRP-cost gap for labor to the regulation in place before the Jobs Act, known as Article 18, which was making the dismissal regulation much more restrictive for firms with more than 15 employees. They find that firms immediately below the threshold not only display higher average gap between the MRPs of labor and wages but also have a much lower response of labor demand to productivity shocks relative to firms far from the threshold. This result is consistent with the hypothesis that the government-mandated regulations on workers' dismissals discourage firms from increasing their size despite the growth opportunities that might be available. Using a quantitative structural model, Rodano, Rosolia and Scoccianti (2017) show that the new dismissal regulation should have favored in the short run the growth of labor demand not only by firms below 15 employees, but also by those far away from the regulatory size threshold.

While the effects of the changes in passive labor market policy, whose setting is now more equitable and supportive to allocative efficiency, have not been assessed yet, the ALMP reform is still in its implementation phase. It will take time for the new national agency to become fully operational, while the whole implementation process is made more complicated by the coexistence of different entities at both the national and the local level. In particular, legislative power in this domain continues to stay with the Regions (given the rejection of the Constitutional amendment in 2016), making it harder for the new national agency to promote convergence to best practices and to enforce conditionality.

All in all, we would conclude that the two recent reforms have significantly changed the Italian labor market functioning increasing its allocative efficiency. In this regard, the new setting will be expected to support productivity growth, the more should the ALPM re-design eventually be fully completed.

Industrial relations.[30] – A crucial role in determining productivity developments is played by the Industrial Relations system, which defines both possible forms of employee involvement in the production

[30] This paragraph partly summarizes D'Amuri and Giorgiantonio (2015a,b).

process – thus their ability to propose organizational and production improvements (Blasi et al. 2010) – and the degree to which innovations involving changes in work organization can actually be translated into practice through changes in labor contracts. Moreover, by determining wage levels across sectors and firms, bargaining has a pivotal role in determining allocative efficiency, by providing incentives for workers to move where their productivity is higher; at the same time, in countries where centrally bargained contracts are extended to all sectors, minimum wage dynamics reflecting average productivity growth can drive least productive firms out of the market.

Greater involvement of employees in the definition of production processes and in the company's strategies is one of the key elements in innovative HR practices (Ichniowski and Shaw, 2003), whose positive effects in terms of productivity and innovation have been confirmed by the empirical literature. More generally, greater worker participation in corporate decisions can foster a cooperative climate between management and employees, while allowing greater information sharing. A strictly centralized system might slow down or discourage the trial of innovative organizational practices tailored to the specific production needs of the firm (Katz, 1993).

Moving to earnings and their link with productivity, the implications of the degree of bargaining centralization are less clear. While decentralized bargaining may favor allocative efficiency and the adjustment to demand shocks, which is a crucial element in a currency area (Mundell, 1961), a more centralized system might allow an increase in the average productivity level in an economy (Moene and Wallerstein, 1997). This is because local bargaining would increase wages in the most productive firms, while introducing wage moderation in other, less efficient, ones allowing them to survive longer. There would therefore be a trade-off, at least in static terms, between the average productivity of firms and employment levels. Nevertheless, in countries with large productivity differentials across areas (such as Italy) and imperfect mobility of workers, a centralized system setting a unique minimum wage might result in labor demand being concentrated in the more advanced areas and structural unemployment emerging in less developed ones (Boeri et al., 2017). In a dynamic perspective, switching to bargaining decentralization may make firms reduce investment and innovation if the resulting increase in profits would have to be shared with workers (Haucap and Wey, 2004). For Italy, Card et al. (2013), using data for the Veneto region, find evidence of a positive elasticity between firm profitability and wages, but the magnitude of the relationship is not large enough to discourage investment.

The missing item in the reform process has been so far the industrial relations system (D'Amuri and Nizzi, 2017), that remains centered upon national, sector-wide agreements setting minimum wages for each specific qualification and rules concerning hours and work organization. The company's (or local) agreement has a much more limited role: it can modify aspects of work organization only if

delegated by the national contract and can determine the payment of additional wage components, on top of the minimum ones defined by the national contract. Following the 1993 agreements, such a centralized structure significantly contributed to macroeconomic stability by moderating wage growth and anchoring inflation expectations; in more recent times, centralized bargaining has delivered wage growth broadly in line with inflation developments, but constantly outstripping productivity dynamics: between 2005 and 2016 hourly wages increased 20 per cent more than hourly productivity. The resulting loss in competitiveness vis à vis other European countries has been partly absorbed by decreasing profit margins (Amici, Bobbio and Torrini, 2017). Moreover, centrally bargained wage growth higher than productivity reduced the room for the development of second level bargaining that, according to the 1993 protocol, should have been in charge of redistributing rents generated by real productivity growth at the local level. In turn, a lower diffusion of local level bargaining could have reduced the adoption of innovation and flexible working practices.

At the current juncture, the need to regain competitiveness through across the board wage moderation could enhance deflationary risks. A wider room for decentralized bargaining, possibly opting out from the wages set at the national level, could provide a way out in which centrally bargained wages grow at a moderate rate, thus anchoring inflation, while single firms are able to compete thanks to higher wage and organizational flexibility (Sestito, 2017).

Contract decentralization would benefit innovation and productivity growth by strengthening within-firm organizational flexibility and paving the way for a greater participation of employees in the companies' strategies and production processes. According to a recent comparative study covering 27 European Union member countries (Eurofound, 2013), Italy is one of those where workers' involvement is more limited[31]. Half of the companies answering to the annual Bank of Italy's survey (Bank of Italy, 2015)[32] said they only apply the standard forms of consultation and information of workers dictated by the National Labor Contract. In about a quarter of cases additional employee-participation tools were present. Overall, structured forms of participation of workers were more frequent in the firms of bigger size and under foreign control.

Using firm level contracts, it would also be easier to create remuneration policies that can motivate workers. Although indirect incentive schemes, such as - for example - career progressions or individual bonuses, are available also through national bargaining, decentralized contracts allow the use of a wider range of options. The specific levers can be indirect, such as – for example – efficiency

[31] See Tronti (2012) on the failure of the take-off of structured forms of employee's participation.
[32] In the Bank of Italy's Survey on Industrial and services sector firms, the question about workers' participation has been asked only to firms with at least 50 employees and for year 2014.

wages higher than the equilibrium ones in order to make any dismissal due to poor performance more expensive for the employee, or direct, such as pay for performance. There is a broad consensus on the effectiveness of performance related pay in increasing firm's productivity (Gielen et al., 2009, Lazear, 2000), through both the attraction and retention of the most able employees and the increase in the motivation level of the workforce. Also for Italy, the positive link between productivity and performance related pay is confirmed by various studies. Lucifora and Origo (2015) and Origo (2009) find evidence of an increase in productivity in firms that have moved, under a framework agreement, from fixed pay increases to reward systems. This positive relationship is confirmed by Damiani et al. (2016) who found positive productivity effects of performance related pay, concentrated in the two extremes of the distribution of firms' productivity (very low and very high productive firms).

Finally, notwithstanding some negative effects previously described, a greater differentiation of wages across and within firms would allow for a closer link between remuneration, on the one hand, and conditions of the local labor market and productivity, on the other hand. This should lead to greater allocative efficiency and lower unemployment, particularly where (as in Italy) there are strong differences between local labor markets conditions and between firms' productivity levels.

5.3 Competition and regulation

The object of this section is to go through the available evidence on the competition-productivity nexus. To simplify things, we focus on two main drivers: the competitive pressures exerted through increased foreign trade (globalization driven) and the domestic regulatory environment (the set of rules affecting both entry costs and the functioning of service regulated sectors).

International trade. – The impact of international trade on productivity is widely studied in the literature. Trade flows can affect aggregate and firm-level productivity via three channels. The first one is a *competition channel*. When international trade intensifies, firms end up facing stronger competitive pressures in any market where they operate, including their own domestic market through increased imports (Melitz, 2003; Bernard et al. 2003; Mayer et al., 2014 and 2016). The competition channel may favor aggregate productivity improvements in a country both triggering reallocation and forcing firms to become more efficient. A second channel goes through *demand*: globalization and trade openness imply an enlargement of a firm' (potential) market size which creates scope for efficiency-enhancing scale effects in production. These market size-effects get further reinforced if, as it appears to be reasonable, larger markets are also more competitive. Finally, there is an *import channel*, whereby a more open international trade setting allows firms to acquire cheaper and/or higher quality inputs from abroad, and thus improve efficiency (Amiti and Konings, 2007; Halpern et al., 2015).

There is a rich empirical literature showing how trade can positively affect productivity. Since the theoretical papers by Melitz (2003), Bernard et al. (2003), and Melitz and Ottaviano (2008) many scholars have explored the impact of trade on productivity through reallocation and the contraction and exit of the least efficient firms.[33] Turning to within-firm effects, the so called "learning-by-exporting" hypothesis has been widely studied with mixed results (Clerides et al., 1998; Bernard and Wagner, 1997).[34] The literature has then developed in the direction of searching for trade effects on observable factors related to a firm's product mix, inputs, technology, and organization. The results point to a positive effect on both innovation[35] and product quality[36] which then translate into productivity enhancement.

What do we know about Italy? Going back to the three shocks described in the introduction, two of them merit a particular attention here. The first one is related to the exceptional increase and massive diffusion of cheaper goods produced in emerging and developing economies in world markets. The increasing role of China as a global player has undoubtedly been the main feature of these developments: since 2001, when China entered the WTO, its share on world goods exports has almost tripled, to 15 per cent in 2015. In some sectors, like textile, clothing and footwear, the increase has been much sharper. The second one descends from the European market integration process and the adoption of the euro which have both significantly eased trade flows within Europe. This process has

[33] According to Pavcnik (2002) Chile's trade reform triggered reallocation of market shares across firms with different productivity levels. Trefler (2004) shows that after the Canada-US Free Trade Agreement the contraction of low-productivity firms sustained productivity growth in industries where tariff cuts were deepest. On the basis of US plant-level data, Bernard et al. (2006a) find that across sectors the exposure to imports from low wage countries is negatively (positively) correlated with employment growth (probability of plant death); analogous results emerge from studies focusing on European countries (Coucke and Sleuwagen, 2008; Bloom et al., 2016; Mion and Zhu, 2013).

[34] De Loecker (2007) shows that in Slovenia both new exporters' firm-level productivity and their productivity gap with respect to domestic firms increase after entry. Using the Canada-U.S. Free Trade Agreement, Lileeva and Trefler (2010) find that labor productivity of Canadian firms increases as a consequence of US tariff cut and that the effect is stronger among ex-ante smaller and less productive firms. Reviewing 45 studies on 33 countries published between 1995 and 2006, Wagner (2007) concludes that exporting firms are more productive than average owing to a self-selection effect, whereas entering foreign markets does not necessarily lead to an increase in efficiency at firm level. These results have been confirmed by an international comparative research project (ISGEP, 2008).

[35] Focusing on increased import penetration after China's accession to the World Trade Organization in 12 European countries, Bloom et al. (2016) find that firms more exposed to such imports increased their R&D expenditure, patenting and adoption of information technology. Bustos (2011) shows that Argentinean firms respond to the Mercosur Free Trade Agreement by increasing both their export market participation and their technology spending. Autor et al. (2016) find instead a negative impact of Chinese import penetration on US manufacturing firms' patents.

[36] Martin and Mejean (2014) estimate a significant increase in the average quality of French aggregate exports in the markets where import penetration by low wage countries has increased relatively more. Amiti and Khandelwal (2013) find that countries with tougher competition in domestic markets export higher quality products to the US. Bernard et al. (2006b) show that trade liberalization may foster productivity growth by inducing firms to shed marginally productive products (i.e., reallocation of resources across products within firm). Mayer et al. (2014, 2016) build a theoretical model whereby tougher competition, shifting down the entire distribution of markups across products, induces firms to skew their export sales toward their better performing products; after empirically confirming this for French exporters, they estimate that this margin of adjustment explains a significant share of aggregate productivity fluctuations.

brought both new opportunities for firms that were earlier unable to overcome trade costs and increased competitive pressures in the European market.

Using the CEPII-BACI dataset, Bugamelli et al. (2017) classify products on the basis of the intensity of competition exerted by China on world markets and distinguish three groups of products: highly-exposed when China's world market share is above 15 per cent, "medium" when China's share falls between 4 and 15 per cent and "low" when China's share is below 4 per cent. Indeed Italy has been relatively more exposed than the other main euro area countries: in 1999 the products characterized by a high degree of competition amounted to 31 per cent of Italy's total exports, compared to around 20 per cent for France, Germany and Spain. Since in all countries the loss of export market shares has been much larger for products characterized by high competition from China, Italy's higher exposure to China is estimated to explain at least one tenth of the Italian exports' under-performance on world markets relative to Germany before 2008.

Not surprisingly, various authors have found significant effects of increased trade-induced competitive pressures on Italian firms. On the universe of Italian manufacturing firms previously described, Linarello and Petrella (2017) find that import penetration, measured as the share of imports from developing countries over domestic consumption at 4-digit industry level, has a strong and positive effect on reallocation (Table 4). As indirect evidence, Federico (2014) finds that competition from low wage countries is negatively correlated to employment and other measures of domestic activity for 230 manufacturing sectors; the contractionary effect is significantly smaller in more skill, capital- and R&D-intensive sectors. Bugamelli et al. (2015) analyze the impact of increase import penetration from China on the dynamics of firm-level output prices in Italy. Accounting for potential endogeneity biases, they find that higher Chinese import penetration restrains price growth. This relationship reflects a procompetitive effect induced by cheaper competing imported goods and implies a reduction in profits and markups which is driven by low-productivity firms within less skill-intensive sectors. A negative impact of import competition on markups is documented also by Altomonte and Barattieri (2015), while Buono (2012) finds that those Italian firms that are more exposed to price competition from China, in order to survive, they pursued an "escape competition" strategy focusing on product innovations, more so if they belong to the high-tech sectors or specialized suppliers, whit a positive effect on their productivity.

As to the euro, Bugamelli et al. (2009) focus on euro area countries and find clear support for the hypothesis that the new currency has induced relatively strong intra-sectoral restructuring. After the adoption and controlling for other factors, productivity growth has been fastest in the sectors with low-skill content, like the ones where Italy is specialized, and in the countries that had relied more on

competitive devaluations, again like Italy. By implying a reduction in trade costs and risks, the currency stability guaranteed by the euro could have allowed small and domestically-oriented firms to get access to foreign markets for their first time. Some evidence in this direction is provided by Bugamelli et al. (2017) which show how since 1999 (and with the only exception of the Trade Collapse in 2008-09) the number of micro exporters (those with 0-19 employees) has markedly and persistently increased. Starting exporting can then have positive effects on productivity: indeed, within the ISGEP project Italy turns out to be the sole exception to the generalized finding of no learning-by-exporting (Serti and Tomasi, 2008). This can go beyond export participation: Accetturo et al. (2015a) use Italian firm-level data and European Patent Office (EPO) records to show that an exogenous increase in exports has a positive effect on the probability that a firm applies for a patent.[37]

All in all, it can assessed that boosts to trade related to globalization forces, both on the export and the import side, have had positive effects on Italian manufacturing productivity via both reallocation effects and within firm adjustments. What though must be recalled is that productivity-enhancing effects may have come with some non-negligible costs in terms of employment (Federico, 2014).

The domestic regulatory environment: the regulation of entry. – At a domestic level, the degree of competition in the economy is affected by the characteristics of the legal and regulatory provisions that control entry into the market.

One can distinguish three different types of entry regulations: a) "registration rules" that include those rules governing the establishment of firms as legal entities, i.e. the registration and incorporation procedures; b) "startup regulations" that make entry subject to the issuing of authorizations and permits by the public administration aimed at protecting public interests (such as health, environment, safety) and, more generally, dealing with externalities produced by economic activities; these entry costs may vary substantially by industry, geographical location, size class, or other firm characteristics; c) "product market regulations" that include regulations governing the entry into a specific industry – typically, in the non-manufacturing sector – with the aim of correcting market failures. Also these regulations usually make firms entry subject to licenses and permits released by public authorities (in some cases, entry is restricted by quotas). In this subsection, we focus on registration and startup costs, leaving the discussion of product market regulation to the next one.

[37] Accetturo et al. (2013) show that an analogous increase in foreign sales cause a sizeable skill upgrading of the workforce, in terms of both average education and share of non-production workers. Using the 1992 devaluation of the Italian lira for identification purposes, Macis and Schivardi (2016) conclude that the devaluation increased the demand for higher skills, in particular for those more useful for exporting, driving their relative price up.

Registration and startup costs can be of a direct monetary nature (e.g. fees, taxes, compliance costs) or of an indirect one, when related to the time needed to complete all the procedures required by the regulation (time costs). Moreover, they come from two sources. The first one is the actual content of the regulation that prescribes the requirements that firms have to fulfill to start their activity and the procedures they have to follow. The second source, mainly affecting time costs, stems from the functioning of the public administrations that are in charge of implementing the regulations. The longer the time employed by public bodies to handle the procedures and release licenses and permits the higher the entry costs for firms.

International comparable measures for registration and startup entry costs are provided by the Doing Business indicators of the World Bank. Specifically, registration costs may be measured by the "Starting a business" sub-indicator.

Figure 14 (panel a) depicts the time and costs of the procedures to be followed to establishing and registering a specific type of firm (a limited liability company) in the main euro area economies and their averages among the high-income OECD countries. While the time needed in Italy is shorter than in Germany and Spain and below the OECD average, the costs are much higher than in the other economies (and higher than OECD average). A proxy of the startup costs is provided by the "dealing with construction permit" sub-indicator that measures the time and costs of the procedures required to obtain a construction permit for a building to be used by a firm as a warehouse (Figure 14, panel b). A first thing that is worth noticing is that startup costs are much larger than registration costs; the more so considering that the employed proxies measure only the costs of one of the several permits that firms may need to acquire before starting their activity. The figure also shows that the length of the procedure is the highest in Italy and it is well above the OECD average and the costs are more than twice the OECD average. As already mentioned, the length of the procedure may also reflect the low quality and efficacy of the bureaucracy; indeed the available comparative evidence suggests that this may be the case for the Italian public administration in comparison with those of the other countries considered above.[38]

Several papers have documented negative effects of bureaucratic entry costs on creation, size, and growth of firms (see, e.g. Klapper et al., 2006; Ciccone and Papaioannu, 2007; Dreher and Gassebner, 2013). As for Italy, the effects of regulatory barriers on entry have been documented by Bripi (2015). Focusing on registration costs of limited liability companies (measured using a survey that

[38] See, for instance, the "governance effectiveness" indicator of the World Bank. Moreover, the quality and effectiveness of the services delivered by public administration have a direct impact on firm's productivity in Italy (Giordano et al., 2015).

draws on the Doing Business methodology) and exploiting the heterogeneity across provinces in regulatory burdens and sectorial differences in "natural" entry rates, Bripi (2015) shows that entry rates of limited liability companies are higher in provinces where entry costs are smaller.

Other papers have investigated the impact of recent reforms aimed at lowering regulatory entry barriers and favoring access to markets. Amici et al. (2016) analyzes the effect of the 2010 reform of one-stop shops (OSSs) for doing business. The OSSs are the administrative units at municipal level that handle the procedures related to the starting of economic activities, issuing permits and authorizations (in our categorization they deal with startup regulations). Exploiting its staggered implementation at municipal level, they find that the reform had a positive effect on entry rates; however, this effect is totally originating from the dynamics of sole-proprietor firms, suggesting that the OSS reform mainly reduced the costs of starting economic activities.

The aggregate economic impact of measures that lower entry costs may be relevant. González-Torres Fernández (2016) focuses on time costs and, using a general equilibrium model calibrated on the Italian economy, estimates that a 40 per cent cut in startup times potentially lead to a 1.9 per cent increase in aggregate output and a 4.3 per cent increase in aggregate productivity; while reducing registration times appears to have had only negligible aggregate effects, given that the initial value was already quite small. The aggregate impact stems from the negative selection effect of lengthy bureaucratic procedures: they poses a fixed entry cost whose relevance increases with an agent's ability to generate income (the opportunity cost of devoting time to bureaucratic tasks increases) so that higher quality entrepreneurial projects are less likely to be pursued, compared to lower quality ones. In other words, the average quality of entrepreneurial projects is negatively affected by lengthier registration and startup procedures.

The domestic regulatory environment: sector regulation. – The literature on the relationship between product market regulation and growth has been recently developing in a significant way pointing to the idea that the regulatory environment influences the allocative efficiency and the entry and exit dynamics.

Using OECD's Product Market Regulation (PMR) indicators, Barone and Cingano (2011) find that a high degree of restrictiveness in service regulation industries (in particular in energy supply services and professional services) has a significant negative effect on the growth rate of value-added, productivity and exports of the downstream industries (typically, manufacturing) using those services as inputs.[39] Arnold et al. (2011) and Andrews and Cingano (2014) show that lower regulatory burdens tend

[39] On this see also Bourles et al. (2013).

to facilitate a reallocation of resources towards more productive firms. Andrews and Criscuolo (2013) find that high regulatory burden in the business service sector reduces investments in knowledge-based capital. A reduction in PMR indices, as a consequence of reforms aimed at liberalizing market services and easing regulation and bureaucratic constrains, is meant to reduce monopolistic rents also favoring competition and entrants of new firms (OECD, 2009; Bartelsman et al., 2009; Bravo-Biosca et al. 2013). To explain the modest growth in productivity recorded in market services in the euro area and in the EU as a whole compared to the US, Van Reenen et al. (2010) find that disparities in ICT-driven productivity growth between countries are largely explained by labor market and services regulation restrictiveness and by skills and organizational capital inside firms (management and decentralization of decision-making). The authors stress that the ICT productivity effect they detect is reduced by 45 per cent if labor regulations are strict and by 16 per cent if services regulation is strict. Barrios and Burgelman (2008) conclude that, in the EU and comparing the EU with the US, ICT investment is significantly lower in countries with rigid, heavily regulated services and labor markets. They speak about "an ICT deterrence effect of strict regulation".

To assess if and how the regulatory restrictions impact on productivity, we estimate a regression model of (log) productivity on the regulation indexes. We do it analyzing the OECD's non-manufacturing regulation (NMR) index between 1998 and 2013 for France, Germany and Italy. NMR is constructed as a synthetic measure of regulation restrictiveness averaging several components across different sectors, namely: energy (electricity and gas), post and telecommunications, transports (road, rail and air), retail trade and professional services (accounting, legal, architectural and engineering).

We find that a unit reduction of the average NMR indicator is associated to a gain in productivity between 25 and 29 per cent.[40] Interestingly, this negative correlation goes through firm growth: regulatory restrictions can indeed deter firms' growth with an indirect depressing effect on productivity. Figure 18 provides a synthetic description of the two correlations: we group the log of firms' size and the log of productivity by NMR quartiles, coming from the distribution of the NMR indices over the three European countries, the four subsectors and the 15 years from 1998 to 2013. We observe a negative relationship, which is particularly striking when comparing the first quartile (minimum regulation) to the last (maximum regulation): the corresponding value of the median log-size is more than double (over seven times in levels); the increase in productivity is lower (one fourth between the first and the last quartile), but still visible. Then the question becomes: how much is the negative effect of PMR on productivity channelled through firm growth? To this aim, we follow a three-step

[40] We insert year dummies to control for differences in the macroeconomic context, and, in a different specification, sector dummies, whereas the sample size does not allow to include both in the same regression. The main result does not change.

procedure whose results are reported in Table 5. We first estimate the following model to retrieve the direct effect of PMR on firm size:

$$ln\ size_{ijt}=\beta PMR+a_i+c_t+\varepsilon_{ijt} \quad (1)$$

where we control for country and year fixed effects and the errors are clustered by sector. Here we find a negative and statistically significant relation (β=-0.85). Then we move to the relationship between size and productivity:

$$ln\ prod_{ijt}=\gamma\ ln\ size_{ijt}+a_i+c_t+u_{ijt} \quad (2)$$

where we retrieve the expected positive and significant association. Finally, we regress the residuals from (2) on the NMR index, in order to understand whether there are other regulation-related elements that are important for productivity but do not affect firm size, i.e.:

$$u_{ijt}=\alpha\ NMR_{ijt}+a_i+c_t+u_{ijt} \quad (3)$$

The α coefficient is insignificant and also the explanatory power of the model proves very low. This is to say that there exists a strict link between regulation, productivity and size: a higher degree of legal constraints appear to be associated to lower size (disincentive to grow), which then negatively affects productivity growth.

What is the macro impact of service liberalization on economic growth? In a DSGE framework, Lusinyan and Muir (2013) and Gerali et al. (2015) investigate the impact of the pro-competitive reforms approved in Italy in 2012.[41] The Bank of Italy analysis assumes the reforms to achieve a 10-percentage points (pp) reduction in the average gross mark-up in the Italian services sector, from 1.29 to 1.19, and to be gradually implemented over a 10-year horizon, starting from 2013. According to this hypothesis, the markup in the services sector ends up being lower in Italy than in the euro-area by 2022. The IMF analysis assumes instead that the reforms will close roughly half of the existing gap with respect to the rest of the euro-area for the product market over a five-year period. The corresponding reduction in the service mark-up amounts to 13 pp (from 1.61 to 1.48). According to Gerali et al. (2015), the GDP elasticity to a 1pp reduction in the mark-up would be around 0.3[42], while Lusynian and Muir (2013) estimate an implicit value of around 0.5. Overall these figures would bring a long run increase of GDP equal to 3 percentage points according to Gerali et al. (2015) and almost 7 according to Lusinyan and Muir (2013).

[41] In Box 3 we provide a wider discussions on the strengths and weaknesses of the DSGE models for assessing the macro impact of structural reforms.
[42] A similar figure is obtained by Gomes et al. (2011), who use a similar model to analyze the implementation of the same type of reform in Germany.

The most recent data on the intensity of PMR indicate that, even though there was little progress on average in the OECD over the 2008-2013 period, a number of OECD countries implemented sizable reforms, often in an attempt to boost economic growth in wake of the economic crisis (OECD, 2013 Figure 15). On average across the OECD, countries have made particular progress in abolishing price controls or improving their design, streamlining administrative procedures for start-ups, simplifying rules and procedures or improving access to information about regulations.

Italy also experienced a series of reforms, aimed at increasing competition in product and service sectors and bridging the gap between the country PMR index and the OECD average. The reforms occurred in 3 waves. The first one, between the end of the Nineties and the beginning of 2000s, introduced significant liberalizations in network industries, such as electricity, gas and telecom. Then, in 2006-07, the so-called Bersani's decrees focused on professional services and the retail sector; further adjustments occurred in the telecommunications, insurance and banking industries. The third wave occurred after the Sovereign Debt crisis under the Monti government. They were broader in scope, further liberalizing network industries, professional services, retail, transport, water and postal services.

Overall, as regards to competition in product markets, Italy is currently in line with the OECD average (Figure 16). In the energy sector it is aligned to the best practices, while it is an intermediate position in professional services; regulatory restrictions remain high and above the OECD average in transportation, and local public services (Figure 17). According to the PMR index, the Italian retail sector is considered to be still highly regulated, despite an intense reform process over the years that in our view has effectively liberalized the market (Box 2).

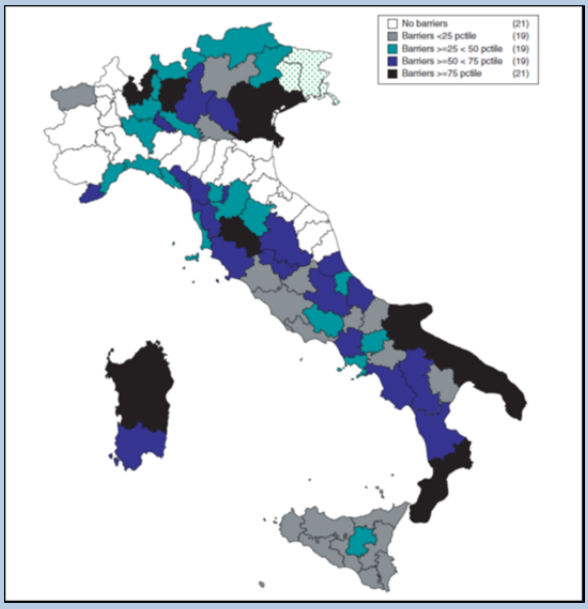
Box 2: The Italian retail sector

The retail sector deserves a particular focus for at least a couple of reasons. First, enlarging the scope of the analysis to the consumers' welfare, the retail sector is the one that can easily nullify the consumers' benefits (in terms of lower prices) coming from a higher degree of competition among the producers of goods and services. Thus neglecting the intermediation role of the retail sector between supply and demand can easily bring to erroneous assessment on the real effects of competition in other sectors. Secondly, and more relevantly for this paper, there is a large consensus that anti-competitive regulation is the main cause of the difference between US and Europe in productivity growth in the service sector over the recent years: the retail trade would alone explain a large fraction of the total gap. For example, it is often claimed that the euro area regulatory environment is more restrictive (and thus less competitive) than that of the US because land zoning regulations constrain the size and density of larger format stores, labor tends to be less flexible (and hence more costly); as to the latter, regulations governing hiring practices, working times, overtime and ancillary payments make it relatively more difficult for euro area retailers to exploit cyclical demand dynamics.

Among the European countries, the case of Italy offers interesting insights: the Italian retail sector, characterized by a prevalence of traditional small stores, underwent a major regulatory change in 1998 (so called Bersani Law, Decree 114/98). The key points of the reform, which undoubtedly represents the first substantial act of liberalization in the Italian retail sector, can be summarized as follow: i) explicit definition of the general principles fostering competition and modernization of the sector; ii) complete liberalization of small outlets, based on the mere communication of the opening to the City Council, which could oppose only for urban planning reasons and within a given period of time; iii) authorization to open new stores delegated to local authorities.

Schivardi and Viviano (2011) carefully analyze the effects of the removal of entry barriers on a battery of performance measures. Exploiting geographical and time heterogeneity, they find that entry barriers play a substantial role in explaining local performance. In particular, they estimate that large stores in the area at the 75th percentile of the barrier distribution recorded higher margins (lower productivity) by about 8 per cent (3 per cent) with respect to those in the area at the 25th percentile. Consistently with lower margins and higher productivity, prices of goods in the grocery retail sub-sector – the segment with the greatest presence of large stores – are higher the more stringent the entry regulation (Figure A).

Figure A - Regional distribution of entry barriers in retail



If we can rightly claim that the Bersani Law represents the first real pro-competitive reform aiming at liberalizing the compartment, its effects were extremely weakened by the responsibility left to local authorities to implement its dictates. The Italian regions have used with great discretion the margins left by the national law. Contrary to the spirit of the law, almost all of the regions divided its territory into areas (more or less coinciding with the provinces) and established quantitative limits on new large-sized retail outlets, often advocating the need to safeguard the smaller sales structure, the plurality of distribution formulas, and employment levels in the sector. Therefore in recent years other national laws for the transposition of Directive 123/2006/EC on "services in the

internal market" have sought to limit the anti-competitive guidelines of local authorities. Quantitative restrictions have been gradually overcome, even though regional law has still focused on maintaining indirect constraints to operations (schedules, sales promotions and so on).

Despite the obstacles imposed by regional regulation, over the last decade, thanks to the spread of new technologies, the sector experienced strong growth. The degree of market concentration decreased in all the areas of the country (the gap between North and South narrowed), as the average size of distributive trade enterprises increased (Table A). Thus, the Italian commercial structure has gradually converged to the standards prevailing in the main euro area countries, although the average size of Italian grocery chain stores still remains below that of France and Germany (Table B).

Table A - Evolution of retail trade- grocery chain stores

	Herfindahl-Hirschman index		Stores per 1000 capita		sqm per 1000 capita		Average size	
	2002	2010	2002	2010	2002	2010	2002	2010
North West	0.066	0.064	0.37	0,39	226	294	617	759
North East	0.070	0.061	0.49	0,52	247	313	507	607
Center	0.071	0.062	0.44	0,45	219	267	493	592
South	0.058	0.048	0.48	0,57	194	261	402	460

Source: Nielsen (2011).

Table B - Grocery retailers in the main euro area countries, 2009

	Stores	Sales area (sqm)	Sqm per store	Stores per 1000 capita	sqm per 1.000 capita
Italy	260,204	25,512	98	4.3	423
Germany	107,965	39,941	370	1.3	488
Spain	157,968	21,091	134	3.4	459
France	93,284	28,546	306	1.4	443

Source: ECB. Occasional paper n. 128/2011.

5.4 Insolvency regime

Sound insolvency regimes, ensuring fast and effective liquidation procedures, are key to productivity growth for they prevent the trapping of assets in unproductive uses and favors their reallocation to more productive ones[43]. Moreover, by providing effective restructuring legal tools they also affect the likelihood that financially distressed firms are successfully restructured and kept as going concern. Since restructuring operations often imply the sale of assets and/or business units to healthy firms and the turnaround of the remaining activities they favor both the reallocation of resources across firms and a more efficient use of them within the firm. The insolvency regime may affect productivity also through its ex-ante impact on firm entry: if efficient, it reduces the cost of failures for entrepreneurs (for instance, providing the possibility of a fresh start) and incentivizes firm creation, particularly in innovative activities that are characterized by higher risk taking (Armour and Cumming, 2006, Peng et al. 2010; Rodano et al. 2016). The relevance of the insolvency framework on firm dynamics and reallocation processes also stems from its impact on the functioning of credit markets. Several studies have documented that the higher the level of creditor protection ensured by the legal framework, particularly by the insolvency regulations, the higher the availability of credit for firms and the lower its cost (see, among others, Bae K. and Goyal, V.K., 2009; Qian J. and Strahan P.E., 2007; Jappelli et al., 2005). Lastly, inefficient insolvency proceedings have an impact on the rising of NPLs.

The availability of international comparable data on the effectiveness of the insolvency regimes is limited. The Doing Business "Resolving insolvency" indicator provides survey-based data on the length, the cost and the recovery rate for secured creditors of an insolvency proceeding that applies to a specific case study; it also provides estimates of the most likely outcome of the proceeding (piecemeal liquidation vs continuation of firms activity).

Table 6 reports the figures on time, cost and recovery rate for the main euro area economies and the averages among the high-income OECD countries: for all the euro area and most of the OECD countries the estimated outcome is continuation; Italy has the highest time and cost of the proceeding that translate into the lowest recovery rate.

[43] For a recent survey, see Adalet MacGowan and Andrews (2016).

Looking beyond the specific case considered by the Doing Business indicator, a more thorough picture of the (in)effectiveness of the Italian insolvency regime can be obtained by looking at country-specific evidence. A first relevant piece of evidence is on the length of the bankruptcy proceedings (i.e. the liquidation procedure for firms). According to the official statistics provided by the Ministry of Justice the average length of bankruptcy proceedings closed in 2014 was nearly 8 years (Figure 19); there are wide differences across courts ranging from 2 years in the best district to 16 in the worst one. The exceptionally lengthy procedures have contributed to the accumulation of NPLs during the crisis. As of recovery rates, there are no official statistics available. Some information can be drawn from a survey conducted by the Bank of Italy among the main banking groups, although only for a specific category of creditors: the banks. In 2014 the average recovery rate for banks in bankruptcy proceedings was nearly 30 per cent, this figure includes both secured and unsecured credit[44] (Carpinelli et al., 2016). The efficacy of the liquidation procedures is hindered by the inefficiency of the civil justice system (see par. 5.4).

Italy's insolvency law provides a number of debt restructuring tools based on contractual agreements between debtors and creditors, designed to enable financially distressed companies to remain viable: recovery plans, restructuring agreements and arrangements with creditors.[45] Lacking statistical data on the outcomes of these different tools, some evidence can be drawn from the Bank of Italy's survey (Carpinelli et al., 2016). The survey provides data on the status of the restructuring procedures four years after they began (three years after for arrangements with creditors). As shown in Figure 20, a positive outcome is not very common within the time span considered: the recovery plan is successful (firms' financial equilibrium is restored or they merge with other businesses) in just over 15 per cent of cases (in terms of the volume of loans involved); the figures are lower for debt restructuring agreements (7 per cent) and for arrangements with creditors (4 per cent). However, very often the restructuring operations are still under way (or another procedure has been opened); this is the case for 75 per cent of restructurings involving recovery plans and 41 per cent both for restructuring agreements and arrangements with creditors.

[44] The survey does not provide information on recovery rates by type of credits.

[45] These instruments differ mainly in relation to the extent of the courts' involvement – the greater this is, the more complex the procedure – and the applicability of the content of agreements to non-participating creditors. Judges have little or no involvement in recovery plans, and increasing involvement in restructuring and arrangements with creditors. Only for both of the latter is it possible, with the judge's intervention, to extend the content of the agreement to non-participating creditors.

5.5 Business environment

Enforcement of contracts. – Efficient resource allocation both in the market and within the firms requires effective enforcement of contracts and protection of property rights. The former is necessary to reduce firm costs and prevent distortions in firms' decisions that may arise from fear of counterparty opportunistic behaviors. Protection of property rights provides agents with incentives to save and invest, assuring that they will not be deprived of the return of these activities. This stimulates the flow of external capital to firms. This explains why well-functioning judiciaries are an essential component of the institutional framework of any economy.

They influence productivity growth through all the channels highlighted in Section 3. First of all, good enforcement of contracts has a positive influence on the process of firms' entry and exit. On the entry side, it fosters competition by lessening financial constraints to firm creation (see below) and by reducing barriers to entry, especially for younger firms (Johnson et al., 2002). The reason is that, where formal enforcement mechanisms are effective, firms do not need to resort to informal methods to support contractual obligations, like personal relations or reputation, that favor incumbent firms at the expense of potential new entrants. On the exit side, effective judicial systems contribute to the good functioning of the insolvency regime, reducing the costs at which capital and labor can be reinvested into more productive activities. An efficient judiciary also helps to reduce the degree of uncertainty over firing costs, allowing firms to better devise their hiring plans and to react to demand shocks.

The quality of the legal environment influences the use of resources within firms, through various channels. First, the empirical literature generally finds a positive relationship between judicial efficiency and firm size, suggesting that protection of contractual relationships allows entrepreneurs to operate closer to their optimal scales (Kumar et al., 2001; Laeven and Woodruff, 2007)[46]. In addition, Kumar et al. (2001) show that the impact on firm size is more pronounced for firms with high levels of intangible assets, like intellectual capital and knowledge assets, that are an important driver of innovation. The finding is explained by the fact that protection of intangible assets requires more sophisticated legal systems. A similar argument lies behind the result by Nunn (2007) that countries with better judiciaries tend to specialize in "contract intensive – high value" industries, that is, industries where relationship-specific investments are more important. These are the industries where the production of the final goods requires intermediate inputs that are not widely available on the market and must be contracted with their suppliers. Secondly, judicial enforcement affects firm productivity through the effect on

[46] Similar results were obtained by Fabbri (2010) on Spanish data; she found that more efficient courts are associated with larger firms and less costly bank financing. More recent empirical papers on the same topic using, respectively, Spanish and Mexican data are Garcia-Posada and Mora-Sanguinetti (2015) and Dougherty (2014).

credit conditions. Finally, judicial systems may affect firms' productivity by shaping their internal organization. Ferguson and Formai (2011) find that weak contract enforcement may induce distortions in favor of organizational arrangements that minimize dependence on other firms, like vertically integrated structures. Bloom et al. (2009) provide evidence that ineffective legal protection induces higher centralization. This reduces firms' growth potential because the top-management does not delegate functional responsibility to the middle-management, in order to maintain control.

Court proceedings are very slow in Italy, both in absolute terms and by international comparison. According to the World Bank sub-indicator "enforcing contracts", in 2016 the time needed for resolving a commercial dispute through a first-instance court was 1120 days in Italy, against an OECD average of 553. According to the official statistics provided by the Ministry of Justice, in 2016, the average actual length of ordinary civil proceedings[47] in the first instance was 1100 days (see Figure 19).

Several papers have shown that reductions in the length of civil proceedings could have sizable impacts on aggregate productivity and growth in Italy. Comparing the average size of manufacturing firms located in proximity of jurisdiction borders but on different sides, Giacomelli and Menon (2016) show that more effective contract enforcement would increase average firm size. Accetturo et al. (2015b) find that firms located in Italian provinces where courts are less effective have a lower probability to participate in global value chains as providers of intermediate inputs. Consistent with results in previous papers, they find that the effect is more pronounced for firms operating in "contract intensive" industries. A lower trial length is also associated with an increase in the supply of credit to households (Fabbri and Padula, 2004) and firms (Jappelli et al., 2005).

Rule of law. – The presence in the market of firms that "do not respect the rules" because they evade taxes, pay bribes to government officials or operate in connections with politicians may distort market selection and affect aggregate efficiency. Political connections are a widespread phenomenon both in developed and developing countries. The range of benefits provided by governments to favored firms are many: a relief respect the burden of regulation; a preferential treatment by government-owned enterprises and for procurement; a privileged access to credit. Through these or other channels, the presence of politically connected businesses can distort resource allocation, harming unconnected businesses, and altering the natural selection process (Shleifer and Vishny, 1994; Khwaja and Mian, 2005; Goldman et al., 2007). Looking at the political connections of Italian firms in the period 1985-1997, Cingano and Pinotti (2013) find that firms' productivity dynamics cannot account for the increase in market power associated with political connections, and that the gains in market

[47] The data includes civil litigious cases, labor and social security, litigious divorces.

power come from public demand shift towards politically connected firms. In a more recent paper Akcigit et al. (2017) propose an endogenous growth model with heterogeneous firms that are subject to a compliance cost with the regulation that is assumed to be proportional to their size. In each period, firms choose whether to invest in innovation or, in alternative, to establish a political connection to minimize the costs of bureaucracy. The model highlights an interesting tradeoff between static efficiency gains and dynamic losses: while political connections might alleviate regulatory barriers in a static framework, their detrimental impact on market competition, new firm entry and innovation might reverse their static benefits, suggesting that political connections might be an important impediment to factor reallocation and productivity growth.

The presence of criminal organizations, tax evasion and corruption jeopardize the ability of markets to allocate resources efficiently, and it does so through two main channels. First, illegal conducts distort competition, by generating economic advantages for the dishonest firms. This in turn alters the incentives of the honest ones. Second, the diffusion of illegal activities reduces the amount of public resources available for the provision of infrastructures and services, both directly (public resources are invested in prevention and repression activities) and indirectly (erosion of the tax basis, higher prices at which goods, services and works are procured by the public sector). Furthermore, the quality of government expenditure is worsened, because resources are distorted towards non-productive projects from which it is easier to exact large bribes. The existence of a negative relationship between the incidence of corruption and organized crime on one hand and countries' productivity and growth on the other has been documented in different papers (e.g. Mauro, 1995; Gamberoni et al., 2016).

Estimates of the shadow economy point to a high level of tax evasion and elevated diffusion of illegal activities in Italy. Istat (2015) reports an official estimate of around 13 per cent for the size of the shadow economy as a fraction of GDP.[48] International indicators of corruption are typically based on perceptions. Although these indicators may suffer from distortions due to subjective and environmental factors or by how much attention the media devote to a certain phenomenon (Rizzica and Tonello, 2015), they nonetheless offer some useful comparisons. According to the Corruption Perception Index developed by Transparency International, Italy is one of the EU countries with the highest level of corruption, alongside Bulgaria, Greece and Romania. The World Bank's Control of Corruption indicator paints a similar picture.

[48] According to Schneider and Enste (2000) and Schneider and Williams (2013) the size of the shadow economy in Italy stands at approximately 25 per cent of GDP as opposed to 15 per cent in France and 8 per cent in the U.S. A similar number for Italy is found by Ardizzi et al. (2014) using the currency demand approach and detailed cash withdrawal data.

The empirical evidence demonstrates that the consequences of corruption, crime, and tax evasion on Italy's productivity and growth are sizable. Fiorino et al. (2012) find a negative and statistically significant correlation between corruption and economic growth (GDP) of the Italian regions in the years 1980 to 2004. In particular, the increase of a crime of corruption discovered would be associated with a reduction of regional GDP by about 2.2 per cent. Pinotti (2015) estimates that the settlement of organized crime in Puglia and Basilicata in the early seventies generated in the two regions a loss of per capita GDP of about 15 per cent over 30 years.

Other papers have attempted a more granular investigation of the channels through which the presence of illegal phenomena influences the allocation of resources in the economy. Bonaccorsi di Patti (2009) analyzes the relationship between local crime rates and the terms on bank loans, providing evidence that higher crime rates are associated with lower availability of credit and worse credit conditions. The results suggests that crime not only has direct repercussions on economic activity but also negatively affects investment by distorting credit allocation. Mirenda et al. (2017) investigate the effects of criminal infiltrations on healthy firms on the performance of the competitors, showing that they are significantly distortionary: generally, competitors experience a loss in terms of revenues and their likelihood of exiting the market significantly increases, while the propensity of new firms to enter infiltrated markets decreases.

Among the papers that focus on the impact of corruption and organized crime on the allocation of public resources, Barone and Narciso (2015) provide evidence that the presence of the mafia positively affects the probability that firms receive public subsidies and the amount of the subsidies they receive. This is not linked to the quality of the firms, but to distortion in public decisions presumably driven by corruption phenomena. Barone and Mocetti (2014) show that the transfer of public funds to Friuli and Irpinia following the earthquakes that hit the two regions in 1976 and 1980 had opposite effect: after 30 years, growth was 20 percentage points higher than it would probably have been in the absence of the earthquake in Friuli and 10 percentage points lower in Irpinia. The gap is explained by the misallocation of public resources in Irpinia, due to the presence of organized crime and more generally to the lower quality of institutions. Using a dynamic panel data approach to economic growth based on data of 20 regions, Del Monte and Papagni (2001) show that corruption reduces the efficiency of expenditures on public investment.

The consequences of tax evasion on the propensity of the economy to innovate and grow have been analized by Bobbio (2016) using a Schumpeterian model with heterogeneous firms calibrated on the Italian economy. The main finding is that, every year, tax evasion reduces Italian productivity growth by 20 basis points. This implies that tax evasion explains up to 15 per cent of the cumulative

growth differential with France and Germany. Enforcing taxes would improve the efficiency of resource allocation, raising the market share of more productive and more innovative businesses by almost 8 percentage points. The economic argument is that the possibility to evade taxes reduces the effort of tax-evading firms to innovate (because growth will increase the probability of being caught by the Tax Authority) as well as that of regular firms (through unfair competition). By lowering the innovation intensity in the economy, tax evasion also hampers selection, shifting the composition of business towards firms with less innovative capacity and reducing the aggregate growth rate over the extensive margin as well.

6. Conclusions and policy implications

Increasing productivity is a policy priority for Italy. Unfortunately, it is not an easy task. Productivity is a synthetic indicator affected by many different factors, some of them easily measurable, others definitely less so. Even when measurable, neither the estimate of their impact on efficiency nor the identification of the mechanisms through which the effect materializes are easily detectable. When they are, it is often difficult to derive reliable aggregate implications or take into account the interactions among the different drivers of productivity or the general equilibrium effects on other-than-productivity variables, above all employment and inequality.

What can we conclude from our long excursus? What are the obstacles that should be most urgently tackled by policy makers to trigger a productivity renaissance in Italy?

Reaching a steadily higher rate of growth in productivity means adjusting the functioning of the economy along three different margins which seem to be equally important in Italy. First, it is crucial to remove all the factors that curb a firm's willingness or ability to grow in size by investing in labor and capital (both tangible and intangible), to adopt modern managerial practices and technologies, to open up its financial structure to equity capital, to innovate products, and to internationalize its activity. Secondly, given the huge heterogeneity characterizing the Italian productive system, the reallocation of production to its best uses, both across and within sectors, can give a further boost to aggregate productivity growth: this favors the growth of the most efficient firms to the detriment of those entrepreneurial initiatives that have no potential. A selection mechanism by which the latter ones will exit the market will also contribute to overall allocative efficiency. Thirdly, policy-making should carefully address the obstacles that are currently limiting the contribution to growth from the creation and development of new productive and innovative firms: leaving aside what happened during the

crisis, this contribution is smaller in Italy than elsewhere and has continued to weaken over the last 15-20 years.

In our view, the policy levers can be divided into three main areas: i) measures directly aimed at influencing firms' specific decisions; ii) regulations of specific sectors or markets such as product, labor, and financial ones; and iii) reforms of the business environment in general: the functioning of the public administration, the rule of law, the education system, the availability of material and immaterial infrastructure and the structure of the taxation system can all importantly affect, even distort, both firms' choices and allocative efficiency.

Our general conclusion is that policy priorities should fall into areas i) and iii). In area ii), we acknowledge the efficacy of the intense reform effort in the labor and product markets; here we just see scope for some further adjustments regarding the implementation of the new active labor market policy setting and the removal of excessive product market regulations in some service sectors (mostly, professional services and local public services).[49] The Italian financial system is too bank-centered and as such not geared enough towards supporting innovation and other risky activities that are better financed by equity rather than debt. In this regard, measures aimed at improving firms' capitalization and stimulating stock market listings and private bond issuing are very much needed; as an example, the recently introduced Allowance for Corporate Equity[50] has indeed favored a change in firms' financial structure (De Socio and Nigro, 2012; Gobbi, 2014; Rossi, 2016). As to the banking system we recall Governor Visco's 2017 speech to the Italian Bankers' Association: '*banks, too, must change, seeking to become more resilient and increase profitability…Increasing profitability can be achieved only through further progress in cost-cutting, organizational restructuring, and the adoption of effective governance models; banks should make the necessary investment to meet, including by updating their business models, the challenges posed by the sweeping changes in technology, regulation, market structures, and consumers' demands'*.

Let us now move to the policy priorities. In the first area, policy interventions should aim at reducing the costs of investment (in both tangible and intangible assets) and innovation. If effective, such measures would bring a double dividend: triggering the desired structural change on one side and sustaining the growth of aggregate demand with further positive side effects on the willingness and

[49] The most important measures may be found in the strengthening of the powers of the Competition Authority, the establishment of a new independent regulator for public transport, and the transfer of water services into the regulatory structure for utilities.

[50] The Allowance for Corporate Equity (ACE, also known as Notional Interest Deduction - NID) is a tax incentive introduced to promote the recapitalization of undertakings and to mitigate the different tax treatment applied to companies funded with debt and others funded with equity. The qualifying equity increases may be inclusive of equity contributions, retained earnings (with the exception of profits allocated to a non-disposable reserve), shareholders credits' waiver.

convenience of firms to grow, to undertake risky, but potentially more profitable, projects, and update their technological endowment and organization.

Since the sovereign debt crisis, Italian governments have been particularly active in this field. They have introduced direct subsidies to investments, such as the "new Sabatini Law", and tax credits such as 'super-depreciation' and 'hyper-depreciation', the latter being targeted to new advanced technologies. To support innovation, industrial policy has been completely overhauled with measures aimed at innovative start-ups, R&D tax credit for incumbent firms and the patent box for large, multinational and strong innovators. While this new setting is in line with best international practices, what still seems to be missing is the provision of careful policy evaluation assessments made by independent authorities on the basis of the best practices recognized at international level. The availability of such a reliable assessment is a necessary condition for selecting the most effective instruments, redesigning the others, better allocating the limited funds across them.[51]

While the measures to support innovation and technology adoption go in the right direction, they must be supplemented with interventions aimed at helping the financial intermediaries specialized in innovative projects in their early stages and in evaluating intangible assets[52], and improving the cooperation between firms and universities in the creation of new technologies and products.[53]

Employer associations and unions should redesign the industrial relations system so as to encourage contract decentralization. Strengthening the organizational flexibility of firms by providing a better alignment between wage and productivity dynamics would benefit product, process and organizational innovations, the adoption of new technologies and managerial practices and therefore the competitiveness of the productive system as a whole.

The third area of measures is the one where we see a bigger and more pressing need for intervention. Overall, what is needed are reforms that often are very complex and entail short-term political costs with longer-term economic benefits.

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[51] It must be considered that, like many other reforms, it takes time for the positive effects to be identifiable, especially if the policies are enacted in a period when demand collapses.

[52] As happened in the US, Germany, Sweden and the UK (Hall, 2009), some sort of public support to the development of venture capital intermediaries could be effective. This is desirable both in general terms since this market could be underdeveloped due to some form of coordination failure (Lerner, 2009b) and more specifically in the Italian case where foreign intermediaries may be reluctant to enter for the difficulties of evaluating small and not very transparent businesses, for regulatory and linguistic barriers, and for other hurdles related to the functioning of the institutional context (for example, the inefficiency of the public administration and the civil justice). See Bugamelli et al. (2012) for a more detailed discussion on the policy interventions that might be needed in Italy.

[53] The German model with public research centers specialized in specific fields and highly incentivized to favor the transfers of new technologies to the private sector seems to be the right direction to go (Bugamelli et al. 2012).

Starting with taxation, the work by Bobbio (2016) highlights that tax evasion, often caused by a high tax burden, can be highly distortive because it generates unfair competition, limiting firms' growth and overall innovation. While Bobbio (2016) offers one clever example of how tax distortions may severely impact on growth, we deem that for an effective and comprehensive reform a deeper analysis of the structure of corporate taxation and of its real effects is very much needed.

Strengthening the innovative capability of the Italian productive system means raising the quality of human capital. This calls for action along the whole chain: the education system (schools and universities), the transition from education to work and on-the-job training. It is surely useful to strengthen the evaluation system introduced by the INVALSI (the Italian National Education Service for Schools) to reduce the existing disparities in schools; the same applies to the action of ANVUR, which is the equivalent of IVALSI for the University system. The governance system must grant universities and other institutions the flexibility to promptly adapt to the economic dynamics, updating curricula and encouraging the transmission of knowledge between the productive and the educational system. A larger supply of professional-oriented tertiary courses, though still very limited, could help narrow the educational attainment gap with other countries and reduce the distance between the demand and the supply of skills.

Improvements in the quantity and quality of material and immaterial infrastructures are much needed. The fall in public investment since the crisis has weighed on infrastructure development. However, returns to investment primarily depend on its quality and efficiency. Despite some progress, in Italy time to completion is still long and costs remain high by international standards. Apart from illegality, this reflects the uncertainty of the funding framework, weakness in project selection and assessment, overlapping powers and responsibilities among different levels of government, and the shortcomings of the rules governing public procurement. The new Procurement Code contains relevant provisions to increase the efficiency of infrastructure spending. However, one and half years after its approval, important parts of the reform (especially those aimed at reorganizing the functions of contracting authorities) have not yet been implemented.

As to digital infrastructures, the Italian Digital Agenda's commitment to bridging the digital divide[54] is key; to increase effectiveness, measures on the supply side must be accompanied by an

[54] The goal is to enable 85 per cent of citizens, as well as public buildings, to have a connection speed of at least 100 Mbps.

appropriate stimulus to demand[55] by encouraging the development of e-commerce and e-government and taking concrete action in the spheres of education and training.[56]

On the insolvency regime reforms are under way. After the measures introduced in 2015-2016 to foster credit recovery and favor the restructuring of distressed firms, in October 2017 an enabling law has been approved. The law tackles the main factors that negatively affect the functioning of the system and contains provisions to enhance judges specialization and to favor early emergence of the crisis. Going forward, the way the principles outlined in the law will be implemented is key for the success of the reform.

This leads to the last, but definitely not least, point: the business environment. According to some estimates by the Ministry for Simplification and Public Administration, Italian firms spend 1.7 per cent of GDP on dealing with bureaucracy. This burden is often an incentive for firms to engage in rent-seeking behavior, with detrimental effects on competition, innovation and aggregate productivity (Akcigit et al., 2017). The inefficiency of the civil justice system[57] , the degree of corruption, the presence of organized crime, and the general malfunctioning of the public administration[58] are the main drags on productivity and GDP growth. The policy interventions on these matters have been very limited and often ineffective. Besides their complexity, these reforms require a long-term perspective with broad support that must go beyond a single legislature to avoid the risk of policy reversal.

[55] Fixed broadband take-up remains low among Italian households and firms, despite decreasing broadband prices. Italian Internet users engage in online activities much less than the EU average; the gap with the EU on business digitization is closing, but SMEs rarely use electronic sales channels. On the public side, Italy scores well in the online provision of public services (Online Service Completion) and Open Data, but it has one of the lowest use of e-Government services in Europe.
[56] To this end, the Government introduced the National Plan for Digital School with a budget of €1 billion.
[57] Giacomelli et al. (2017) provide an detailed assessment on the recent developments in the field of civil justice in Italy.
[58] On the very complex and multifaceted issue of the functioning of the public administration see also Bank of Italy (2015), D'Amuri and Giorgiantonio (2016), Giorgiantonio et al. (2016), Occhilupo and Rizzica (2016) and Rizzica (2015).

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Tables and Figures

Table 1 - Real GDP growth decomposition, 1995-2016.

Real GDP growth decomposition (1) (2)
(average percentage changes)

	GDP	Employment	*Population*	*Share of working age population (15-64 years)*	*Employment rate*	Productivity per worker	*Hours per worker*	*Hourly labor productivity*	*Capial deepening*	*TFP*
	A=B+C	B=B1+B2+B3	*B1*	*B2*	*B3*	C=C1+C2 C=C3+C4	*C1*	*C2*	*C3*	*C4*
France										
1995-2016	1,5	0,8	*0,6*	*-0,2*	*0,4*	0,8	*-0,4*	*1,2*	*0,3*	*0,5*
1995-2007	2,3	1,1	*0,6*	*0,0*	*0,5*	1,2	*-0,6*	*1,7*	*0,3*	*0,8*
2007-2013	0,3	0,1	*0,5*	*-0,4*	*0,0*	0,2	*-0,3*	*0,5*	*0,4*	*-0,2*
2013-2016	1,0	0,5	*0,4*	*-0,5*	*0,6*	0,5	*-0,2*	*0,7*	*0,2*	*0,3*
Germany										
1995-2016	1,3	0,6	*0,1*	*-0,2*	*0,7*	0,7	*-0,5*	*1,2*	*0,2*	*0,5*
1995-2007	1,6	0,5	*0,0*	*-0,2*	*0,7*	1,1	*-0,6*	*1,7*	*0,4*	*0,7*
2007-2013	0,6	0,8	*-0,1*	*-0,3*	*1,2*	-0,2	*-0,7*	*0,6*	*0,0*	*-0,1*
2013-2016	1,7	1,0	*0,8*	*0,2*	*0,0*	0,8	*0,0*	*0,8*	*0,0*	*0,9*
Italy										
1995-2016	0,5	0,6	*0,3*	*-0,3*	*0,6*	-0,1	*-0,4*	*0,3*	*0,0*	*-0,1*
1995-2007	1,5	1,2	*0,3*	*-0,4*	*1,3*	0,3	*-0,2*	*0,5*	*0,1*	*0,2*
2007-2013	-1,5	-0,7	*0,5*	*-0,3*	*-0,9*	-0,9	*-0,9*	*0,1*	*0,1*	*-0,9*
2013-2016	0,6	0,7	*0,1*	*0,0*	*0,6*	0,0	*0,1*	*-0,1*	*-0,3*	*0,2*
Spain										
1995-2016	2,1	1,4	*0,7*	*-0,2*	*0,9*	0,6	*-0,1*	*0,7*	*0,4*	*0,2*
1995-2007	3,7	3,6	*1,1*	*0,1*	*2,4*	0,1	*-0,2*	*0,3*	*0,1*	*0,0*
2007-2013	-1,4	-2,9	*0,5*	*-0,5*	*-2,9*	1,6	*-0,1*	*1,7*	*1,5*	*0,0*
2013-2016	2,6	2,0	*-0,2*	*-0,4*	*2,6*	0,6	*0,2*	*0,4*	*-0,4*	*0,9*

Source: own calculations on Annual Macroeconomic Database (Ameco).
(1) GDP at market prices, chained values, reference year 2010- (2) The growth rate of GDP (A) breaks down in contributions due to the employment dynamics (B) and labor productivity (C). The contribution of employment is further fragmented into that of the population (B1), the share of working age population (B2) and the employment rate (B3). Productivity can be decomposed by distinguishing between hours worked for occupancy (C1) and hourly productivity (C2) or between capital deepening (C3) and total factor productivity (C4).

Table 2 - Shift-share decomposition of average productivity by size class in manufacturing in major European countries.

COUNTRY	PJ	P_AVERAGE	DIFFERENCE	SECTOR EFFECT	COUNTRY EFFECT	INTERACTION
			SIZE CLASS [0 9]			
France	44.9	35.3	9.6	-0.1	8.8	0.9
Germany	32.4	35.3	-2.9	0.5	-2.4	-0.9
Italy	26.1	35.3	-9.3	-1.0	-8.9	0.6
Spain	27.2	35.3	-8.1	-0.6	-7.7	0.2
UK	50.4	35.3	15.1	2.3	14.3	-1.5
			SIZE CLASS [10 19]			
France	49.0	41.8	7.2	0.4	5.5	1.3
Germany	38.3	41.8	-3.5	0.5	-3.8	-0.2
Italy	40.9	41.8	-0.9	-0.1	-0.9	0.1
Spain	38.4	41.8	-3.3	-0.5	-4.1	1.2
UK	47.9	41.8	6.1	2.0	4.7	-0.7
			SIZE CLASS [20 49]			
France	55.2	48.8	6.4	1.0	4.9	0.5
Germany	44.0	48.8	-4.8	0.8	-5.1	-0.5
Italy	49.5	48.8	0.7	-0.4	0.7	0.4
Spain	46.8	48.8	-2.0	0.4	-2.2	-0.2
UK	49.2	48.8	0.4	1.4	-0.5	-0.5
			SIZE CLASS [50 249]			
France	60.9	58.2	2.7	0.4	2.1	0.2
Germany	52.7	58.2	-5.5	1.0	-6.8	0.3
Italy	64.1	58.2	5.9	1.8	4.4	-0.3
Spain	56.6	58.2	-1.5	0.8	-2.0	-0.4
UK	61.3	58.2	3.1	0.4	2.0	0.7
			SIZE CLASS [250+]			
France	81.5	80.7	0.9	3.2	-2.0	-0.3
Germany	79.7	80.7	-1.0	0.4	-2.3	0.9
Italy	77.6	80.7	-3.1	1.5	-4.5	-0.1
Spain	74.0	80.7	-6.7	2.7	-8.8	-0.6
UK	88.3	80.7	7.6	3.6	4.6	-0.6

Source: Ciapanna (2015), based on Eurostat, *Structural Business Statistics*, 2012, 2008 prices.
Note: PJ is labor productivity of country J.; P_AVERAGE is average productivity across countries. The DIFFERENCE is decomposed in: SECTOR EFFECT, representing the extent to which sectorial specialization affects productivity (the weight difference in terms of added value of the sector I in country J compared to the average weight in the other countries), a COUNTRY EFFECT, that measures the difference between the productivity of sector I in country J and the average productivity of sector I, and an INTERACTION term which is just a residual.

Table 3 - The decomposition of aggregate productivity's dynamics.

	Surviving firms		Firm demography			
	Average productivity	Reallocation	Entry	Exit	Net	Aggregate productivity
			Manufacturing			
2005–06	3.43	3.04	-0.87	1.15	0.28	6.75
2006–07	-0.07	1.73	-0.98	1.24	0.26	1.92
2007–08	-4.31	0.91	-0.96	1.14	0.18	-3.22
2008–09	-17.66	3.72	-0.73	1.62	0.89	-13.05
2009–10	7.30	6.89	-1.10	1.61	0.52	14.70
2010–11	-1.63	5.67	-1.19	1.17	-0.02	4.02
2011–12	-4.93	2.69	-1.03	1.18	0.15	-2.09
2012–13	-4.56	5.89	-1.07	1.51	0.45	1.77
			Services			
2005–06	-2.04	3.44	-2.09	2.59	0.50	1.90
2006–07	-0.92	1.16	-2.41	2.45	0.04	0.27
2007–08	-2.93	-0.48	-2.16	2.45	0.29	-3.11
2008–09	-9.55	0.49	-1.76	2.93	1.17	-7.89
2009–10	-0.02	5.79	-2.38	2.65	0.27	6.03
2010–11	-5.49	3.95	-2.80	3.01	0.21	-1.34
2011–12	-5.66	0.20	-2.46	2.77	0.31	-5.16
2012–13	-4.91	4.55	-2.76	3.29	0.53	0.18
			Total			
2005–06	-1.20	4.50	-1.79	2.13	0.34	3.64
2006–07	-0.79	1.52	-2.06	2.10	0.05	0.77
2007–08	-3.14	-0.39	-1.87	2.06	0.20	-3.33
2008–09	-10.66	-0.57	-1.49	2.58	1.09	-10.14
2009–10	0.99	7.80	-2.14	2.37	0.23	9.02
2010–11	-4.95	5.57	-2.48	2.52	0.04	0.67
2011–12	-5.54	1.32	-2.18	2.35	0.17	-4.05
2012–13	-4.85	5.10	-2.39	2.85	0.46	0.71

Net demography is defined as the sum of entry and exit.

Own calculation on Istat data referring to the universe of firms. See Ladu et al. (2016) for a detailed description of the dataset.

Table 4 - The aggregate productivity components in the long run vs. sectoral characteristics.

	Average productivity	Reallocation	Entry	Exit	Aggregate productivity
			Panel (a):		
log Herfindahl	-0.8766	1.6105**	0.3955*	-0.6597***	1.4351**
	[0.884]	[0.732]	[0.214]	[0.197]	[0.706]
N	580	580	577	576	580
R^2	0.007	0.032	0.016	0.052	0.026
			Panel (b):		
ImpPen developing	-8.9043	25.7745*	-5.1873	22.7467***	18.7375
	[15.348]	[13.732]	[5.632]	[4.613]	[16.677]
N	184	189	191	190	190
R^2	0.003	0.037	0.020	0.224	0.016

Robust standard errors. All the regressions have been weighted by the number of employees in each sector. The regressions in panel (a) have been performed on data disaggregated at the 5-digit level. Those in panel (b), instead, refer to manufacturing sector only, and have been performed at the 4-digit level, since data on import penetration were not available at a more disaggregated level.

Own calculation on Istat data referring to the universe of firms. See Ladu et al. (2016) for a detailed description of the dataset.

Table 5 - Productivity, regulation and firms' size.

dependent variable: *log size*	**Coef.**	**Std. Err.**
NMR	-0.85***	0.17
Country fixed effects	yes	
Year fixed effects	yes	
Obs.	162	
R squared	0.62	
Errors clustered by sector		
dependent variable: *log productivity*		
log size	0.29***	0.17
Country fixed effects	yes	
Year fixed effects	yes	
Obs.	162	
R squared	0.45	
Errors clustered by sector		
dependent variable: residual of *log productivity on log size*		
PMR	-0.11	0.19
Country fixed effects	yes	
Year fixed effects	yes	
Obs.	162	
R squared	0.06	
Errors clustered by sector		

Source: our calculation based on OECD NMR and Eurostat SBS statistics

Notes: ***p<1%; **p<5%; *p<10%.

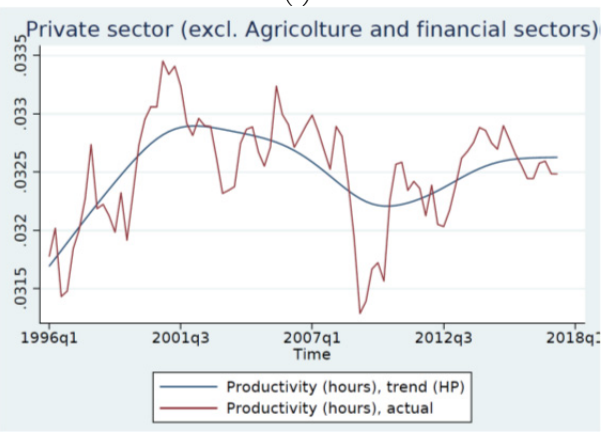
Table 6 - Resolving insolvency in OECD countries.

	Recovery rate (cents on the dollar)	Time (years)	Cost (% of estate)
France	78.8	1.9	9
Germany	84.4	1.2	8
Italy	63.9	1.8	22
Spain	78.3	1.5	11
OECD	73.0	1.7	9.1

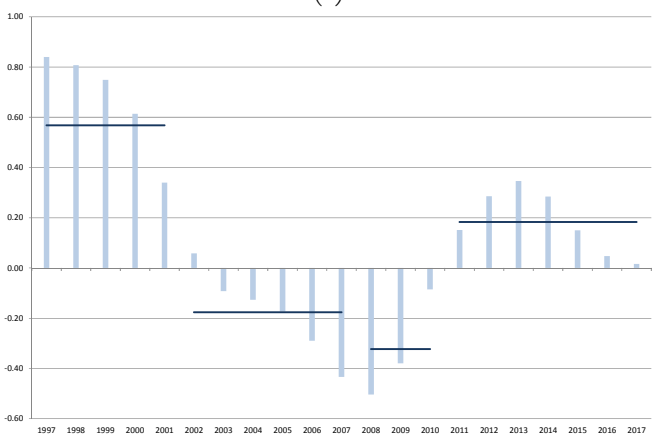
Source: World Bank Doing Business

Figure 1 – Hourly labor productivity in the non-agriculture, non-financial private sector (panel a) and yearly average growth rates (panel b).

(a)

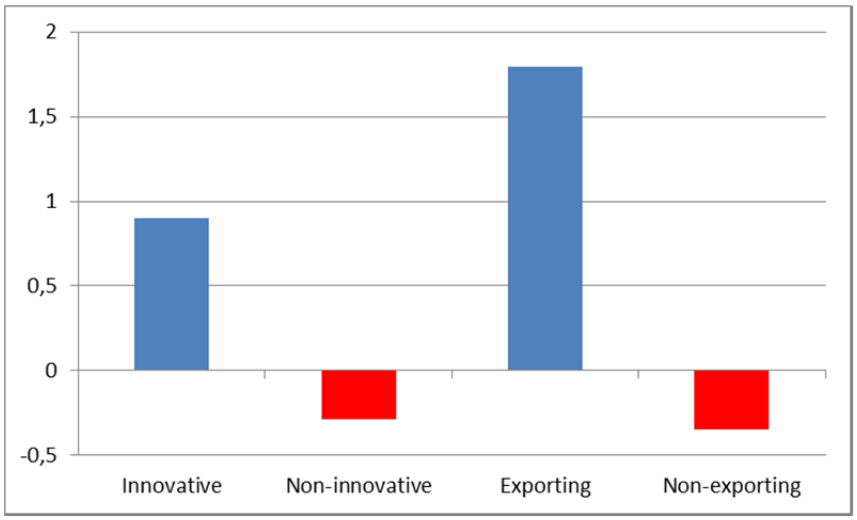


(b)



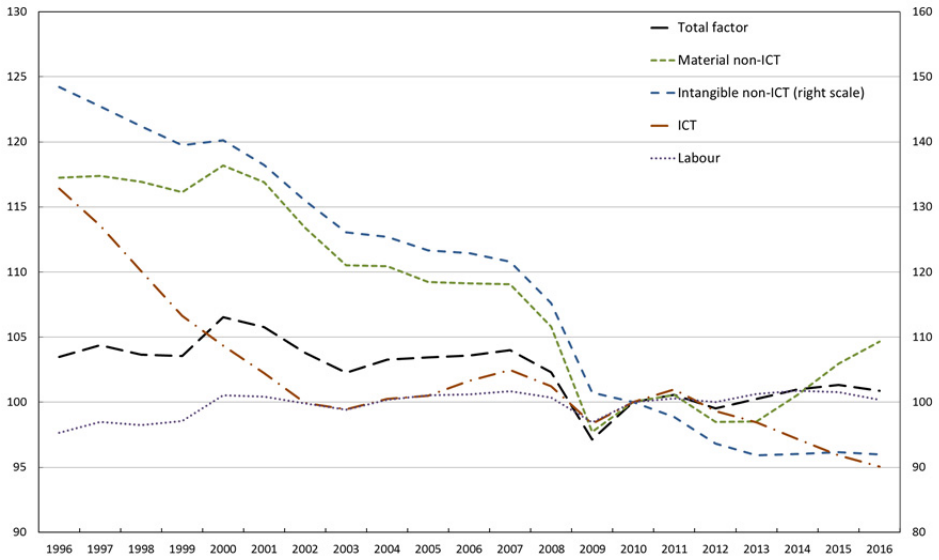
Source: own calculations based on National accounts (Istat).

Figure 2 - Corporate strategies and sales turnover growth in 2010-2016.



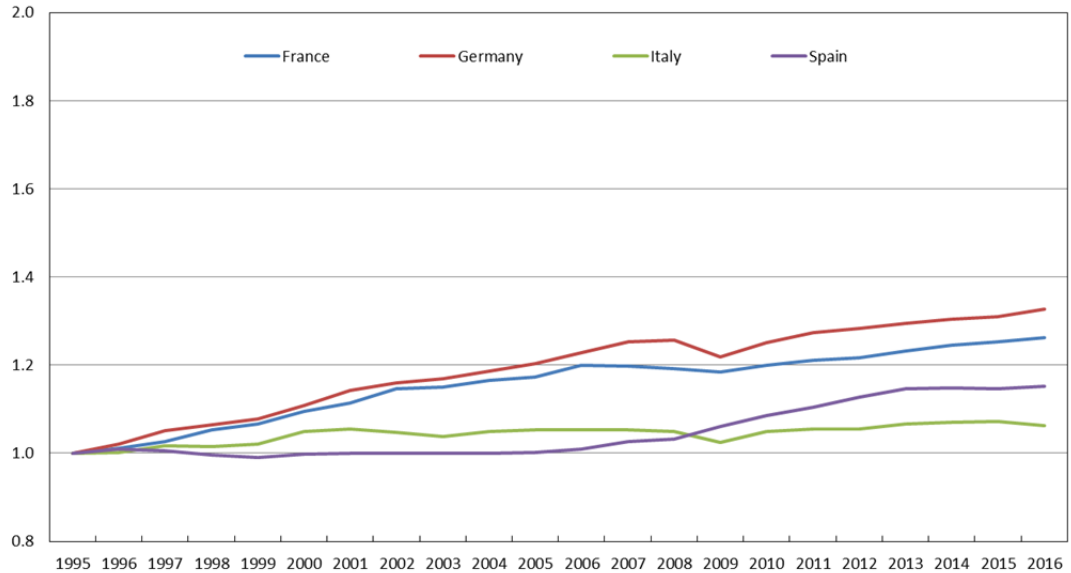
Source: own calculations based on INVIND data. Average change in sales turnover at constant prices based on firms of the same size, sector and location. (Non-)innovative firms are firms that did (not) spend on R&D in the reference year; (non-)exporting firms are firms that generated more (less) than a third of total sales turnover on foreign markets in the reference year.

Figure 3 – Productivity measures (2010=100).



Source: own calculations based on National accounts (Eurostat).

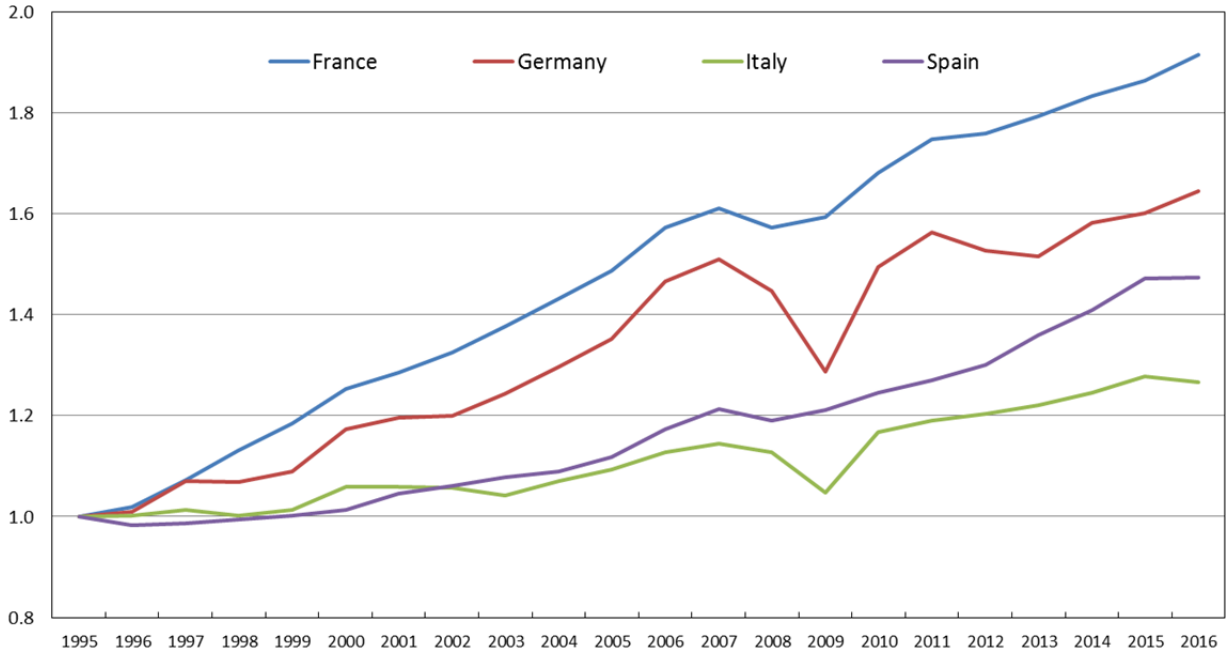
Figure 4 - Hourly labor productivity, total economy (1995=1).



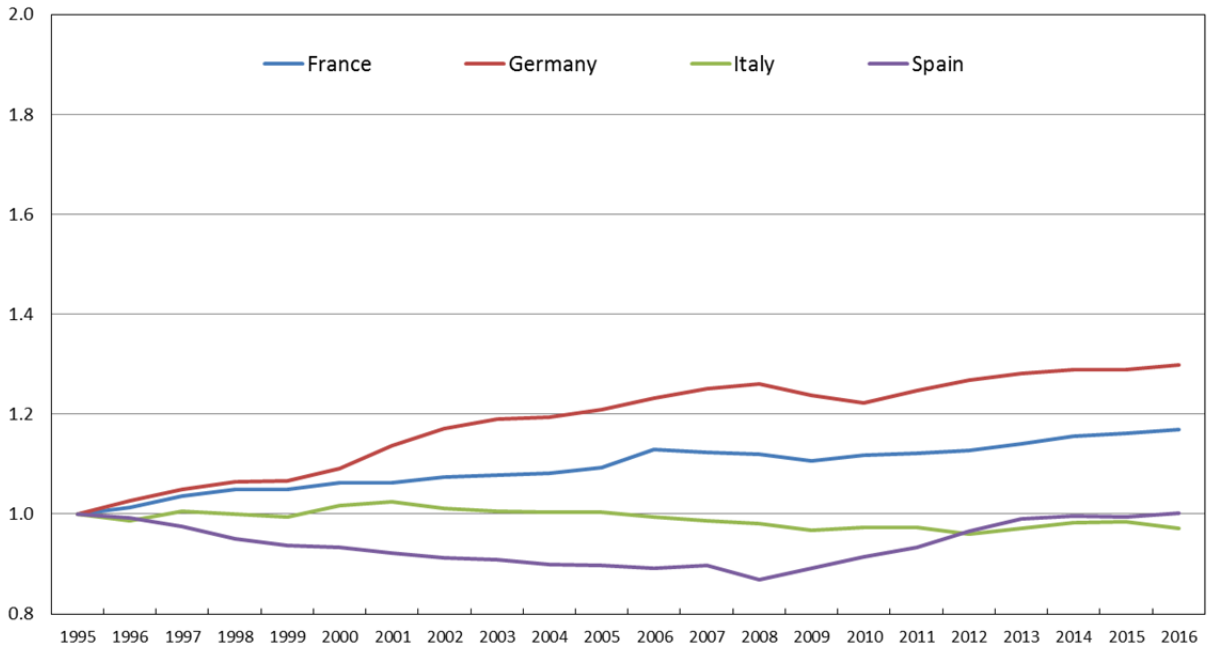
Source: own calculations based on National accounts (Eurostat). September 2017.

Figure 5 - Hourly labor productivity, total economy (1995=1). Manufacturing (panel a) and private, non-financial services (panel b).

(a)



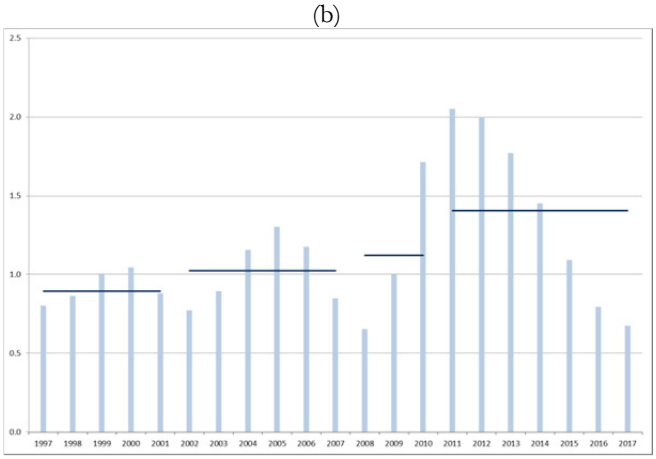
(b)

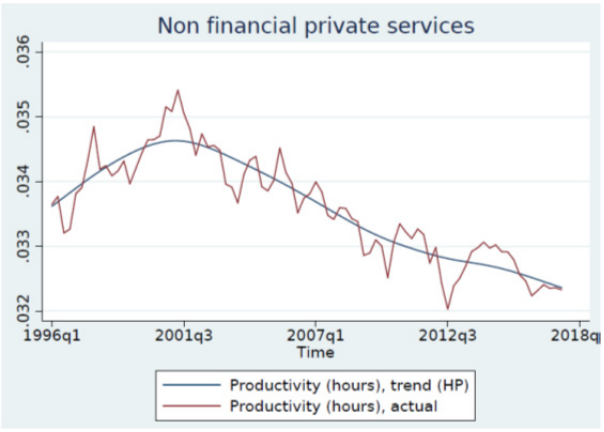


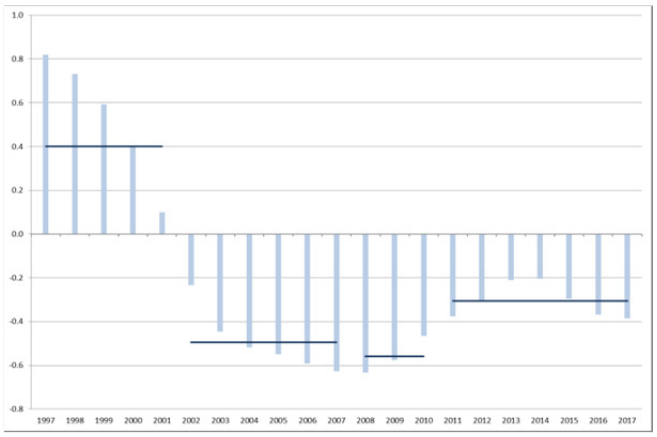
Source: own calculations based on National accounts (Eurostat). September 2017.

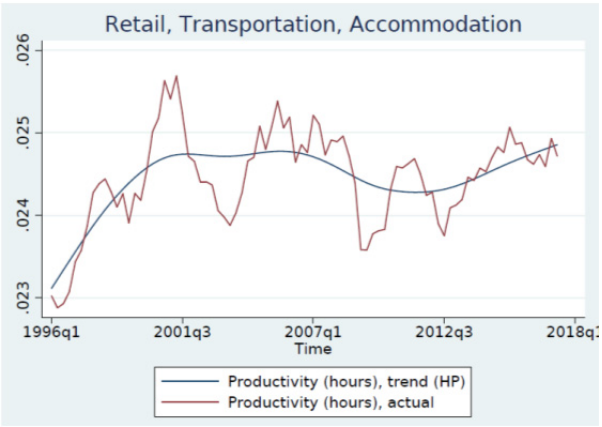
Figure 6 – Sectorial hourly labor productivity (panel a) and yearly average growth rates (panel b).

(a) (b)









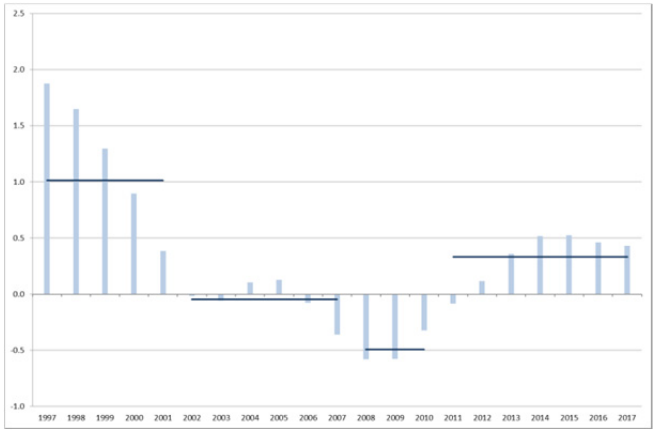
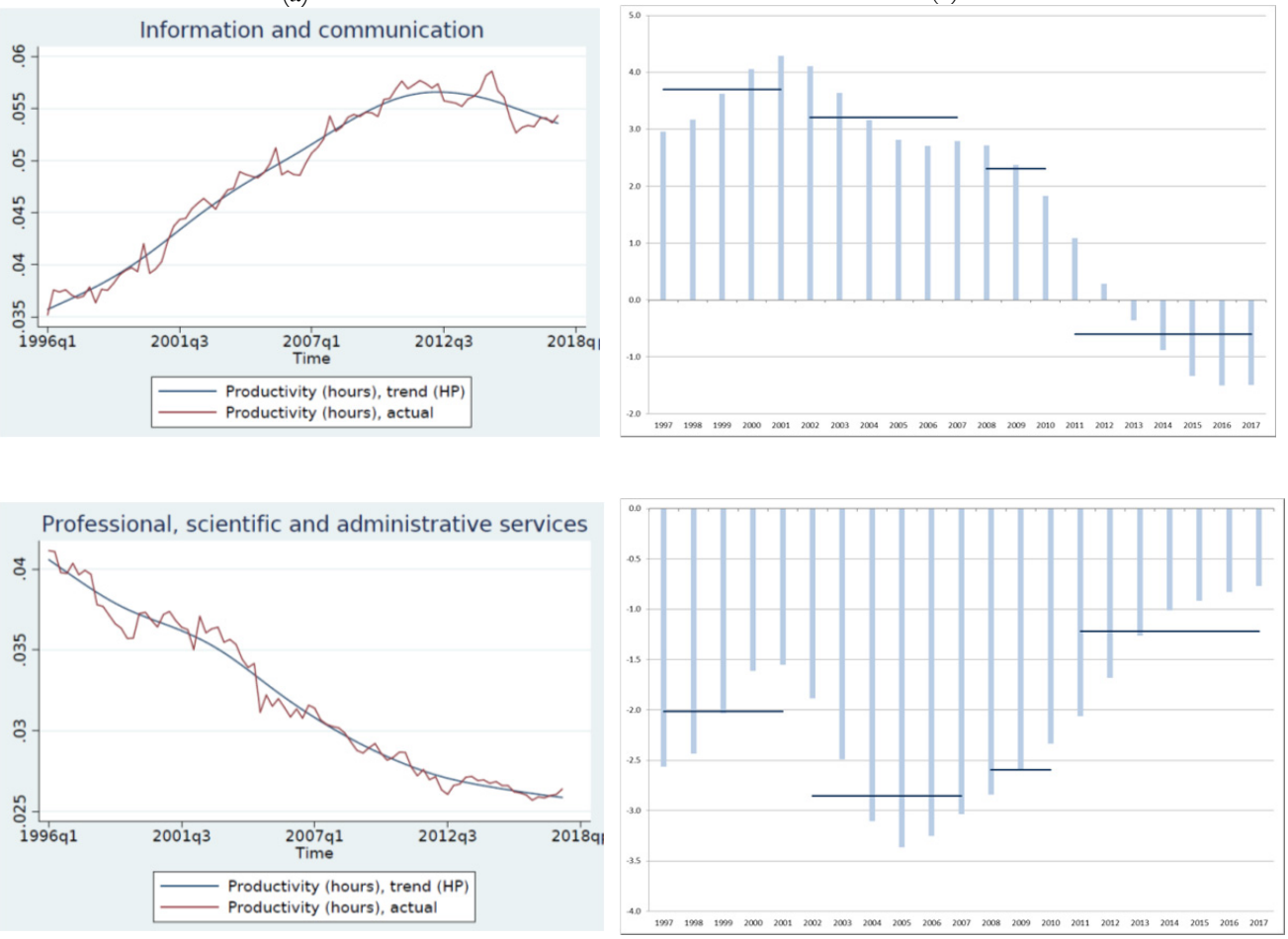


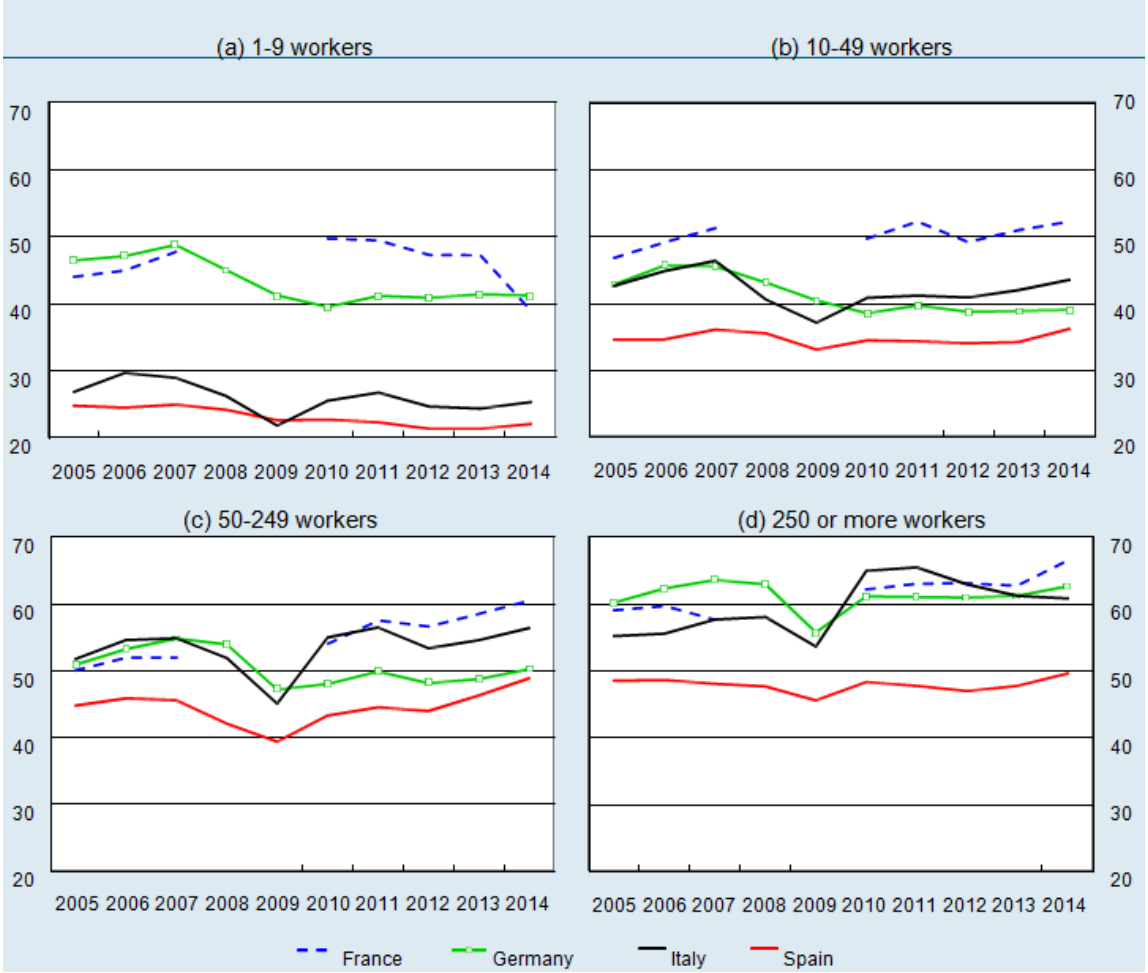
Figure 6, contd. – Sectorial hourly labor productivity (panel a) and yearly average growth rates (panel b).

(a) (b)



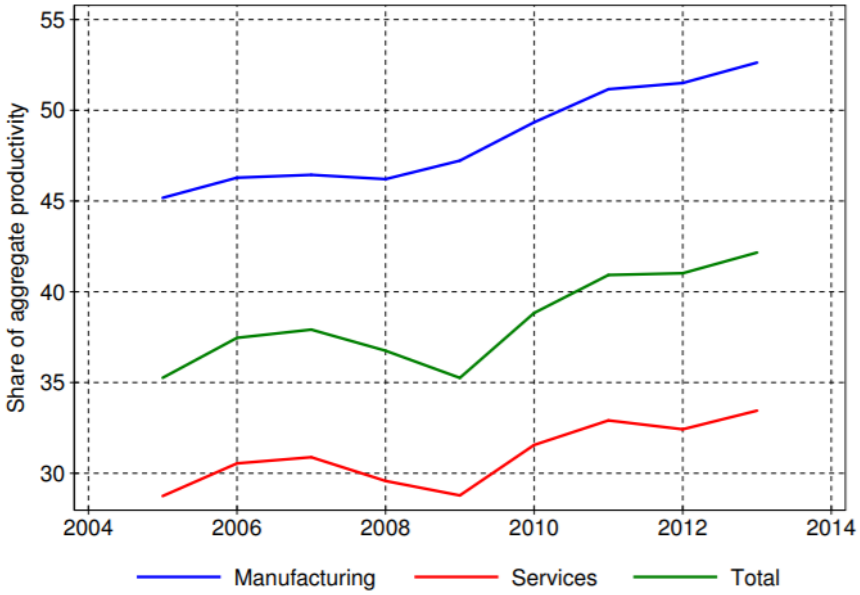
Source: own calculations based on National accounts (Istat).

Figure 7 - Labor productivity by size class: total economy (value added per worker at 2005 prices; thousands of euros).



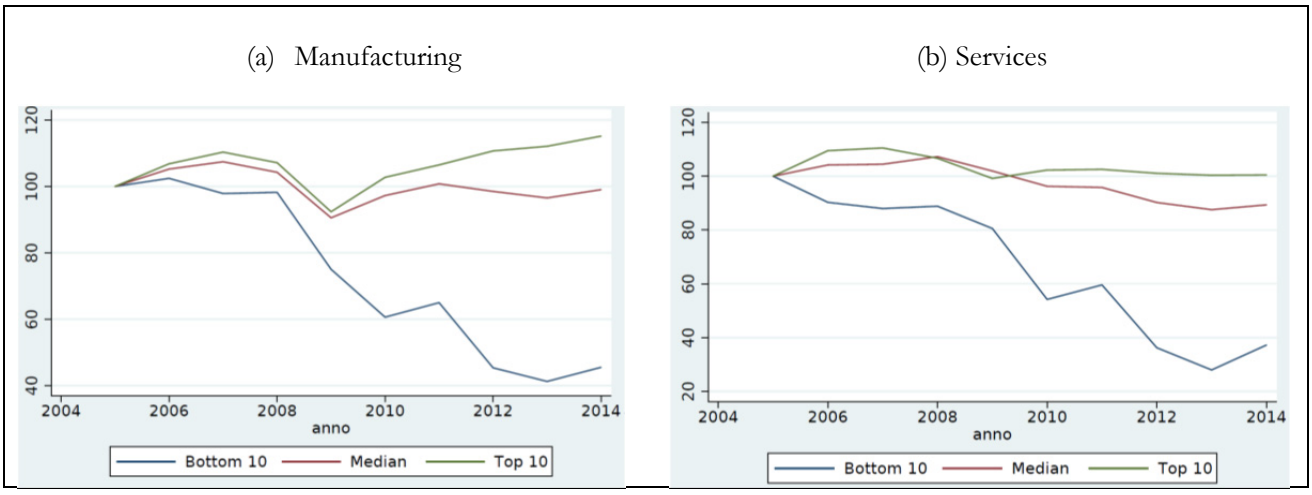
Source: Eurostat, Structural Business Statistics. Manufacturing and private non-financial services. The data for 2008 and 2009 are not available for France.

Figure 8 - The contribution of reallocation to the level of aggregate productivity.



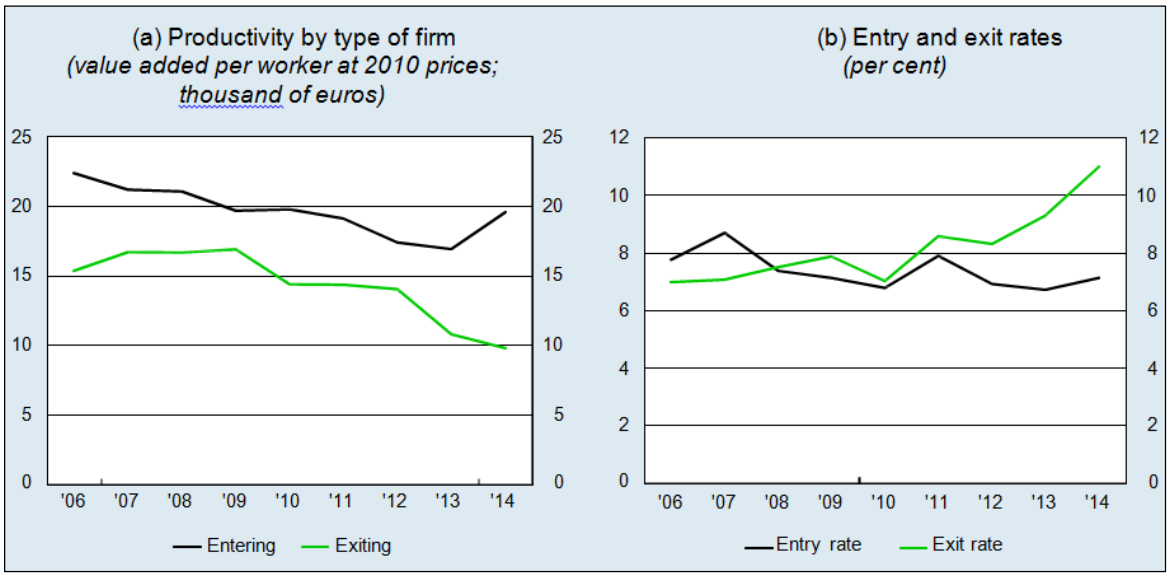
Own calculation on Istat data referring to the universe of firms. See Ladu and Linarello (2016) for a detailed description of the dataset.

Figure 9 – Productivity growth of selected quantiles (10th, 50th and 90th; 2005=100).



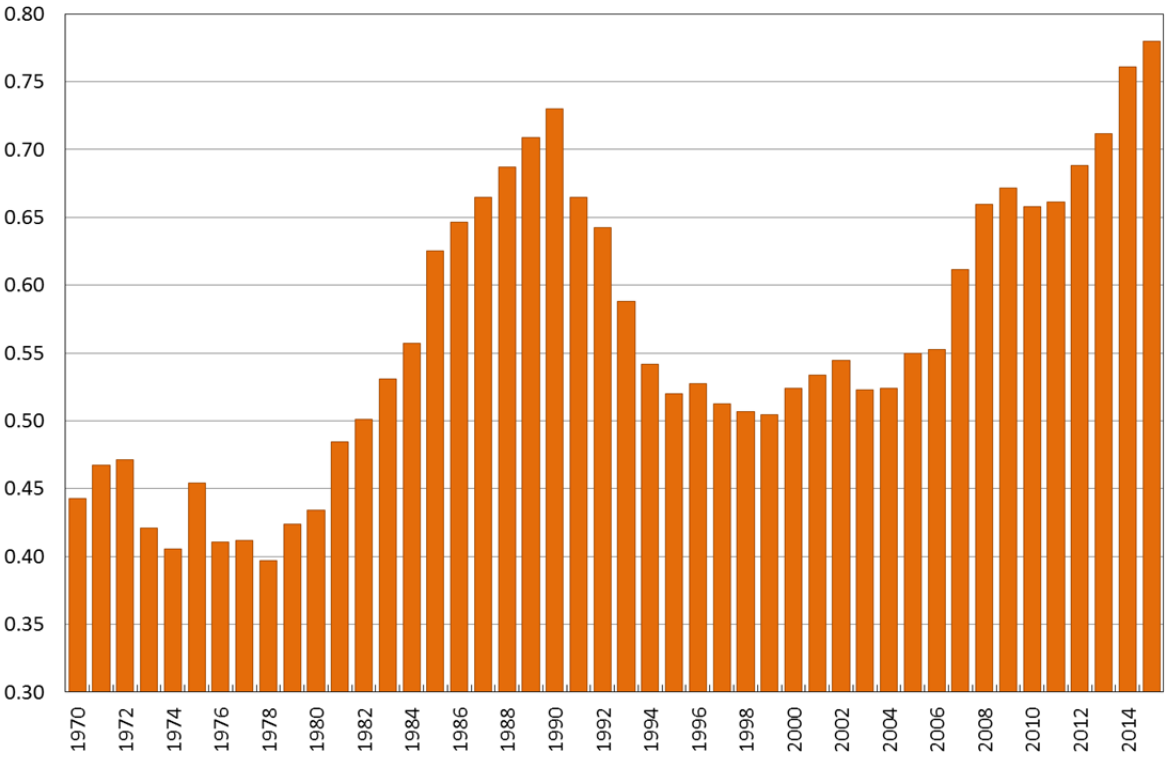
Own calculation on Istat data referring to the universe of firms. See Ladu and Linarello (2016) for a detailed description of the dataset.

Figure 10 - Firm demographic dynamics and productivity.



Own calculation on Istat data referring to the universe of firms. See Ladu and Linarello (2016) for a detailed description of the dataset.

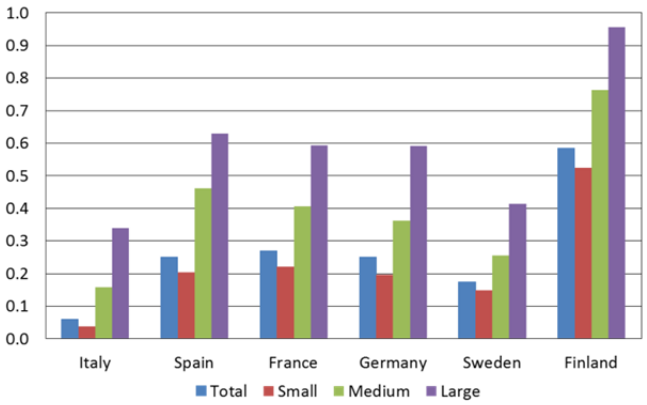
Figure 11 - Business R&D expenditure as a share of GDP.



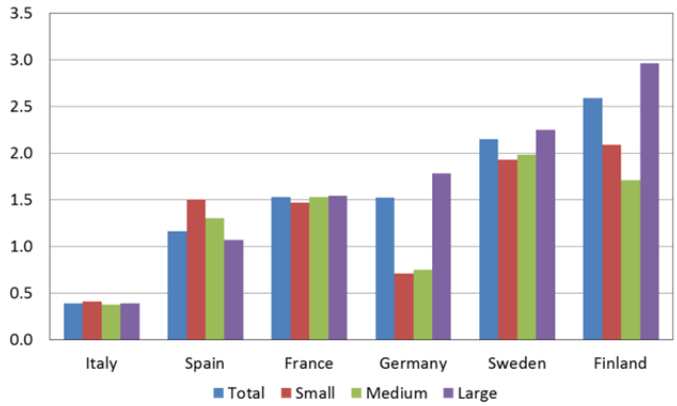
Source: ISTAT.

Figure 12 – R&D indicators according to firms' size class

(a) Share of firms doing R&D

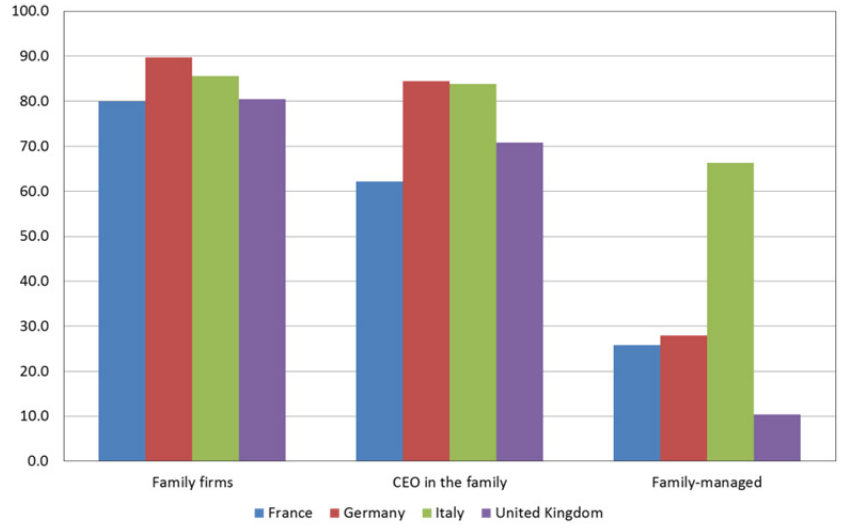


(b) R&D over sales



Source: own calculations using Eurostat (Community Innovation Survey - CIS) data.

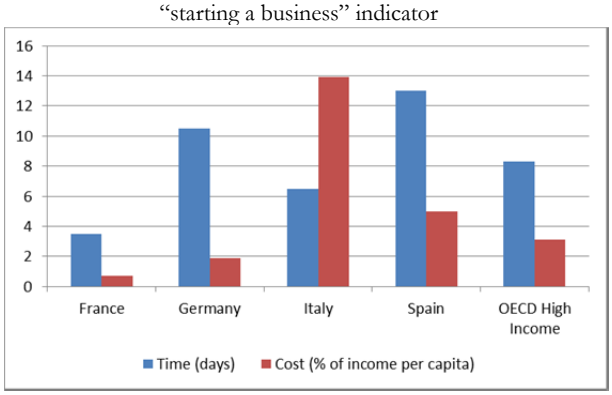
Figure 13 – Family ownership and management



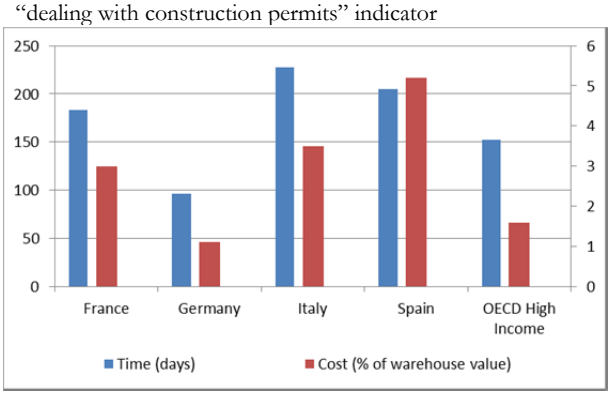
Source: own calculations using EFIGE data.

Figure 14 - Regulatory entry cost in OECD countries (2016).

(a) Registration cost in OECD countries: "starting a business" indicator

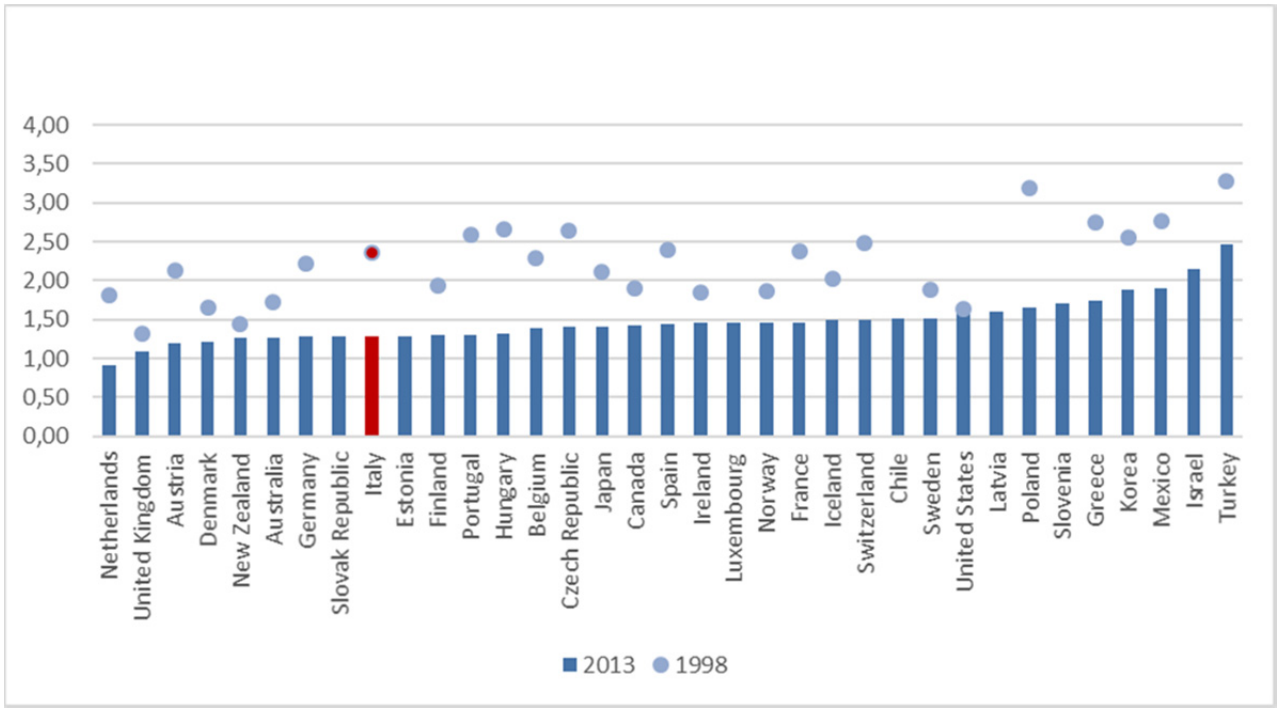


(b) Startup cost in OECD countries: "dealing with construction permits" indicator



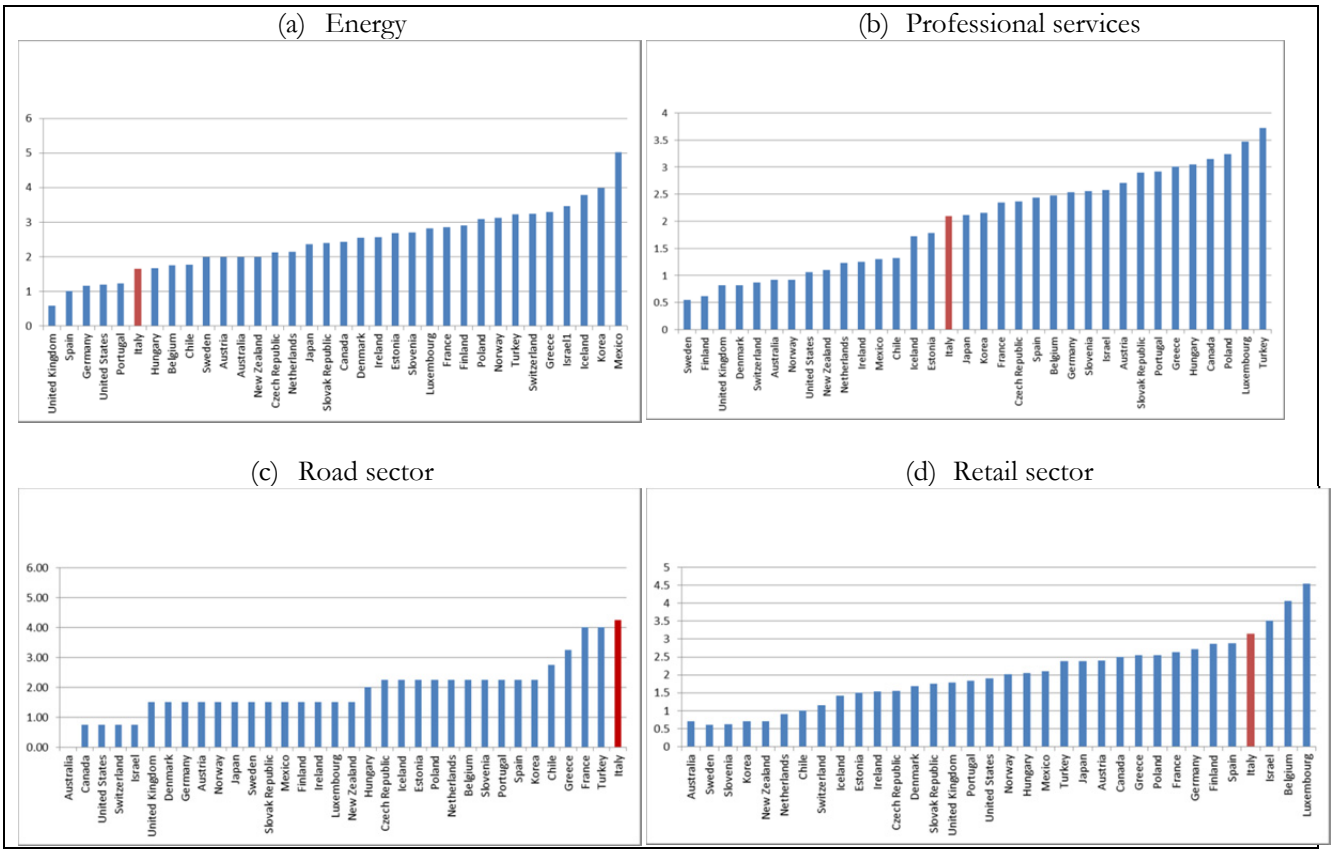
Source: World Bank, Doing Business in 2017

Figure 15 - Product market regulations in OECD countries (1998 and 2013).



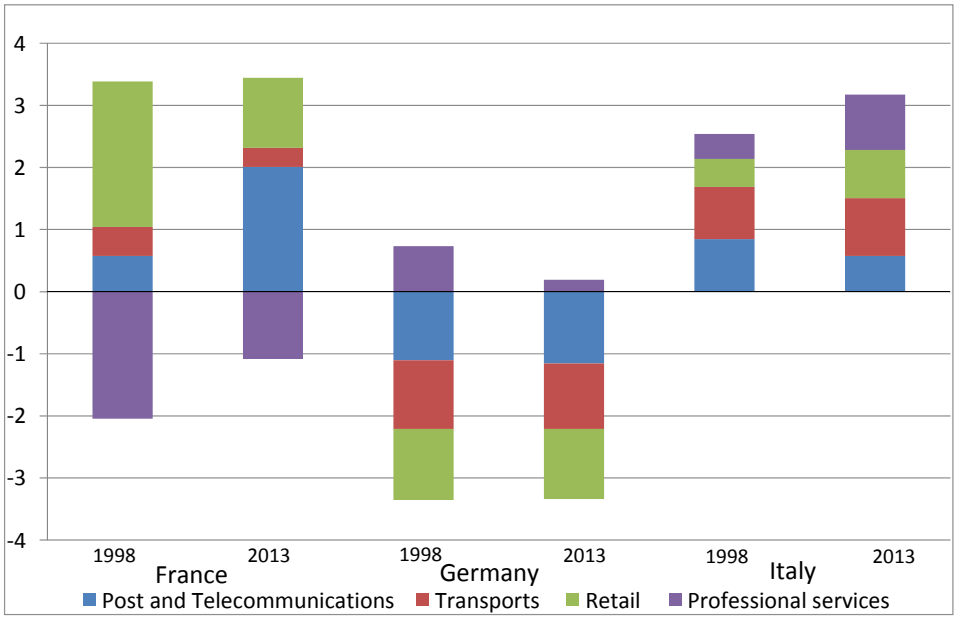
Source: OECD PMR database, 2013 update release.

Figure 16 – Sectorial product market regulations in OECD countries (2013).



Source: OECD PMR database, 2013 update release.

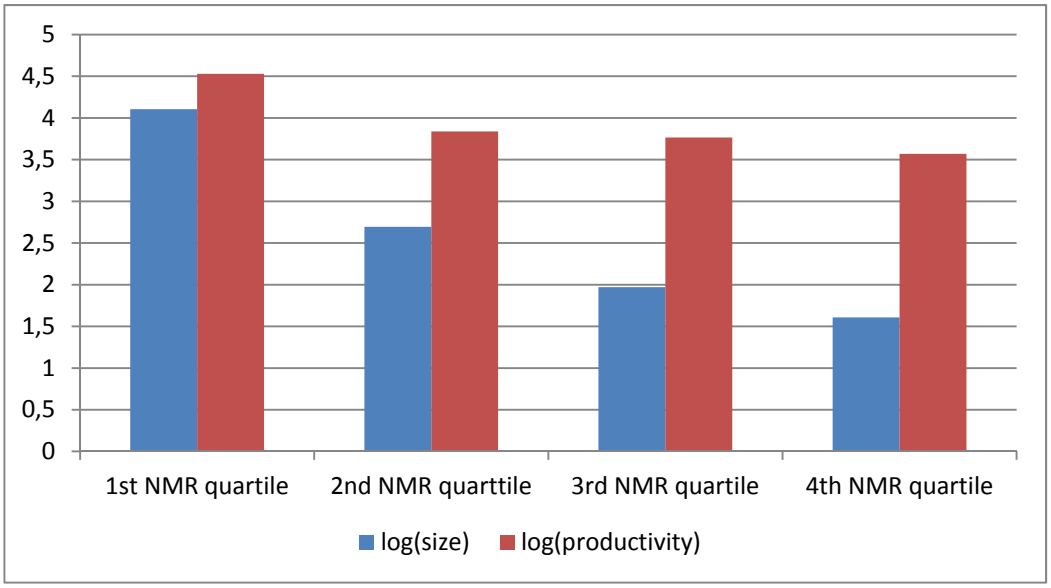
Figure 17 - Evolution in NMR Indices, 1998-2013 (Standardized distance from within sector-across countries average*).



Source: own calculations on OECD PMR database, 2013 update release.

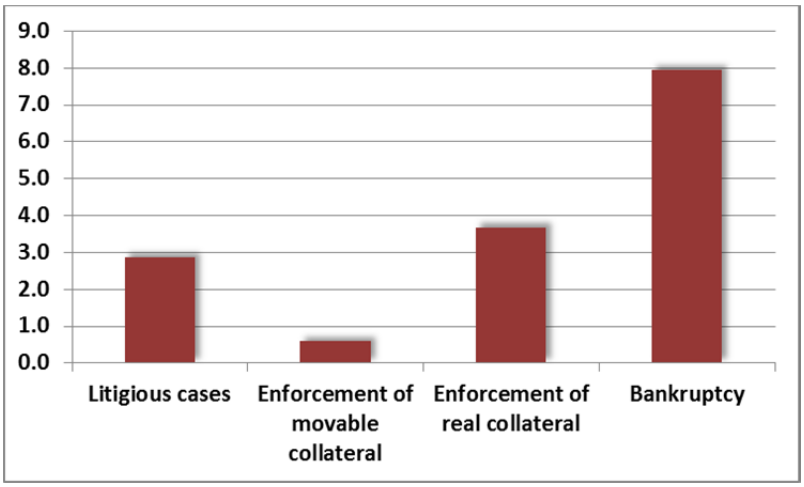
* The standardized distance is defined as the difference between the country/sector index and the average by sector of the three country indices, divided by the standard deviation across countries within sector.

Figure 18 - Firms' size and productivity median over NMR quartiles, 1998-2013 (log of size and productivity grouped by NMR quartiles)



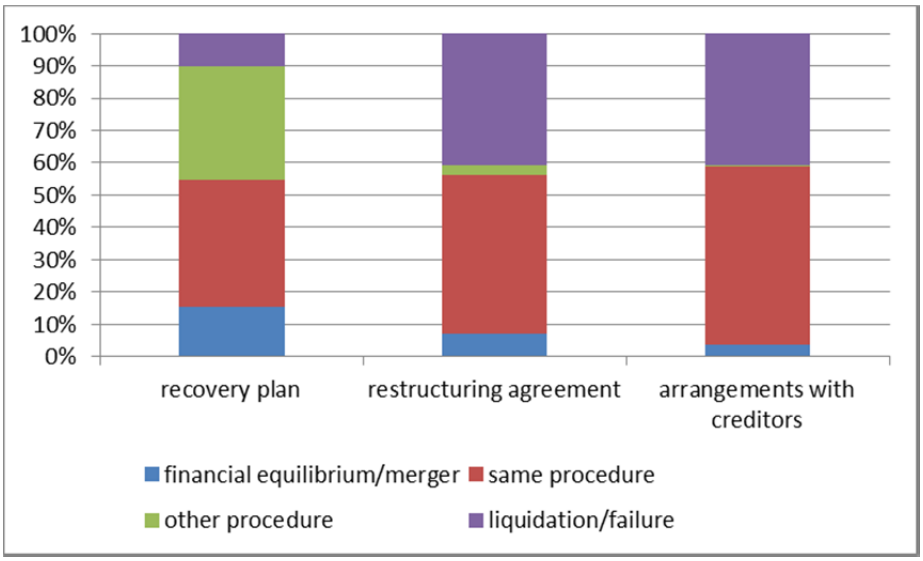
Source: our calculations on OECD PMR database, 2013 update release, Eurostat SBS and National Accounts.

Figure 19 - Length of civil proceedings in Italy in years (2014).



Source: Ministry of Justice.

Figure 20 – Firms' restructuring tools in Italy: outcome four years after their launch (percentage).



Source: Carpinelli et al. (2016).