EFIGE country report: Italy

Investment in intangible assets and level of sophistication: the role of Italian firms' financial structure

Silvia Cerisola, Elena D'Alfonso, Giulia Felice, Silvia Giannangeli and Daniela Maggioni

European Firms In a Global Economy

EFIGE

EFIGE IS A PROJECT DESIGNED TO HELP IDENTIFY THE INTERNAL POLICIES NEEDED TO IMPROVE EUROPE'S EXTERNAL COMPETITIVENESS

Funded under the Socio-economic Sciences and Humanities Programme of the Seventh Framework Programme of the European Union.

LEGAL NOTICE: The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 225551. The views expressed in this publication are the sole responsibility of the authors and do not necessarily reflect the views of the European Commission.

The EFIGE project is coordinated by Bruegel and involves the following partner organisations: Universidad Carlos III de Madrid, Centre for Economic Policy Research (CEPR), Institute of Economics Hungarian Academy of Sciences (IEHAS), Institut für Angewandte Wirtschafts-forschung (IAW), Centro Studi Luca D'Agliano (Ld'A), Unitcredit Group, Centre d'Etudes Prospectives et d'Informations Internationales (CEPII).

The EFIGE partners also work together with the following associate partners: Banque de France, Banco de España, Banca d'Italia, Deutsche Bundesbank, National Bank of Belgium, OECD Economics Department.

ITALY COUNTRY REPORT

Investment in intangible assets and level of sophistication: the role of Italian firms' financial structure

By Silvia Cerisola (LdA), Elena D'Alfonso (UniCredit), Giulia Felice (LdA), Silvia Giannangeli (UniCredit) and Daniela Maggioni (Università Politecnica delle Marche and LdA)

Main policy questions and policy implications

Competing in a global environment requires an increasing level of 'sophistication' in firms' investment, innovation, internationalisation and organisation strategies. A lack of comparable data on firms has so far prevented a systematic comparison of the characteristics of the Italian manufacturing structure and firms' behaviour with respect to the other European partners.

In this report, we focus on several dimensions of the Italian manufacturing structure. We address two main sets of questions by using the EFIGE data on firms. While the scope of this report is essentially descriptive, our results lead to the identification of new potential areas of policy intervention. At the same time, our findings raise some new questions for future investigation.

1- Which is the comparative level of sophistication of Italian firms' strategies? We look at three areas of firm activity (internationalisation, innovation and human capital) by depicting firms' complexity, or their 'quality', through a wide spectrum of variables that capture, in our view, their intangible assets endowment. We single out several indicators of a sophisticated firm and investigate how they are related among themselves and with firm size, comparing Italian firms' performance with respect to France, Germany and Spain. Do Italian firms behave like their European competitors? Along which dimensions do they differ? Do these differences disappear when comparing firms belonging to the same size class? Is the relationship between a firm's quality and size similar across countries? Answering these questions allows us to show whether Italian firms suffer a gap in their degree of sophistication with respect to other European countries, and along which specific dimensions.

2- As a second step, this report investigates a potentially relevant aspect that can be a driver of firms' strategic choices: their financial structure. More complex strategies imply more elaborated financial needs. Intangible assets do not always embed physical collateral to be held as a guarantee to external financiers. First, we look at the relationship between Italian firms' financial structure and size, investigating whether small- and medium-sized firms are characterised by a different financial structure with respect to larger firms. Then, we investigate whether there is a relationship between a firm's financial structure and its sophistication, as predicted by the abovementioned set of indicators of firm quality.

Overall, the Italian corporate sector shows a lack of sophistication. The gap with the other European countries is not only driven by the Italian firms' size distribution, but also by a lower performance with respect to the main European counterparts within each size class. Also, our analysis shows that large Italian firms are characterised by a less fragile financial structure than small- and medium-sized firms, and that firms with a less fragile financial structure are more sophisticated.

Our findings highlight the specific areas where Italian firms lag behind their European competitors and that should be targeted by policy intervention. At the same time, the report argues that, in order to be effective,

policy intervention should pay attention to the financial and banking system's ability to assess the intangible assets of firms, which are required in the current global competition environment. Our findings ask some questions about the relationship between firms' financial structure, size and intangible assets endowments. They suggest that further comparative research is required to highlight if and how the gap in the performance of Italian firms with respect to other European countries is related to the characteristics of their financial structure. In addition, further research should also be developed in order to clearly understand whether a more structured use of the financial supply and a wider supply of ad hoc financial tools, provided not only by the banking sector, but also by different players in the financial system, could be considered as potential instruments to accelerate a firm's transition towards both dimensional growth and more sophisticated global strategies.

1. Executive summary

Key messages

On the basis of the new EFIGE data, this report gives an overview of Italian firms' performance with respect to a set of quality indicators, chosen as proxies of firms' sophistication, in comparison to France, Germany and Spain. As a second step, the report gives some insights on Italian firms' financial structure and their relationship with the abovementioned indicators. The main findings of the descriptive evidence shown in this report can be summarised as follows:

1. **Italian firms show, on average, a lack of sophistication in their innovative, international and human capital related strategies**. Italian firms show a lower performance with respect to France and Germany in most of the indicators regarding firms' international activities (with the exception of the export extensive margin and production to order for foreign firms), and all the human capital indicators. Italian firms are more likely than other European firms to export their products, but the unsatisfactory performance of Italian exporters, when compared with French and German ones, is displayed by both the share of firms exporting to more distant markets and by the lower number of foreign destinations. In terms of foreign direct investments, French, German and Spanish firms outperform Italian ones. The relatively weak performance of Italy is particularly apparent in the purchase of customised intermediates from abroad. In terms of human capital the comparison of Italian firms with other European firms gives a worrisome picture. For all human capital indicators Italy falls behind France, Germany and Spain by a huge margin. According to this evidence, Italian firms pay less effort to human capital investments: they are less likely to offer training programmes, the share of trained workers is lower and also the share of graduated employees lags behind with respect to the other countries. The innovation indicators show a more mixed picture. While Italian firms perform in line with France and Germany in some indicators of successful innovation, such as intellectual property right adoption and product innovation, the share of Italian firms with R&D workers is lower than that of the other analysed countries.

2. **Firm size is positively associated with all the indicators in all countries.** Larger firms show a higher propensity to innovate and carry out R&D activities, a higher sophistication of their international activities and a higher quality of their workforce. Firm size is still a relevant issue, especially when we look at the intangible assets implied by more sophisticated strategies. Nevertheless, by comparing Italian performance with the other countries by size class, there is a within size-class effect for most indicators. Firms belonging to the same size class behave differently in Italy compared to the other countries, but this is particularly true for small-medium firms. Large Italian firms do not appear to behave very differently from French and German large firms, and better than Spanish firms, while Italian small firms appear to perform worse than their foreign counterparts in the internationalization and human capital strategies and in R&D employment. This suggests that beyond a potential composition effect (as it is well known, the Italian industrial structure is strongly biased towards small firms), the average performance of Italian firms is also affected by a worse performance within each size class. In the case of successful innovation indicators and sales to order to foreign customer, where Italian firms overcome on average the other countries, a better performance is also shown in each size class.

3. Turning the attention to firms' financial structure, we consider four fundamental dimensions of the assets/liabilities composition: i) firm reliance on external finance, i.e. debt; ii) firm debt maturity structure; iii) assets' liquidity, and iv) firm dependence on bank debt. In Italy, smaller firms are more heterogeneous in their financial structure than larger firms. Small-medium enterprises (firms below 50 employees) are more evenly distributed across the financial indicators' quintiles, while larger firms are more concentrated in the "virtuous" quintiles. **Overall, small- and medium-sized firms have a weaker**

financial structure. A higher share of smaller firms is undercapitalized, being more dependent on external finance, and showing, in particular, a higher share of short term debt and lower liquidity. They are also less indebted with the bank system.

4. By looking at the relationship between firms' financial and quality indicators for two classes of firms (i.e., we define large and small-medium firms as firms above and below the 50 employees, respectively), it is observed a higher variability of all the quality indicators for larger firms across the financial quintiles. **The "quality" or intangible assets endowment of a firm, as proxied by the analysed indicators, is less related to its financial structure among smaller firms than among larger ones.**

5. In general, **firms' "quality" is negatively associated with firms' leverage and, in particular, the share of short term debt, while it is positively associated with firms' liquidity, and with the share of bank debt**. Firms displaying a lower leverage enter in a larger number of countries and export a higher share of their goods. Similarly, lower leveraged firms are more likely to introduce product innovation, to invest in training programs and to hire high skilled workers. Bank debt is associated with higher innovativeness, in term of product innovation, organizational innovation and R&D employment, in particular for smaller firms. Higher bank debt is also associated with higher probability of exporting. Firm size and sector of activity are relevant drivers of both firms' quality and financial structure. Nevertheless, from our analysis it emerges a relationship between some of the indicators of a firm financial stability and the sophistication of their strategies, going beyond industry and size. This opens room to the opportunity of focusing on the role of the financial system in supporting firms' virtuous behavior.

2. Introduction

During the last decade the Italian economy went through different cyclical phases. While the beginning of the new century has been stagnating, characterised by low growth and productivity rates, just before the crisis Italian firms seemed to have started a restructuring process.

In the last few years a number of analyses – mainly focused on the period 2000-2005 – have pointed out the role played by the introduction of the euro and the rise of international competition as relevant drivers of a restructuring process in the Italian production system. Such restructuring took place through a reallocation not only between sectors – with more dynamic ones growing more than less competitive ones – but also within sectors (Bugamelli, Schivardi and Zizza, 2009). In particular, De Nardis and Pappalardo (2009) suggest that the competitive pressure implied an inter-firm adjustment that selected the best Italian exporters and an intra-firm adjustment that selected the 'best' goods.

The EFIGE dataset takes a picture of the Italian firms just after the beginning of this restructuring period in the triennium that includes the great financial crisis of 2008. It is interesting, therefore, to question whether this restructuring and upgrading process continued during the recent difficult phase and assess the impact on Italian corporate quality in an international perspective. In this respect, the EFIGE survey offers both direct and indirect information and sheds some light on the strengths and weaknesses of the Italian firms' manufacturing activities.

The aim of this analysis is to describe Italian firms' sophistication, which we identify using a range of different variables included in the EFIGE questionnaire that give an idea about the level of overall quality of the organisation and production activity of the firms.

Participating in a global supply chain implies a level of sophistication not only in the production of traded goods, but also in all the complementary strategies. In the new environment the intangible assets, which are to be considered as an important factor of a firm's success, embed a wide spectrum of activities beyond firm investments in R&D. We can group these variables in three main areas: internationalisation, innovation and human capital. Additionally, we will not restrict our analysis to the dichotomous terms in which these issues are usually considered, i.e. export/non-export or innovative/non-innovative, but we will try to assess the level of sophistication in these activities.

We focus especially on the level of penetration and presence in foreign markets and international production networks of firms, on their innovation activities and on their human capital endowment, and we interpret these variables as expression of the intangible assets owned and produced by the firm.

First, we look at how goods are traded globally and at the level of sophistication of Italian firms' internationalisation. As pointed out in Barba Navaretti *et al* (2011), it is important to look at the micro data to understand the country performance on foreign markets in the manufacturing sector, since from their analysis the individual firm characteristics overcome the country effect in explaining internationalisation trends. Some questions included in the EFIGE survey, in fact, give us important information about the role of Italian firms in the new globalisation: for instance, FDIs can partially represent the offshoring process, while the purchase of goods abroad or the production to order for foreign firms give us some suggestions about the participation of Italian firms in the global supply value chain. A more detailed analysis of the export activity of firms in terms of geographical scope is also informative of the capacity of firms to acquire and exploit the technical, financial, and organisational resources to become a main player in the global markets.

In addition, we consider the innovation/know-how choices, since they contribute to the 'quality' of the goods produced by Italian firms and to the productivity level, which leads firms to increase their competitiveness

and allows them to place themselves on segments of the market characterised by a higher quality and a higher technological complexity.

The third area on which we focus our attention is human capital, which is also strictly linked to the former two. The presence of skilled workers and of a qualified management able to face the challenges of globalised markets is, in fact, one of the determinant assets for a firm's adoption of sophisticated strategies (in terms of competitive policy, investments in research, penetration in international markets and quality upgrading) that may drive a firm's success.

As the UniCredit Corporate Report (2010) suggests, Italian firms display a need of complexity in the mentioned fields with respect to other countries. This seems to reflect, at least partially, the well-known size issue of the Italian corporate sector, mainly composed by small- and medium-sized enterprises. The aggregate statistics seem to be the result of (or, at least, deeply affected by) a composition effect generated by the presence of a small number of large firms that are quite similar to their European competitors, and a multitude of firms that don't have the sufficient size to adopt sophisticated strategies. In the global supply chain there is, in fact, the possibility also for small- and medium-sized firms to find and operate in a market niche, but the increasing geographical scope and number of trade relations implies a minimum threshold size. It is not a matter of being necessarily large but of reaching the minimum size that allows a firm to operate in a wider number of countries or with a higher number of products, investing a significant share of the revenues in R&D or in high skilled workers.

In the first part of this report we will look at the data by firm size, to assess the importance of corporate sector composition: it is not the object of this work to determine a threshold level, but we will, however, describe Italian firms by size class in order to investigate whether size plays an important role on the performance with respect to decisions concerning a firm's intangible characteristics.

There is another factor, potentially related to firm size, which can affect the investment in intangible assets: the robustness of the financial structure. The literature in this field is mainly focused on the problem of financing innovation, but some of the insights suggested by this literature can be easily extended to the wider concept of intangible assets, as considered in this work. One of the main arguments put forward by the literature for motivating the financing problems faced by firms for their innovation investments is the presence of asymmetric information and moral hazard problems (Hall, 2002; Hall and Lerner, 2009). In this perspective, the uncertainty of the returns on innovation investments may prevent the financial sector from correctly evaluating and monitoring firms. As a result, there is a wedge between the external and internal cost of capital required for backing R&D investments, ultimately constraining firms' activity. A robust financial structure with a solid capitalisation is, therefore, a necessary requirement for implementing more complex strategies. In fact, not only asymmetric information problems may prevent firms from getting the required financial resources, but the perceived risk of financing investments such as innovation, quality upgrading, international positioning and network development may be particularly high for external financers if these investments do not provide appropriate collateral. All these activities can be, indeed, defined as intangibles, since by definition they do not imply physical collateral and are therefore more difficult to finance.

It is well known that the Italian firms are usually less solid, with a lower level of capital and higher share of short-term debts than other European firms (Relazione Annuale della Banca d'Italia 2009, 2010). As a consequence, the lack of complex strategies (in terms of internationalisation, innovation and human capital) of Italian firms might be related to a weaker financial structure. This issue will be explored in the second part of this work, by describing the financial structure of firms using four fundamental dimensions of the assets/liabilities composition: firm reliance on external finance (i.e. debt; firm debt maturity structure), assets' liquidity and firm dependence on bank debt. In principle, a firm can adopt sophisticated strategies if it is able to sustain them financially in the medium term through equity or using ad hoc financial instruments

such as venture capital or private equity. As discussed by the UniCredit Corporate Report (2010), the EFIGE survey points out that Italian firms generally make use of a limited number of financial instruments and are mainly financed by bank debt.

In the next section of this work we describe the variables that we use to identify firm sophistication and the correlation structure; we will also provide a description of the variables in terms of size, comparing them at international level. In particular, we take Germany, France and Spain as benchmarks, since they are the larger economies within Europe. Section 4 describes the financial structure of the firms included in the analysis and the relationships between financial structure and strategic choices. Section 5 concludes.

3. Firms' sophistication and intangible assets

As mentioned in the introduction, the restructuring process is not only a reallocation issue. In this analysis we will look at a wide range of factors that contribute to a firm's quality. The quality of a firm, indeed, is the result of several strategic choices as, for instance, product or process innovation, as well as some complementary activities, such as product distribution networks, or management qualification that can be relevant in determining a firm's success. We will, therefore, try to investigate the firm quality looking at different variables, which we describe herein grouping them in three different areas: internationalisation, innovation and human capital.

The international activity is an important part of the firm strategy, as it describes its attitude with respect to the new global organisation of production and its ability to compete in a global environment (Mayer and Ottaviano, 2007). First, we will consider international trade, describing it not only through the simple dichotomous classification exporter/non exporter, but taking also into account two other qualifying characteristics in terms of depth of internationalisation: the average number of destinations per firm and the number of exporters in emerging markets. These two variables reveal an aggressive and more elaborated strategy aimed at gaining market share, balancing the risk, and accessing those countries that show stronger internal demand and higher growth rates. The drawback of this kind of exporting strategy is the uncertainty associated to the political and economic instability of these countries, which is difficult to forecast. The firm must have a well structured organisation able to manage the risk and the complex logistics, denoting a sophistication that cannot be easily translated into physical assets of quantifiable collateral, even if it involves higher investments. We also consider indicators of the firm international activity, which can signal its quality. These are related to the role of the firm in the global value chain, as measured by its foreign direct investments, its reliance on production to order and customised purchasing. Investing abroad the firm becomes a global producer and takes part in (or creates) a global value chain (Barba Navaretti and Venables, 2004). Indeed, the customised relationships with foreign clients or suppliers may require, on the one hand, an appropriate organisation inside the firm that is able to run the relative linkages with these operators and, on the other hand, can offer important opportunities to improve their product quality and competitiveness, usually thanks to stricter contacts with efficient foreign firms, the exploitation of the growth of their clients and ad hoc inputs that can also be characterised by a better quality and a higher technological content. In general, the more sophisticated the firm international activities, the more complex the firm organisation and, hence, the endowment of intangible assets necessary to operate globally.

Innovation is a typical area of activity based on intangible investments: investments in R&D are typically difficult to finance as they do not provide physical collateral and their returns are uncertain and difficult to evaluate. In our analysis, we will try to qualify in more detail the nature of these investments, looking at a wider spectrum of variables. The presence of employees in R&D denotes the existence of an internal structure devoted to research activities, which implies long-term investments. Product innovation is also a long-term investment, while process innovation has immediate returns and also possible collateral (the machinery) to guarantee the investment. The protection of the outcomes from innovation activity implies some relevant costs and also a strong commitment by the firm, as well as the organisational changes implied by innovation.

Finally, we will look at the human capital stock: the number of graduate workers as well as the workers' training programmes indicate the skill endowment of firm workforce. Additionally, we also consider two other variables that help to identify the ability of the management to operate abroad (executives with foreign experience) and the purchasing power of the firm in attracting the best managers (executives' and managers' reward). These variables can give us an idea about the capacity of the firm to produce know-how inside its boundaries, since human capital forms the basis for the creation of the firm knowledge and where the existing knowledge is stored.

As suggested in Barba Navaretti *et al* (2011), the differences in trade performances of the European countries are largely determined by firm characteristics, more than by sectoral trends. In particular, labour force skills and innovation are positively related to firms' export performance and to more complex international strategies. Thus, we can expect that all the presented intangible factors are strictly linked. The correlation analysis among the considered variables – related to firm internationalisation, innovation and human capital – confirms our expectations (see Tables A_a and A_b in Appendix). All the variables described before are positively and significantly correlated among each other. There is, therefore, a strong relationship between the three areas of activity, suggesting that in the new global production scenario it is necessary to have more than just one sophisticated characteristic to compete internationally. Firms aiming to reach a relevant role in the global value chain tend to be more innovative and invest in skilled human capital, using a larger number of sophisticated strategies.

3.1 The investment in intangible assets of Italian firms in a cross-country comparison

Internationalisation

The internationalisation activities have a central role in the strategies of firms operating in all economic activities. Globalised markets offer important opportunities to firms in terms of expansion of their market size, technology transfers and inputs procurement. In this section, we focus on several indicators showing firms' ability to enter foreign markets in various modes. The more sophisticated the firms' international activities, the more they are likely to be related to firms' endowment of intangible assets, or, more generally, with firms' quality.

As shown in Table I_3.1, Italian firms are more likely than other European firms to export their products. In a more and more globalised world it is not enough for firms to cross the national border. It is becoming important to be engaged in deeper strategies of internationalisation. The penetration of a large number of countries, the entry in emergent countries, together with the ability to satisfy foreign buyers' specific needs by providing goods they cannot find in their domestic market[1], the undertaking of foreign direct investments and the ability to look for foreign customised intermediate goods can be identified as characteristics of a successful firm operating in a international marketplace. At the same time, all these complex internationalisation modes capture the relative quality of the firm in the globalised environment.

Table I_3.1 also gives an overview of the variables capturing the sophistication of firm internationalisation for European countries. The evidence clearly shows that, even if Italy presents a higher extensive margin (share of exporters), when we analyse the sophistication of firm internationalisation Italy falls behind France and Germany, while it outperforms Spain. The only exception is the production to order activity for foreign costumers, where on average Italy is in line with Germany and France, while Spain lags behind.

[1] Production to order per se is not necessarily an indicator of sophistication with respect to producing in advance, and the large majority of firms produces to order at least part of the production. Nevertheless, it is usually associated with the production in the differentiated/specialised segments of the market and, in particular, it is associated with higher quality when carried out for foreign buyers, especially in the case of Italy, where production costs are generally not lower than in their export markets, where the buyers are located.

Table I_3.1: International activities by country

Indicator	FRA	GER	ITA	SPA
Exporters (%)	58.52	59.97	72.16	61.06
No. of export destinations*	11.08	13.36	10.71	8.39
Exporters to emergent countries*	22.23	27.3	17.71	10.76
Prod. to order for foreign firms**	48.13	42.70	47.27	25.23
Purch. of customised goods abr. (%)	30.46	11.70	7.75	7.46
FDI-Makers (%)	3.88	5.79	2.46	2.74

*Only for the population of exporters

** Only for the population of firms producing to order

The unsatisfactory performance of Italian exporters compared with French and German ones is displayed by both the share of firms exporting to emergent countries[2] (China and India) and also by the number of served countries[3]. Italian exporters sell their products to a lower number of foreign destinations and this prevents them from fully exploiting the economies of scope (in terms of geographical scope) that may exist in the export activity.

Moreover, their presence in emergent countries is scant and this proves the incapacity of Italian firms to take advantage of the great growth that these countries have been experiencing in the last few decades and of their increasing openness to globalisation.

Looking at foreign direct investments, involving higher sunk costs than exports, not only German and French but also Spanish firms outperform Italian ones.

The relatively weak performance of Italy is particularly remarkable in the purchase of customised intermediates from abroad, where even France outperforms Germany. This empirical fact is especially important because it sheds some light on the difficulties that Italian firms may be facing not only when they try to penetrate foreign markets with their products, but also when they try to find specialised foreign suppliers looking for inputs satisfying their needs in terms of quality and technological content. The incapacity to exploit opportunities that globalisation offers in terms of wider availability of intermediates may have a direct, and of course negative, impact on the quality level of domestic production.

Building on this evidence, we now investigate whether the less sophistication in the internationalisation strategies of Italian firms compared with French and German firms is driven by the firm size that, as shown by the literature, is a significant determinant for the export entry and for foreign investments. Both different export modes and FDI and imports of customised goods are activities characterised by various sunk costs[4], some of which are typically due to the lack of information firms have to cope with if they want to enter foreign markets (Roberts and Tybout, 1997). The presence of these costs involves the need for the firm to develop the know-how, organise internal resources, find financial resources and invest in human capital in order to be ready to face the challenges that international markets create. As a consequence, success in global markets may be considered an intangible asset or, better, the expression of multiple intangible assets that allow a firm to build up an important *savoir-faire*. As mentioned above, in order to build this *savoir faire* there are some

[2] Throughout the report, when we will use the term emergent countries, we will refer to China and India.

[3] All tables showing the number of export destinations and the probability to export to emergent countries are constructed only on the basis of the population of exporters.

[4] Transportation costs, distribution or marketing costs, costs in adapting domestic products to foreign consumers tastes and specific needs, costs of adapting the foreign inputs to the production process, and all the costs related to the organisation of production abroad.

sunk costs that firms have to bear. In this process firm size may play an important role. Larger firms are usually more efficient and have the financial, economic and human resources to bear these burdens. If this is the case, it may be that the lower sophistication of Italian firms shown in table I_3.1 is due to a compositional effect. That is, it may be due to the larger presence of small firms in Italy compared with France and Germany.

Table I_3.2 confirms that in Italy larger firms are more likely to enter foreign markets, to undertake more sophisticated internationalisation strategies (especially to sell to a wider number of destinations and to expand their presence in emergent countries), and to undertake part of their production abroad through direct investment. Moreover, important differences across size classes are detected in the customised relationships with foreign suppliers and in the production to order for foreign firms.

Table I_3.2: International Activities by Size Class - Italy

Size Class	Exporters (%)	No. Export Dest.*	Exporters to emergent countries*	Production to order for foreign firms**	Purchase of cust. goods abroad	FDI makers (%)
10-19	65.44	8	13.26	38.60	4.41	0.57
20-49	73.20	10	18.39	49.62	7.84	2.24
50-249	86.59	17	21.84	63.30	15.86	6.24
≥ 250	92.62	29	40.36	57.50	25.06	25.91

*Only for the population of exporters. ** Only for the population of firms producing to order.

Tables I_3.3 to I_3.7 confirm the importance of firm size in the explanation of internationalisation for other European Countries. For all countries and all the analysed internationalisation variables it is evident that firms with more than 250 employees are more likely to bear the sunk costs involved in the internationalisation activity[5].

[5] The only exception is the production for foreign customers in Italy and Spain, where the percentage is slightly lower for the largest size group in comparison with firms in the third size class (more than 50 employees, but less than 250).

Table I_3.3: Number of export destinations by size class and country

Size Class	FRA	GER	ITA	SPA
10-19	7	7	8	5
20-49	9	12	10	8
50-249	15	17	17	12
≥ 250	24	24	29	23

Only for the population of exporters

Table I_3.4: Share of Exporters (%) to emergent countries by size class and country

Size Class	FRA	GER	ITA	SPA
10-19	18.21	13.88	13.26	6.99
20-49	21.08	25.98	18.39	9.24
50-249	26.98	34.16	21.84	16.48
≥ 250	27.88	45.25	40.36	29.76

Only for the population of exporters

Table I_3.5: Share of FDI makers (%) by size class and country

Size Class	FRA	GER	ITA	SPA
10-19	0.89	1.53	0.57	0.75
20-49	2.09	3.86	2.24	1.76
50-249	8.81	9.08	6.24	7.91
≥ 250	23.81	31.95	25.91	25.15

In general, the role of size with respect to firms' performance along the dimensions we consider is confirmed. Nevertheless, the variability across size groups, and, in particular, the large divide between firms above and below the threshold of 50 employees, is stronger in the case of FDI activities and imports of customised intermediates than for the other indicators. By contrast, the role of size is less pronounced when looking at production to order for foreign customers.

Table I_3.6: Share of firms producing to order for foreign firms by Size Class and Country

Size Class	FRA	GER	ITA	SPA
10-19	39.08	28.76	38.60	17.16
20-49	46.78	40.93	49.62	25.27
50-249	62.25	58.37	63.30	44.06
≥ 250	72.45	61.44	57.50	40.03

Only for the population of firms producing to order

Table I_3.7: Share of firms importing customised goods (%) by size class and country

Size Class	FRA	GER	ITA	SPA
10-19	21.85	7.52	4.41	5.33
20-49	29.90	10.35	7.84	7.35
50-249	42.54	18.71	15.86	11.02
≥ 250	58.13	17.65	25.06	24.24

When we split the firms by size class it seems that the lower sophistication in internationalisation strategies of Italian firms is in part due to the size structure of the Italian economy, ie the composition effect is important. In particular, concerning the number of export destinations, Italian firms have a similar performance to (and sometimes better than) French and German firms when the comparison is made within the same size class (Table I_3.3). Similarly, the average performance of Italian firms producing to order for foreign buyers – only slightly higher than in France and Germany – may be due to a composition effect. As for smaller firms (<50 employees), Italy strongly outperforms Germany and Spain, and only slightly France, in terms of production to order for foreign buyers, while the reverse is true for larger firms (≥50 employees).

Focusing on the share of exporters to emergent countries, the gap between Italy and other European countries still remains when we account for the size class. Even if in all countries there are great differences in the probability that exporters enter emergent markets across size classes, these differences are not so strong in France, and the performance of French firms is quite uniform across size classes. Comparing Italy to Germany, the table shows that the lower presence of Italian exporters in emergent Asian countries is not only due to a compositional effect, but also to a within size-class effect. Especially in this case, while the performance of smaller Italian firms (between 10 and 20 employees) is in line with the one of German firms in the same size class, larger firms in Italy perform worse than German ones.

The picture is different when we turn our attention to FDI: even in this case, within-size effects are displayed, but smaller firms are characterised by larger differences. The penetration of foreign markets through direct investments is a difficult task for firms. The risks, costs, informational and organisational burdens for foreign investments could be large compared with the ones involved in export activity. Table I_3.6 displays the incapacity of small Italian firms to face these high fixed costs. Even if important differences between Italy and other countries can be detected within each size class, the greater gap concerns the class of firms between 10 and 20 employees. In this class, Italian firms present a lower internationalisation not only compared to French and German firms but also to Spanish ones. The reasons of the lower foreign investments of Italian firms may be linked to a lack of financial, organisational and human resources, but the lacking intervention of institutions in the promotion of FDI may play a role as well.

A similar picture appears when looking at the purchasing of foreign customised intermediates, where a within size class effect is clearly weakening the Italian position. Italy has much lower percentages of firms importing intermediates with respect to France and Germany in almost all size classes, but the difference is higher for smaller firms (<50 employees), while it vanishes or eventually reverses for larger firms with respect to Germany. Italy outperforms Spain in all classes.

Innovation

Along with the internationalisation activities described above, there is another important qualifier of a firm's commitment to intangible capital formation: its involvement in innovation activities. In this paragraph, we take a look at several indicators of innovation and the nexus between a firm's commitment to innovation and its size. Table INN_3.1 summarises the average value of these indicators in Italy and in the other European countries included in the analysis. The findings on the relative performance of Italian firms are not univocal: in some respects, Italian firms are found to be more active in innovation than their foreign counterparts (this is the case, for instance, for the share of firms with R&D expenses), but rank well below all other countries in the share of firms with workforce devoted to R&D activities. Intellectual Property Rights (IPR) adopters are 22.2% of the Italian sample, a lower share than in Germany and Spain, but higher than in France. The share of firms introducing product innovation in Italy (47.8%) lies between the maximum value registered in Germany (48%) and the minimum of Spain (44.3%). Finally, Italian firms are less likely than German and Spanish ones to couple organisational and technological innovations (28.7% of Italian innovators modified their organisational structure following the introduction of process or product innovations).

Overall, assuming Germany as a benchmark for assessing Italian firms' performance in terms of innovation, the figures discussed so far seem to suggest that Italian firms are less likely to commit part of their workforce to innovative activities and, in particular, to invest in R&D. This evidence indicates that Italian firms are less willing to face sunk costs in setting up in-house structures such as R&D departments or teams devoted to industrial design and development. In addition, a milder propensity of Italian firms towards 'heavy' innovations may be suggested by the fact that a lower percentage, with respect to Germany, of innovators introduced organisational changes. Overall, a more pronounced organisational rigidity seems to characterise Italian innovators with respect to German ones. In the light of this evidence, the large diffusion of firms that state to commit money to R&D activities could be interpreted as the result of a larger recourse to outsourced research services[6].

Table INN_3.1: Innovation activities by country

Indicator	FRA	GER	ITA	SPA
Firms with employees in R&D	59.02	67.97	51.16	59.71
Firms with R&D expenses	49.57	50.13	52.84	44.24
IPR adopters	20.32	23.43	22.21	24.49
Product innovators	47.77	48.03	47.8	44.27
Innovators undertaking organisational changes	27.53	41.46	28.72	31.75

To verify whether these figures are driven by differences in the size composition of the manufacturing sector across countries, we break down the overall sample into size classes, as already done for internationalisation variables. Table INN_3.2 reports the average value of the indicators of innovation discussed so far for different size classes in Italy. The data suggest that there are large differences in the propensity to innovation among firms of different sizes. Overall, as expected each indicator adopted in the analysis tends to increase with firm size.

[6] The EFIGE survey seems to confirm that Italian firms are more likely to outsource R&D activities (for further details, see D'Alfonso and Giannangeli, 2010).

Table INN_3.2: Innovation activities by size class – Italy

Size class	Firms with employees in R&D	Firms with R&D expenses	IPR adopters	Product innovators	Innovators undertaking organisation changes
10-19	40.34	42.78	14.43	41.52	22.48
20-49	54.33	55.04	23.85	48.73	31.09
50-249	68.03	72.03	35.76	61.68	35.75
≥ 250	83.08	80.98	54.96	65.71	50.16

However, the cross-country comparison by size class offers interesting insights. First, Table INN_3.3 highlights that the registered low propensity of Italian firms to devote part of their workforce to R&D activities is particularly pronounced in the lowest size classes: with respect to Germany, for instance, the share of Italian firms with 10-19 employees devoting part of them to R&D is more than 15% lower. This disadvantage reduces to nearly 13% in the class of 20-49 employees, attaining the minimum level of 8% in the class of largest firms. Even if the distance of Italian firms to the best performers – German firms – reduces as firm size increases, the gap suffered by firms in Italy remains sizeable. Moreover, large Italian firms do not appear to behave very differently from large firms in France and Spain, while the smallest firms clearly perform worse than foreign small firms considered in the sample.

Table INN_3.3: Firms with R&D employees by size class and country

Size class	**FRA**	**GER**	**ITA**	**SPA**
10-19	50.14	55.97	40.34	51.32
20-49	58.62	67.58	54.33	62.76
50-249	71.51	79.34	68.03	69.4
≥ 250	86.09	91.36	83.08	81.8

Interestingly, the high propensity of Italian firms to invest in R&D, as captured by the percentage of firms sustaining R&D expenses, is found to be the highest among the countries considered, independent of the size class, as shown in Table INN_3.4.

Table IN_3.4: Firms with R&D expenses by size class and country

Size Class	**FRA**	**GER**	**ITA**	**SPA**
10-19	39.47	33.17	42.78	34.22
20-49	48.95	50.32	55.04	46.52
50-249	64.92	66.12	72.03	60.09
≥ 250	77.42	76.88	80.98	72.31

Looking at the rest of the indicators of innovation included in the analysis, the relevance of the size composition of manufacturing sectors across countries is confirmed to be important. For instance, as for the adoption of IPR protection, large Italian firms outperform large firms from other countries in the sample. Concerning the introduction of product innovation, Italian firms perform well at aggregate level and also have a higher propensity to innovate within size classes. Clearly, the primacy of German firms at the aggregate level

is entirely due to compositional effects. Finally, an interesting result concerns the complementarity of organisational and technical innovations, which is found to be particularly low in Italy. In fact, large Italian firms do not seem to behave differently from, say, German ones, while the propensity to modify the organisational structure of firms with less than 250 employees is considerably lower.

Table INN_3.5: IPR adopters by size class and country

Size Class	FRA	GER	ITA	SPA
10-19	13.06	12.36	14.43	18.8
20-49	19.66	21.07	23.85	25.71
50-249	30.13	37.07	35.76	32.81
≥ 250	46.68	49.4	54.96	46.32

Table INN_3.6: Product innovators by size class and country

Size Class	FRA	GER	ITA	SPA
10-19	44.43	36.65	41.52	38.49
20-49	47.69	48.48	48.73	45.18
50-249	51.4	59.14	61.68	53.08
≥ 250	61.39	61.42	65.71	70.99

Table INN_3.7: Organisational innovators by size Class and country

Size Class	FRA	GER	ITA	SPA
10-19	24.95	30.64	22.48	26.26
20-49	28.38	42.56	31.09	34.04
50-249	30.12	50.4	35.75	36.78
≥ 250	31.44	50.98	50.16	47.94

Overall, Italian firms show a considerable degree of heterogeneity in the use of innovation inputs, such as employees and R&D, but also with respect to innovation output (both product and organisational innovations) and the use of IPRs. In general, and in particular in smaller firms, Italian firms seem less inclined to combine technological and organisational innovations and to devote part of their workforce to innovative activities. The behaviour of larger firms is, instead, found to be quite similar to the behaviour observed for large firms in Germany, the country which is traditionally adopted as a benchmark and an example of best practice for innovation in Europe.

Human capital

We turn now our analysis on the human capital endowment of firms. In the current economic context, where the international competition from other countries, especially emergent and low-wage countries, is increasing and where technology and intangible capital play a central role in providing a competitive advantage, human capital may become a factor of success for the firm[7]. This is especially true in view of the competitive pressure from developing countries, which firms in advanced countries may escape and face by switching to higher-quality, higher-technology and more sophisticated segments in their production sector. This switching could

[7] Human capital could also be key to overcoming the economic downturn following the recent crisis.

be possible only if the firm develops the know-how and the human resources necessary to change its production process. Moreover, the characteristics of management could reveal the ability of the firm to cope with the threats and to take advantage of the opportunities of the globalised market.

Thus, we mean to investigate whether Italian firms pay attention to this strategic asset and how they are positioned compared to other European countries.

We focus on three variables capturing the attention that firms pay to their workforce: the share of firms offering training programmes to their workforce, the percentage of trained workers and the share of graduated employees. All these indicators allow us to assess the propensity of a firm to undertake human capital investments. We then turn to the characteristics of management and we analyse the share of firms where executives have experienced a working period abroad (at least one year). The experience that executives have accrued working in other countries may help them face the challenges of globalisation. For this reason the presence of executives with a working experience abroad could be seen as an intangible asset.

The comparison of Italian firms with other European firms delivers us a worrying picture (see Table H_3.1). For all human capital indicators Italy falls behind France, Germany and Spain. While the other European countries show similar values for the analysed variables, Italy presents a huge gap. According to this evidence, Italian firms invest less in human capital than other firms: they are less likely to offer training programmes to their workforce, the share of trained workers is lower and also the share of graduated employees is lower. The share of firms with executives who experienced a working period abroad in France, Germany and Spain is more than double the share in Italy.

This evidence may be indicative of the incapacity and/or difficulty of Italian firms to face the tougher competitive pressure of low-cost countries, especially if this stronger competition calls for a technological and/or qualitative upgrading of domestic production in advanced countries. The level of education of a country's population affects its future growth, so the human capital of the firm may be considered as an important driver of the expansion of its activities in terms of both scale and quality.

Table H_3.1: Human capital variables by country

Indicator	FRA	GER	ITA	SPA
Training (percentage of firms)	83.23	83.18	53.7	82.88
Trained workers share*	26.45	29.64	22.23	34.54
Graduated employees share	8.34	11.1	6.45	10.53
Executives with foreign experience (percentage of firms)	16.00	26.92	11.43	22.03
Executives' and managers' reward	44.40	49.12	16.42	24.68

* Only for the population of firms doing training

Table H_3.2 splits the sample by size class and investigates the role of the firm size as determinant of the firm human capital. As we could expect, there are great differences across the size classes, with larger firms paying more attention to human capital. Larger firms are more likely to engage themselves in worker training programmes, and the probability to offer training more than doubles when we move from the lowest class (less than 20 employees) to the highest one (more than 250 employees)[8]. Similar results are shown for the

[8] There are no great differences on the trained workers share when we analyse the population of firms offering training programmes.

share of graduated employees. Moreover, in larger firms it is more likely that executives have acquired some working experience abroad.

Table H_3.2: Human capital by size class – Italy

Size Class	Training (percentage of firms)	Trained workers share*	Graduated employees share	Executives with foreign experience (percentage of firms)	Reward
10-19	42.26	24.34	5.95	7.97	11.17
20-49	56.57	21.64	6.15	9.70	15.69
50-249	73.14	19.57	8.41	23.22	30.19
≥ 250	91.34	26.38	13.01	62.35	63.36

* Only for the population of firms doing training

Thus, it is evident that firm size helps to explain the characteristics of firm employment and this linkage could form the basis for the low investments in human capital that Italian firms undertake. We add the size dimension in the cross-country comparisons in order to detect the importance of the between and within size-class components in the differences shown in Table H_3.1 between Italy and other European economies.

Tables H_3.3 to H_3.6 confirm the strong relationship between size and human capital existing in all countries, even if the larger differences across size classes are recorded for Italy. For each human capital variable, Italy shows a poor performance in all size classes compared with other countries. This gap seems to be wider for smaller firms. For firms with more than 250 employees the values of Italian firms for all variables are in line or very similar to the ones of other countries. The scant investments in human capital of smaller firms may be due to the lack of financial resources, and this is what we are going to identify in Section 4. Therefore, this evidence highlights the importance of interventions by national institutions that support small firms in the financing and implementation of programmes that aim to develop human capital.

Table H_3.3: Training (percentage of firms) by size class and country

Size class	FRA	GER	ITA	SPA
10-19	73.58	70.27	42.26	74.69
20-49	84.96	84.44	56.57	86.14
50-249	96.97	94.82	73.14	92.64
≥ 250	97.98	96.82	91.34	97.03

Table H_3.4: Share of trained workers by size class and country

Size class	FRA	GER	ITA	SPA
10-19	27.03	32.88	24.34	35.54
20-49	24.69	28.15	21.64	34.69
50-249	27.44	28.10	19.57	31.31
≥ 250	32.59	33.93	26.38	37.67

Only for the population of firms doing training

Table H_3.5: Share of graduated employees by size class and country

Size Class	FRA	GER	ITA	SPA
10-19	7.62	12.38	5.95	10.57
20-49	8.08	10.21	6.15	9.97
50-249	8.70	10.83	8.41	11.48
≥ 250	14.83	12.78	13.01	15.30

Table H_3.6: Executives with working experience abroad (percentage of firms) by size class and country

Size class	FRA	GER	ITA	SPA
10-19	9.08	16.70	7.97	11.39
20-49	12.08	23.15	9.70	22.80
50-249	27.44	40.14	23.22	41.60
≥ 250	59.81	62.67	62.35	68.77

Turning our attention to the internal organisation of firms, we focus on the incentive mechanisms and highlight if firms' executives and managers are rewarded partly on the basis of their performance and achievement of individual targets (we include both financial and non-financial benefits). On average, Italy shows the lowest use of these rewards with respect to the other three countries. Firms rewarding managers with benefits related to their performance are around 50% in France and Germany and 25% in Spain, while this percentage drops to 16% in Italy.

The usual monotonic and positive relationship with size emerges within each country, but Italy is strongly behind France and Germany for all firms smaller than 250 employees, while Italy lags behind only France for larger firms (see Table H_3.7).

Then, we can conclude that the average low attitude of Italian firms in paying performance-related incentives is also due to the lower propensity of Italian firms within each size class (which is less pronounced only for the very large firms).

Table H_3.7: Executives and managers reward (percentage of firms) by size class and country

Size Class	FRA	GER	ITA	SPA
10-19	38.90	36.50	11.17	16.85
20-49	39.90	48.50	15.69	25.00
50-249	55.63	63.61	30.19	38.35
≥ 250	83.14	64.67	63.36	68.44

4 The link between firm financial structure and its investments in intangible assets

4.1 Firm financial structure and size

In the introduction we discussed the motivation for looking at the link between firms' financial structure and their investment in intangible assets. There are several ways to look at the financial structure of firms: for the purpose of our analysis, we consider four fundamental dimensions of the assets/liabilities composition: (i) firm reliance on external finance, ie debt; (ii) firm debt maturity structure, (iii) assets' liquidity, and (iv) firm dependence on bank debt. Table 4_var describes the financial indicators adopted throughout the analyses in Section 4.

Table 4_var: Description of financial indicators adopted

Financial indicator	Explanation
Leverage	Total debt/Capital
Short-term leverage	Short-term debt/Capital
Current ratio	Current assets/Current liabilities
Bank debt	Debt owed to banks/Total debt

All indicators refer to 2006, while the proxies adopted for capturing firms' investment in intangible assets refer to 2007-2009. To offer a concise and easy-to-read discussion of a firm's financial structure, we consider its position within the distribution of the relevant financial indicators explained in Table 4_var. In particular, firms are grouped according to the quintile of the financial indicators' distribution where they are located: for instance, if a firm is classified as being '1' or '5' in the leverage distribution, this means that its leverage value belongs to, respectively, the lowest or the highest 20% of the overall leverage distribution. In this exercise, each firm is compared with the distribution of the relevant national sample, in order to glean any possible country 'fixed effects'.

Tables 4.1a to 4.1d show the breakdown of the Italian sample into firm size classes and quintile of the relevant financial indicators distribution. It is worth noting that, on average, in Italy enterprises with fewer than 50 employees are more uniformly distributed across the financial indicators' quintiles, especially, but not only, when looking at the leverage and short-term leverage indicators. This interesting outcome signals a higher heterogeneity in small-and medium-sized firms' financial structure than in larger firms. Larger firms are more concentrated in the 'virtuous' quintiles (the lowest quintiles of the total or short-term leverage distribution).

The share of firms located in the lowest two quintiles of the distribution across leverage quintiles is 35.5% in firms with 10-19 employees, while it rises to around 60% in firms with 50-249 employees and to almost 73% in the largest firms. A similar picture is shown for the distribution across short-term leverage quintiles. As for liquidity conditions (measured by the current ratio), the share of firms located in the highest two quintiles of the distribution is 36.5% in firms with 10-19 employees, and monotonically increases with firm size class, until reaching 43.7% of firms with more than 250 employees. Similarly, the share of firms belonging to the fourth and fifth quintile of the bank debt distribution increases monotonically with firms size, ranging from 37.5% in the smallest size class to 46.5% in the largest one. Overall, these results confirm that small firms have a weaker financial structure, as they are more dependent on external debt, which is composed to a greater extent by items different from bank loans (such as trade debt).

For the sake of brevity, in the rest of the analysis we adopt a simplified size breakdown criterion, distinguishing firms above and below 50 employees. For each investigated area of firm intangible assets (internationalisation, innovation and human capital) we focus only on the variables that, according to our

previous analysis, seem to better capture the sophistication of firm activity and reveal the gap between Italy and other European countries[9].

Table 4.1a: Distribution of firms of different sizes across leverage quintiles – Italy

	Quintiles of leverage distribution					
Size class	**1**	**2**	**3**	**4**	**5**	**Total**
10-19	14.91	20.62	20.92	22.42	21.12	100
20-49	19.78	18.38	20.81	20.52	20.52	100
50-249	34.33	25.62	14.43	11.19	14.43	100
≥ 250	51.16	21.71	13.18	5.43	8.53	100

Table 4.1b: Distribution of firms of different sizes across short-term leverage quintiles – Italy

	Quintiles of short-term leverage distribution					
Size class	**1**	**2**	**3**	**4**	**5**	**Total**
10-19	14.91	21.22	20.62	21.52	21.72	100
20-49	19.63	18.45	20.59	21.11	20.22	100
50-249	34.58	23.63	15.92	11.94	13.93	100
≥ 250	54.26	19.38	12.4	4.65	9.3	100

Table 4.1c: Distribution of firms of different sizes across current ratio quintiles – Italy

	Quintiles of current ratio distribution					
Size class	**1**	**2**	**3**	**4**	**5**	**Total**
10-19	21.64	21.73	18.94	18.25	19.44	100
20-49	19.46	19.24	20.56	20.04	20.7	100
50-249	16.83	17.82	22.03	23.76	19.55	100
≥ 250	11.45	16.79	24.43	31.3	16.03	100

[9] For the other variables, not commented in this section, the relative tables can be found in the Appendix.

Table 4.1d: Distribution of firms of different sizes across bank debt ratio quintiles – Italy

	Quintiles of bank debt ratio distribution					
Size Class	**1**	**2**	**3**	**4**	**5**	**Total**
10-19	23.88	20.08	18.58	18.78	18.68	100
20-49	19.09	19.82	20.78	20.93	19.38	100
50-249	13.43	20.15	21.14	20.65	24.63	100
≥250	15.5	23.26	14.73	20.93	25.58	100

4.2 Firm financial structure and its investments in intangible assets

Internationalisation

As already mentioned, firms' international activities involve some sunk costs that they have to cope with. These costs are larger the more sophisticated the internationalisation strategy. Thus, only firms that have economic, human and financial resources may be able to penetrate a larger number of export destinations, more distant and competitive countries and undertake their production abroad through foreign direct investment. We have already stated that internationalisation, especially more sophisticated strategies, requires the development of *savoir faire*, in terms of organisational complexity, know-how and information acquisition (ie regarding the preferences of foreign consumers, the competitive environment in foreign countries, technical and legal rules etc.), that firms do not always have at their disposal. As a consequence, the availability of financial resources may allow firms to undertake the investments necessary to develop the capacity to go international. For this reason, the analysis of the financial conditions and structure of Italian firms can shed some light on their performance in terms of internationalisation.

In general, for all the indicators (and all considered countries), a much higher variability across financial quintiles emerges for larger firms[10]. The financial structure seems to be more relevant for larger firms than for smaller ones (with the caveat of the role of size with respect to the abovementioned financial structure).

We start considering the probability to cross the border and sell their products abroad. As shown in table I_4.1 firms with a stronger financial structure are more likely to enter export markets. The size dimension is clearly more important than the financial dimension; within the same size class the financial structure still plays a role. Firms characterised by larger leverage and short-term leverage are less likely to penetrate foreign markets. However, this linkage can only be detected for firms with more than 50 employees. No great differences across leverage quintiles are displayed for smaller firms. This fact is also confirmed when we focus on the current ratio. Larger firms are more likely to be exporters if they have a greater liquidity. So, against our expectations, the financial structure seems to play a greater role for larger firms when they decide to go international than for smaller firms. The role of banks for internationalisation strategies seems to be relevant. When we split our sample by quintile of bank debt indicator, we find a monotonic and positive relationship between the share of bank debt and the firm export status. Unlike the other financial indicators, the share of bank debt is positively correlated to the probability of exporting not only for larger firms but also for firms with fewer than 50 employees.[11].

[10] In what follows, we will refer to 'large' and 'small' as to firms with a number of employees ≥50 or <50, respectively.

[11] It is worth noting that the relationships we observe in these tables could also be capturing the role of industry and that of firms' size, considering that firms are heterogeneous in size within the two classes we consider. For this reason we carry out some robustness checks (reported in the Appendix, Table A_reg). The positive relationship between firm's liquidity and bank indebtedness and firm's probability to export is robust to controlling for firm size and industry, while

Table I_4.b1: Share of exporters (percentage) by size class and financial quintile

Size class	1	2	3	4	5
Quintiles of leverage					
10-49	69.69	72.70	70.43	66.16	70.35
≥ 50	91.70	87.55	93.10	80.22	74.35
Quintiles of short-term leverage					
10-49	68.35	73.11	69.72	69.39	68.44
≥ 50	91.91	89.33	89.30	79.03	75.54
Quintiles of current ratio					
10-49	62.38	67.50	76.53	75.14	67.64
≥ 50	78.77	84.37	92.47	89.11	89.04
Quintiles of bank debt					
10-49	65.70	68.31	71.49	72.42	71.15
≥ 50	75.40	89.11	83.81	89.36	93.28

We focus now on two variables that we believe are able to capture the level of sophistication of firm export activities: the number of export destination (see Table I_4.2) and the export to Emergent Countries (see Table I_4.3)[12]. As in the previous section, these variables are analysed only for the population of exporters.

All financial indicators display a positive relationship between the goodness of the financial situation of exporters and their geographical export scope. Firms with lower leverage (and short-term leverage) and higher liquidity enter a larger number of markets and this is true for both small and large firms. Additionally, it is worth noticing that the financial structure seems to give an important contribution to the explanation of geographical export scope, as it is shown by the large differences across quintiles. Concerning the role of banks, only for larger firms a greater bank debt share also reveals a more sophisticated internationalisation strategy in terms of geographical penetration scope.

The other indicator of export sophistication, the export penetration of Emergent Countries, delivers us similar conclusions. A larger leverage ratio (and short-term leverage ratio) is negatively related with the probability of exporting to emergent countries. In addition, smaller firms are more likely to enter China and India when they have at their disposal a large liquidity as shown by the current ratio, but this linkage seems to disappear and to be not monotonic when we focus on firms with more than 50 employees. The evidence is less clear with respect to the firm share of bank debt.[13]

the relationship with the leverage indicators that we observe in the descriptive statistics seems to be mainly capturing the role of industry and size. Interestingly, the opposite emerges by considering the export share where the negative relationship with the leverage indicators is robust to industry and size controls.

[12] Even if the FDI variable can also capture the level of sophistication of firm internationalisation strategies as shown in Section 3, the number of firms undertaking part of their production abroad through direct investment is small and the split of the sample by size class and by quintile of financial indicators can drive to imprecise conclusions. For this reason we discard this variable from our main analysis (one can see the Table A_I.3 in the Appendix).

[13] While for the number of export destinations, the financial structure plays a role over and above firm's size and industry, when looking at the role of firms' financial structure with respect to their propensity to export into emergent countries, only few quintiles remain statistically significant (Table A_reg in the Appendix). This suggests that firm size and sector of activity play a major role in the latter case.

Table I_4.2: Number of export destinations by size class and financial quintile

Size class	1	2	3	4	5
Quintiles of leverage					
10-49	10	11	9	8	8
≥ 50	22	19	16	18	10
Quintiles of short-term leverage					
10-49	10	11	9	8	8
≥ 50	22	20	15	14	11
Quintiles of current ratio					
10-49	7	9	9	10	10
≥ 50	15	17	20	19	19
Quintiles of bank debt					
10-49	11	9	8	9	10
≥ 50	16	17	17	17	23

Only for the Population of Exporters

Table I_4.3: Share of exporters (percentage) to emergent countries by size class and financial quintile

Size Class	1	2	3	4	5
Quintiles of leverage					
10-49	24.81	16.46	15.81	12.27	14.45
≥ 50	23.98	28.39	21.28	21.11	18.82
Quintiles of short-term leverage					
10-49	22.71	19.61	13.92	13.31	14.18
≥ 50	24.38	29.55	19.79	19.58	19.38
Quintiles of current ratio					
10-49	9.91	12.28	20.74	15.91	22.23
≥ 50	23.91	20.59	21.53	30.89	19.30
Quintiles of bank debt					
10-49	16.78	19.99	14.36	16.39	15.53
≥ 50	21.34	23.41	20.20	22.63	28.49

Only for the Population of Exporters

Finally, when we turn our attention to the two indicators capturing linkages with foreign suppliers/customers we find similar results (see Table A_I.1 and Table A_I.2 in Appendix). For the largest firms, stronger capitalisation, lower short-term debt, higher solvency and higher bank debt share of total debt are all positively related to producing to order for a foreign buyer. In particular, it is worth noticing that while the role of leverage is mainly related to size class, this is not the case for solvency and bank credit share. In the case of purchases of customised intermediates, a negative relationship emerges with leverage and short-term leverage for larger firms. The relationship is more mixed when looking at the other financial indicators. In general, size seems to play a much greater role in explaining firm's propensity to import customised goods[14].

Thus, this analysis seems to reveal a positive correlation between the goodness of the financial structure of firms and their internationalisation strategies in terms of both entry into foreign markets and sophistication of activities. Even if a firm's size and industry play an important role in the explanation of its international

[14] See also regressions in Table A_reg in the Appendix.

activities, taking into account this dimension does not completely eliminate the correlation that we find with the financial indicators. Our evidence is, in this regard, strictly linked to the literature dealing with the role of financial factors for the international activity at firm level (see, among others, Greenaway et al, 2007, Berman and Héricourt, 2010)[15].

Innovation

We now turn to the analysis of the relationship between firm innovation and financial structure. All the innovation indicators adopted in the analysis show a similar relationship with firm debt and liquidity. In the following, only the average share of product innovators and organisational innovators, as well as firms with employees in R&D activities, by size class and quintile of the financial structure distribution, are shown and discussed (see Tables A_INN_1 and A_INN_2 in the Appendix for the share of firms with R&D expenses and the share of IPR adopters). Table INN_4.1 shows that highly leveraged firms are less likely to introduce product innovations: less than 45% of firms with fewer than 50 employees in the fourth and fifth quintile of the leverage distribution displayed innovation in its product portfolio in 2007-2009. This share is higher in the lowest quintiles of the distribution. As for firms with more than 50 employees, there is a sizeable difference between the share of innovators in the highest leverage class and the rest of the group, suggesting that in larger firms, leverage can be seen as an obstacle to innovate only when firms are highly indebted, or, in other terms, their capitalisation is too low. According to the descriptive statistics, leverage does not seem to stand in a monotonic negative relation with the propensity to innovate: if some binding effects on innovation exist, these are detected only for the highest levels of debt. Similar considerations become clear when looking at the short-term leverage quintiles: there is a marked decrease in the share of innovators when going from the first to the fifth quintile of the short-term leverage distribution, but once again the decrease becomes particularly evident when comparing the fourth and the fifth quintile. A marked difference between firms above and below the threshold of 50 employees can be detected in the observed relationship with firm liquidity, as measured by the current ratio, and the share of debt owed to banks. Indeed, while a higher liquidity seems to be associated with the propensity to innovate of larger firms, this is no longer true for smaller ones. For larger firms, in fact, the share of product innovators increases considerably from 54% and 52% in, respectively, the first and the second quintile of the current ratio distribution, to levels higher than 58% in the upper quintiles (with the highest values recorded in the third and fifth quintiles). By contrast, the share of smaller firms innovating products is similar across quintiles. If liquidity conditions seem to be an enhancing factor of innovation in larger firms, the share of debt owed to banks is found to be more important for smaller firms. Indeed, the share of innovators increases with the quintiles of the bank debt distribution when firms are below the size threshold of 50 employees, suggesting that for smaller Italian enterprises the access to the credit market is key for ensuring the financial resources for innovation.

[15] These works concern, in general, the mere export status of firms. Results from these studies are mixed. While Greenaway et al (2007) do not find any significant role that the financial health of UK firms plays in their decision to export, Berman and Héricourt (2010) highlight a negative impact of financial constraints on firms' probability to enter foreign markets.

Table INN_4.1: Product innovators by size class and financial quintile

Size class	1	2	3	4	5
Quintiles of leverage					
10-49	50.53	45.25	48.00	40.99	43.65
≥ 50	64.97	61.82	63.32	65.67	42.12
Quintiles of short-term leverage					
10-49	49.82	45.89	45.98	45.11	41.47
≥ 50	65.13	62.79	61.91	61.68	44.14
Quintiles of current ratio					
10-49	42.16	45.08	50.86	47.35	42.74
≥ 50	54.14	52.04	68.99	58.67	69.29
Quintiles of bank debt					
10-49	41.55	42.47	45.92	48.59	49.32
≥ 50	59.64	61.67	53.46	61.27	66.55

Results are less clear-cut when analysing the link between firms' financial structure and the indicator of innovation based on employment levels in R&D (Table INN_4.2), especially with respect to firm leverage (both total and short-term leverage): the share of firms with employment in R&D is clearly lower in the highest quintile than in the lowest quintile of the leverage distribution, but the relationship is far from monotonic. When looking at the type of firm debt, large (above 50 employees) firms that rely the most on bank loans (highest quintile of the bank debt distribution) are more likely to have employees devoted to R&D activities. The relationship is less clear in smaller firms.

Finally, as for firms' propensity towards organisational innovations, no clear relationship with firm leverage (both total or short-term) emerges from the data, either in firms above 50 employees, or below that size threshold. However, the results discussed before on the link of innovation with liquidity (in larger firms) and bank debt (in smaller firms) is found to hold.[16]

[16] By controlling for industry and size in the robustness checks reported in the Appendix (Table A_reg) one can see that the negative relationship between firms' attitude to introducing new products with the leverage indicators is robust to size and industry controls (this is also true for IPR protection). A positive and significant relationship between all the innovation indicators (ie R&D employment and expenditure, product and organisation innovation and IPR protection) with bank debt goes beyond industry and size for most of the quintiles. By contrast, the role that liquidity plays, which emerges from these tables, is mainly one of capturing firms' industry and size, with only some exceptions.

Table INN_4.2: Firms with employees devoted to R&D activities

Size class	1	2	3	4	5
Quintiles of leverage					
10-49	51.18	44.35	52.08	48.30	45.84
≥ 50	72.24	68.22	70.20	74.45	50.86
Quintiles of short-term leverage					
10-49	49.01	46.14	51.61	50.91	43.91
≥ 50	72.75	67.43	67.76	76.26	51.27
Quintiles of current ratio					
10-49	43.79	48.12	55.01	49.90	44.98
≥ 50	59.32	69.71	71.95	69.61	68.13
Quintiles of bank debt					
10-49	46.90	49.19	45.77	50.69	49.15
≥ 50	50.41	69.34	67.24	72.50	74.29

Table INN_4.3: Organisational innovators by size class and financial quintile

Size class	1	2	3	4	5
Quintiles of leverage					
10-49	26.26	22.74	27.21	29.70	30.06
≥ 50	37.13	39.48	36.81	51.70	26.90
Quintiles of short-term leverage					
10-49	24.37	24.63	26.27	30.79	29.77
≥ 50	37.76	42.55	32.89	48.67	26.60
Quintiles of current ratio					
10-49	30.79	31.29	29.57	24.92	20.22
≥ 50	29.62	39.31	38.42	35.89	43.84
Quintiles of bank debt					
10-49	23.11	25.42	28.41	29.05	30.84
≥ 50	36.81	39.23	30.46	43.54	38.45

Human Capital

We have already documented that larger firms are more likely to offer training programmes to their workforce, hire graduated people and have management executives with foreign work experience. We now investigate the role of the firm's financial structure, in order to find out whether it exists and whether it is different across size classes. Table H_4.1 shows the share of firms offering training by size class and financial quintile. According to most financial indicators (leverage, short-term leverage and current ratio) firms with a better financial structure (lower debt and higher liquidity) are more likely to invest in the training of their employees. The differences across financial quintiles are stronger for firms with more than 50 employees than for firms with fewer than 50 employees (especially for the current ratio, there are no differences across quintiles in the smaller size class).

The bank debt indicator does not give a clear suggestion of the potential role of banks. Even for larger size class, the training of employment is more widespread among firms with lower bank debt share.[17]

[17] This evidence is robust to both industry and size controls for the highest quintiles of the leverage indicators, while in the other case it seems to be mainly driven by firms' size and industry (see Table A_reg in the Appendix).

Table H_4.1: Training (percentage of firms) by size class and financial quintile

Size class	1	2	3	4	5
Quintiles of leverage					
10-49	55.35	49.99	49.88	52.04	48.10
≥ 50	82.26	73.61	75.55	71.73	58.64
Quintiles of short-term leverage					
10-49	54.43	48.48	51.11	53.54	47.58
≥ 50	82.03	75.94	68.82	75.47	59.33
Quintiles of current ratio					
10-49	51.51	50.99	50.51	51.05	50.41
≥ 50	62.51	76.02	74.12	78.27	80.58
Quintiles of bank debt					
10-49	51.81	46.95	51.49	51.49	52.64
≥ 50	80.66	77.67	69.54	72.13	75.40

For the percentage of graduates hired by firms (see Table H_4.2), the evidence is similar to the one shown above when we consider the level of firm debt (both the leverage indicators). Less indebted firms also employ more graduates. For the current ratio, the evidence is weaker and only for firms with fewer than 50 employees we can detect a positive link between the hiring of graduates and the firm liquidity level, even if the differences across quintiles are not strong. The results do not offer an interesting hint of the role of financing from banks.

Table H_4.2: Share of graduated employees by size class and financial quintile

Size class	1	2	3	4	5
Quintiles of leverage					
10-49	7.67	6.64	5.61	5.07	5.28
≥ 50	10.52	7.94	10.22	10.17	6.12
Quintiles of short-term leverage					
10-49	7.24	6.83	5.59	5.23	5.32
≥ 50	10.44	9.04	9.73	8.10	6.27
Quintiles of current ratio					
10-49	5.31	5.48	6.03	6.76	6.42
≥ 50	9.08	8.72	9.31	10.13	8.20
Quintiles of bank debt					
10-49	6.49	6.10	5.41	5.51	6.40
≥ 50	10.83	9.80	7.12	8.74	9.81

In terms of the presence of executives with experience abroad, the results for the role of the firm's financial structure mimic the previous ones (see Table A_H.1 in the Appendix). Less leveraged firms are more likely to have management executives with foreign experience, especially in the larger size class (more than 50 employees).

Again, current ratio and bank debt do not present any significant relationship with this indicator of intangible assets.

Finally, the firms' attitude to link part of managers' benefits to their performance seems less related to the financial structure than the other indicators we have considered (see Table H_4.3). However, a negative relationship with the leverage indicators emerges, in particular, for larger firms.

Table H_4.3: Executives' and managers' reward

Size class	1	2	3	4	5
Quintiles of leverage					
10-49	16.71	13.64	13.91	11.74	14.08
≥ 50	39.19	28.58	42.52	25.77	31.01
Quintiles of short-term leverage					
10-49	15.14	14.71	12.38	14.26	13.35
≥ 50	39.37	32.63	34.51	27.00	30.31
Quintiles of current ratio					
10-49	11.98	14.88	15.19	14.05	13.48
≥ 50	24.66	31.04	44.12	35.00	35.08
Quintiles of bank debt					
10-49	14.10	14.77	14.51	14.55	11.50
≥ 50	37.03	35.38	33.80	37.17	30.56

5 Conclusion

1- Overall, Italian manufacturing firms show on average a lack of sophistication in their innovative, international and human capital related strategies.

2- Firm size is generally positively associated with the degree of firm sophistication in all countries. Larger firms are more innovative, export to more distant countries and to a higher number of markets, produce abroad, and have higher quality workforces. This report argues that the gap between Italian firms and the other European countries considered is not only driven by the Italian firms' size distribution, but also by a lower performance with respect to its main European competitors within each size class.

3- Our analysis shows that larger Italian firms are characterised by a less fragile financial structure. Large firms are more capitalised, they have a lower share of short-term debt on total debt, while they have stronger relationship with banks (a higher share of bank debt). Large firms show a higher liquidity.

4- Overall, Italian firms with a less fragile financial structure are more sophisticated. Firms with lower leverage, lower share short-term debt and higher liquidity enter in a larger number of countries, export to emergent markets, are more innovative and more likely to invest in training programmes and in high-skilled workers.

5- Our findings suggest that the relationship between firm's financial structure, size and degree of sophistication should be further investigated in order to clearly point out whether and along which lines the financial system should be targeted by policy intervention that aims to strengthen Italian firms' position in global competition.

APPENDIX

Variables Description

Exp stat = dummy variable equal to one if exporter

Exp dest = no. of export destinations

Exp. ch-in = dummy variable equal to one if export to emergent countries (China, India)

Imp. Cust. = dummy variable equal to one if import of customised goods from abroad

Prod Ord = dummy variable equal to one if production to order for foreign firms

Fdi = dummy variable equal to one if FDI maker

Prod. Inn. = dummy variable equal to one if product innovation

Org. Inn. = dummy variable equal to one if product/process innovators adopt organizational inn.

Ipr = dummy variable equal to one if Intellectual Property Rights adopter

R&D expe = dummy variable equal to one if expenditure in R&D

R&D emp = dummy variable equal to one if employees in R&D

Grad_emp = share of graduated employees

For. Exec. = dummy variable equal to one if executives with experience abroad

Reward = dummy variable equal to one if executives reward related to results

Training = dummy variable equal to one if training provided

Train_sh = share of trained workers

Table A_a: Correlation, all sample (Note: The table reports the correlation ratios between each pair of variables and below the p-value of their statistical significance)

	exp stat.	exp. dest.	exp. ch-in	Imp. Cust.	Prod Ord.	fdi	Prod. Inn.	Org. Inn.	ipr	R&D expe	R&D emp	grad_emp	For. Exec.	reward	training	train_sh
exp stat.	1															
exp. dest.	.	1														
	0															
exp. ch-in	.	0.3931	1													
	0	0														
Imp. Cust.	0.1629	0.134	0.0888	1												
	0	0	0													
Prod Ord.	0.5447	0.1063	0.1252	0.2023	1											
	0	0	0	0												
fdi	0.1153	0.1985	0.13	0.137	0.1289	1										
	0	0	0	0	0											
Prod. Inn.	0.2233	0.1998	0.1204	0.1414	0.1783	0.1147	1									
	0	0	0	0	0	0										
Org. Inn.	0.063	0.0669	0.0407	0.0615	0.0748	0.0666	0.3091	1								
	0	0	0.0014	0	0	0	0									
ipr	0.2183	0.2683	0.1322	0.1518	0.1658	0.1717	0.3507	0.148	1							
	0	0	0	0	0	0	0	0								
R&D expe	0.2862	0.1961	0.1602	0.1636	0.2438	0.1359	0.4244	0.2631	0.319	1						
	0	0	0	0	0	0	0	0	0							
R&D emp	0.2216	0.1713	0.129	0.1444	0.1944	0.1266	0.3577	0.2203	0.2714	0.5925	1					
	0	0	0	0	0	0	0	0	0	0						
grad_emp	0.1189	0.122	0.1348	0.0775	0.105	0.0933	0.1556	0.0837	0.1869	0.192	0.1853	1				
	0	0	0	0	0	0	0	0	0	0	0					
For. Exec	0.1823	0.2122	0.1298	0.1175	0.1454	0.2222	0.1692	0.1255	0.2171	0.2074	0.1859	0.2403	1			
	0	0	0	0	0	0	0	0	0	0	0	0				
reward	0.0949	0.149	0.1276	0.1478	0.1174	0.1496	0.1538	0.138	0.1463	0.1855	0.1924	0.1767	0.23	1		
	0	0	0	0	0	0	0	0	0	0	0	0	0			
training	0.0376	0.0842	0.0819	0.0982	0.0403	0.0747	0.1159	0.1575	0.1207	0.1744	0.2172	0.1521	0.1609	0.1997	1	
	0.0001	0	0	0	0	0	0	0	0	0	0	0	0	0		
train_sh	-0.0066	0.0608	0.0429	0.0388	-0.0222	0.0355	0.0678	0.1301	0.0708	0.0952	0.1088	0.1645	0.1242	0.1305	0.4225	1
	0.4798	0	0.0008	0	0.0244	0.0001	0	0	0	0	0	0	0	0	0	

Table A_b: Correlation, Italy (Note: The table reports the correlation ratios between each pair of variables and below the p-value of their statistical significance)

	Exp stat.	exp. dest.	exp. ch-in	Imp. Cust.	Prod Ord.	fdi	Prod. Inn.	Org. Inn.	ipr	R&D expe	R&D emp	grad_emp	For. Exec	reward	training	train_sh
Exp stat.	1															
exp. dest.	.	1														
	0															
exp. ch-in	.	0.3503	1													
	0	0														
Imp. Cust.	0.1364	0.1429	0.0825	1												
	0	0	0.0002													
Prod Ord.	0.6204	0.0714	0.1203	0.1545	1											
	0	0.0021	0	0												
fdi	0.0975	0.145	0.1371	0.1628	0.1042	1										
	0	0	0	0	0											
Prod. Inn.	0.2648	0.2082	0.1233	0.1503	0.2201	0.0983	1									
	0	0	0	0	0	0										
Org. Inn.	0.0788	0.1083	0.0137	0.0885	0.0656	0.0668	0.2683	1								
	0	0	0.5439	0	0.0005	0.0002	0									
ipr	0.221	0.2905	0.1135	0.1942	0.1648	0.144	0.3347	0.1422	1							
	0	0	0	0	0	0	0	0								
R&D expe	0.2557	0.1921	0.1497	0.1457	0.2398	0.1212	0.4496	0.2813	0.2976	1						
	0	0	0	0	0	0	0	0	0							
R&D emp	0.2638	0.18	0.1382	0.1438	0.2229	0.1199	0.3701	0.2339	0.2781	0.6325	1					
	0	0	0	0	0	0	0	0	0	0						
grad_emp	0.1101	0.1428	0.106	0.1149	0.0743	0.0965	0.1702	0.0993	0.1491	0.1842	0.1826	1				
	0	0	0	0	0.0001	0	0	0	0	0	0					
For. Exec	0.1457	0.2416	0.1257	0.1362	0.0827	0.219	0.1172	0.0975	0.1829	0.1548	0.156	0.2208	1			
	0	0	0	0	0	0	0	0	0	0	0	0				
reward	0.1068	0.1721	0.1377	0.1128	0.069	0.1685	0.1332	0.1258	0.1597	0.2009	0.1924	0.2019	0.2509	1		
	0	0	0	0	0.0003	0	0	0	0	0	0	0	0			
training	0.0842	0.1384	0.0678	0.1072	0.0581	0.0701	0.1473	0.2071	0.1737	0.2511	0.241	0.1681	0.1787	0.1667	1	
	0	0	0.0026	0	0.0021	0.0001	0	0	0	0	0	0	0	0		
train_sh	-0.0124	0.0658	0.0088	0.0574	-0.0266	0.0208	0.0843	0.1301	0.0947	0.1184	0.1028	0.1213	0.1019	0.1182	0.4705	1
	0.4945	0.0035	0.6972	0.0016	0.1594	0.254	0	0	0	0	0	0	0	0	0	

Table A_I.1: Production to order for foreign firms

Size class	1	2	3	4	5
Quintiles of leverage					
10-49	47.02	49.45	44.74	42.02	41.95
≥ 50	64.57	63.56	72.02	58.10	47.32
Quintiles of short-term leverage					
10-49	45.34	47.94	47.03	44.22	40.21
≥ 50	64.41	64.00	73.62	52.91	48.07
Quintiles of current ratio					
10-49	36.62	41.88	50.54	50.64	45.21
≥ 50	59.04	60.90	64.79	72.09	51.95
Quintiles of bank debt					
10-49	43.22	42.68	44.44	47.16	46.80
≥ 50	43.20	68.10	63.20	62.75	66.70

Table A_I.2: Purchase of customised goods abroad (percentage)

Size class	1	2	3	4	5
Quintiles of leverage					
10-49	4.90	7.92	5.29	6.57	7.11
≥ 50	20.56	13.97	15.96	13.31	15.14
Quintiles of short-term leverage					
10-49	4.68	6.74	5.98	7.49	6.75
≥ 50	19.78	14.33	18.37	13.20	13.55
Quintiles of current ratio					
10-49	6.51	7.41	6.91	6.54	4.79
≥ 50	13.31	9.58	20.01	24.04	14.45
Quintiles of bank debt					
10-49	5.87	5.79	6.13	7.71	6.57
≥ 50	19.91	14.00	12.52	15.45	21.81

Table A_I.3: Share of FDI makers (%)

Size class	1	2	3	4	5
Quintiles of leverage					
10-49	1.85	0.84	1.22	1.86	1.59
≥ 50	9.07	7.40	9.04	6.46	7.26
Quintiles of short-term leverage					
10-49	2.12	0.59	1.07	2.02	1.58
≥ 50	9.70	6.24	9.24	6.12	7.38
Quintiles of current ratio					
10-49	1.20	2.70	1.26	1.01	1.31
≥ 50	3.78	7.27	9.05	11.09	7.87
Quintiles of bank debt					
10-49	1.05	1.04	1.48	1.87	2.14
≥ 50	5.15	4.42	5.62	9.27	14.03

Table A_INN.1: Firms with R&D expenses

Size class	1	2	3	4	5
Quintiles of leverage					
10-49	53.02	46.64	49.78	51.15	49.59
≥ 50	73.72	73.76	75.41	76.74	54.95
Quintiles of short-term leverage					
10-49	51.13	48.41	49.44	52.54	48.51
≥ 50	74.81	72.12	71.77	78.24	57.19
Quintiles of current ratio					
10-49	52.32	48.38	55.22	49.04	44.91
≥ 50	64.72	69.63	75.27	72.73	74.84
Quintiles of bank debt					
10-49	47.49	47.65	45.05	53.76	56.35
≥ 50	55.86	72.05	71.53	77.15	75.75

Table A_INN.2: IPR adopters

Size class	1	2	3	4	5
Quintiles of leverage					
10-49	24.10	18.58	19.17	18.13	20.10
≥ 50	46.08	32.33	36.52	33.73	22.24
Quintiles of short-term leverage					
10-49	22.54	19.34	18.65	20.03	19.30
≥ 50	45.87	33.86	33.18	34.67	22.18
Quintiles of current ratio					
10-49	18.61	22.75	19.01	20.88	18.05
≥ 50	23.73	31.38	42.57	44.49	35.82
Quintiles of bank debt					
10-49	16.47	17.22	16.84	26.96	22.05
≥ 50	29.08	34.63	27.65	39.97	47.20

Table A_H.1: Executives with working experience abroad (percentage of firms)

Size class	1	2	3	4	5
Quintiles of leverage					
10-49	9.42	9.99	9.22	8.46	7.84
≥ 50	33.98	25.89	25.31	14.78	18.48
Quintiles of short-term leverage					
10-49	9.19	9.80	9.43	8.40	8.06
≥ 50	33.17	30.85	20.34	11.78	20.54
Quintiles of current ratio					
10-49	7.31	10.07	8.84	9.84	8.76
≥ 50	26.88	25.35	27.88	28.61	24.29
Quintiles of bank debt					
10-49	10.01	8.31	7.79	9.86	8.85
≥ 50	32.88	27.95	19.54	25.68	28.33

Table A_H.2: Trained workers share (percentage)

Size class	1	2	3	4	5
Quintiles of leverage					
10-49	27.46	20.13	22.92	22.17	20.87
≥ 50	20.53	24.99	23.54	15.27	17.58
Quintiles of short-term leverage					
10-49	27.97	20.26	21.65	22.34	21.45
≥ 50	20.32	24.90	23.78	16.37	18.24
Quintiles of current ratio					
10-49	21.74	23.53	18.72	25.12	24.30
≥ 50	25.58	23.56	20.11	19.17	19.93
Quintiles of bank debt					
10-49	21.49	24.07	21.00	21.90	25.24
≥ 50	24.13	21.40	25.43	19.48	17.53

Only for firms doing training

Table A_reg: Regressions

	Leverage	ST Leverage	Current ratio	Bank debt
Share of exporters				
Size	0.103***	0.105***	0.101***	0.101***
	(0.010)	(0.010)	(0.010)	(0.010)
Q2	0.028	0.043*	0.039	0.037
	(0.025)	(0.026)	(0.028)	(0.027)
Q3	0.011	0.014	0.118***	0.067**
	(0.026)	(0.026)	(0.027)	(0.027)
Q4	-0.025	0.009	0.099***	0.071***
	(0.027)	(0.027)	(0.027)	(0.026)
Q5	0.008	0.002	0.035	0.076***
	(0.027)	(0.027)	(0.027)	(0.027)
Observations	2884	2884	2899	2888
R-squared	0.094	0.093	0.102	0.096
Export Destinations				
Size	0.390***	0.388***	0.413***	0.417***
	(0.029)	(0.029)	(0.028)	(0.028)
Q2	-0.061	-0.027	0.254***	-0.128*
	(0.071)	(0.072)	(0.080)	(0.077)
Q3	-0.206***	-0.195***	0.358***	-0.166**
	(0.071)	(0.070)	(0.074)	(0.076)
Q4	-0.178**	-0.244***	0.371***	0.015
	(0.074)	(0.074)	(0.076)	(0.075)
Q5	-0.315***	-0.283***	0.341***	0.102
	(0.076)	(0.076)	(0.075)	(0.078)
Observations	1878	1878	1888	1880
R-squared	0.172	0.173	0.177	0.171
Exporters to emergent countries				
Size	0.059***	0.060***	0.064***	0.065***
	(0.012)	(0.012)	(0.011)	(0.011)
Q2	-0.036	0.007	0.008	0.029
	(0.029)	(0.030)	(0.025)	(0.029)
Q3	-0.054*	-0.056**	0.070***	-0.004
	(0.029)	(0.028)	(0.026)	(0.027)
Q4	-0.071**	-0.051*	0.046*	0.010
	(0.029)	(0.028)	(0.025)	(0.028)
Q5	-0.046	-0.033	0.065**	0.023
	(0.029)	(0.029)	(0.028)	(0.029)
Observations	1878	1878	1888	1880
R-squared	0.076	0.077	0.078	0.073

Table A_reg: Regressions, cont.

	Leverage	ST Leverage	Current ratio	Bank debt
Product innovators				
Size	0.11***	0.11***	0.11***	0.11***
	(0.01)	(0.01)	(0.01)	(0.01)
Q2	-0.06**	-0.03	0.05*	0.01
	(0.03)	(0.03)	(0.03)	(0.02)
Q3	-0.04	-0.03	0.01	-0.00
	(0.03)	(0.03)	(0.02)	(0.02)
Q4	-0.05**	-0.02	0.03	0.10***
	(0.03)	(0.03)	(0.03)	(0.02)
Q5	-0.03	-0.02	-0.01	0.07***
	(0.03)	(0.03)	(0.02)	(0.03)
Observations	2884	2884	2899	2888
R-squared	.1683018	.1669624	.1686326	.1751298
R&D employees				
Size	0.13***	0.13***	0.13***	0.13***
	(0.01)	(0.01)	(0.01)	(0.01)
Q2	-0.04	-0.01	0.04	0.04
	(0.03)	(0.03)	(0.03)	(0.03)
Q3	0.01	0.03	0.06*	0.03
	(0.03)	(0.03)	(0.03)	(0.03)
Q4	-0.01	0.03	0.02	0.06**
	(0.03)	(0.03)	(0.03)	(0.03)
Q5	-0.03	-0.03	-0.03	0.08***
	(0.03)	(0.03)	(0.03)	(0.03)
Observations	2884	2884	2899	2888
R-squared	.180	.180	.182	.182
Organisational innovators				
Size	0.10***	0.10***	0.09***	0.09***
	(0.01)	(0.01)	(0.01)	(0.01)
Q2	-0.02	0.01	0.01	0.02
	(0.03)	(0.03)	(0.03)	(0.03)
Q3	0.02	0.02	-0.02	0.05*
	(0.03)	(0.03)	(0.03)	(0.03)
Q4	0.06**	0.07**	-0.06**	0.07**
	(0.03)	(0.03)	(0.03)	(0.03)
Q5	0.05*	0.06**	-0.09***	0.08***
	(0.03)	(0.03)	(0.03)	(0.03)
Observations	2884	2884	2899	2888
R-squared	.114	.114	.117	.114

Table A_reg: Regressions, cont.

	Leverage	ST Leverage	Current ratio	Bank debt
Training (percentage of firms)				
Size	0.160***	0.161***	0.164***	0.164***
	(0.011)	(0.011)	(0.011)	(0.011)
Q2	-0.044	-0.047*	0.014	-0.048*
	(0.028)	(0.029)	(0.029)	(0.029)
Q3	-0.044	-0.033	-0.000	-0.021
	(0.029)	(0.029)	(0.029)	(0.029)
Q4	-0.022	-0.004	0.011	-0.016
	(0.029)	(0.029)	(0.029)	(0.029)
Q5	-0.067**	-0.064**	0.007	0.003
	(0.029)	(0.030)	(0.029)	(0.029)
Observations	2885	2885	2900	2889
R-squared	0.100	0.101	0.097	0.099
Share graduated employees				
Size	1.072***	1.110***	1.271***	1.324***
	(0.270)	(0.268)	(0.264)	(0.264)
Q2	-1.005	-0.345	0.143	-0.594
	(0.628)	(0.624)	(0.540)	(0.641)
Q3	-1.869***	-1.628***	0.505	-1.249**
	(0.606)	(0.613)	(0.555)	(0.570)
Q4	-2.437***	-2.043***	1.214**	-0.803
	(0.587)	(0.560)	(0.609)	(0.590)
Q5	-2.179***	-1.856***	0.618	0.130
	(0.606)	(0.597)	(0.578)	(0.623)
Observations	2881	2881	2896	2885
R-squared	0.116	0.115	0.110	0.111
Executives & managers reward				
Size	0.11***	0.11***	0.11***	0.11***
	(0.01)	(0.01)	(0.01)	(0.01)
Q2	-0.04*	-0.01	0.03	-0.00
	(0.02)	(0.02)	(0.02)	(0.02)
Q3	-0.02	-0.03	0.04*	-0.00
	(0.02)	(0.02)	(0.02)	(0.02)
Q4	-0.05**	-0.01	0.02	-0.00
	(0.02)	(0.02)	(0.02)	(0.02)
Q5	-0.02	-0.01	0.02	-0.03
	(0.02)	(0.02)	(0.02)	(0.02)
Observations	2884	2884	2899	2888
R-squared	.140	.139	.139	.139

Note: OLS regressions. Q2, Q3, Q4 and Q5 are respectively the dummy variables for the quintiles of the relevant financial indicator. *, **, *** significant at 10, 5 and 1%.

References

Bank of Italy (2010) "Relazione Annuale"

Bank of Italy (2009) "Relazione Annuale"

Barba Navaretti G., M. Bugamelli, F. Schivardi, C. Altomonte, D. Horgos, and D. Maggioni (2011) "The global operations of European firms", *Second EFIGE Policy Report*, Bruegel Blueprint 12

Barba Navaretti G., and A. J. Venables (2004) "Multinational firms in the world economy", with F. Barry, K. Ekholm, A. Falzoni, J. Haaland, K-H. Midelfart, & A. Turrini, *Princeton University Press*

Berman N. and J. Héricourt (2010) "Financial Factors and the Margins of Trade: Evidence from cross-country firm-level data", *Journal of Development Economics*, 93 (2), 206-217

Bugamelli M., F. Schivardi, and R. Zizza (2009) "The euro and firm restructuring", *Temi di discussione (Economic WP) No. 716, Bank of Italy, Economic Research Department*

D'Alfonso E. and S. Giannangeli (2010) "Crisi e innovazione: il ruolo delle strategie per il finanziamento della R&S", *Economia e Politica Industriale, 4/2010*

De Nardis S. and C.Pappalardo (2009) "Export, Productivity and Product Switching: The Case of Italian Manufacturing Firms", *ISAE Working Papers No. 110, ISAE - Institute for Studies and Economic Analyses - (Rome, ITALY)*

Greenaway D., A. Guariglia and R. Kneller (2007) "Financial Factors and Exporting Decisions", *Journal of International Economics*, 73 (2), 377-395

Hall B. and J. Lerner (2009) „The Financing of R&D and Innovation", *NBER Working Paper No. 15325*

Hall B. H. (2002) „The Financing of Research and Development", *Oxford Review of Economic Policy*, 18, pp. 35-51

Mayer T., and G. I. P. Ottaviano (2007) "The Happy Few: The Internationalisation of European Firms. New Facts Based on Firm-Level Evidence", *CEPR-Bruegel, Brussels*

Roberts M.J., and J.R. Tybout (1997) "The Decision to Export in Colombia: An Empirical Model of Entry with Sunk Costs", *American Economic Review*, 87, pp. 545-564

UniCredit (2010) "UniCredit Corporate Report"

The EFIGE Project

European Firms In a Global Economy (EFIGE) is a research project, funded by the European Community's Seventh Framework Program / Socioeconomic Sciences and Humanities (FP7/2007-2013). The project aims to analyse the competitive performance of European firms in a comparative perspective.

The **EU-EFIGE/Bruegel-UniCredit Survey** is the backbone of the whole project: it is the first harmonised cross-country dataset containing quantitative as well as qualitative information on around 150 items for a representative sample of some 15,000 manufacturing firms in the following countries: Austria, France, Germany, Hungary, Italy, Spain and the United Kingdom. These items cover international strategies, R&D, innovation, employment, financing and organisational activities of firms in the period 2007-2009.

This Country Report presents preliminary evidence on the relationship between firm financial structure and investment in intangible assets in Italy. The database has been merged with data from Amadeus for the construction of the financial indicators. France, Germany and Spain are also considered as benchmarks.