THE FINANCIAL STRUCTURE OF INNOVATIVE FIRMS IN ITALY

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Abstract

Innovative companies represent a crucial resource for the development of modern industrial economies: the liveliness and performance of these companies strongly affect the innovative capacity and competitiveness of the economic system. The birth and survival of these companies is influenced by various factors that can be summarized in the two main themes of the knowledge gap and the funding gap. In particular, some characteristics of innovative companies, such as information asymmetries, the absence of guarantees and the high costs related to the estimate of creditworthiness, can become strong impediments to the provision of capital in the form of debt, with impacts on the financial structure of these companies.

The paper aims to propose an analysis of the financial structure of innovative firms in Italy. The verification uses the tools of the balance sheet analysis; the survey was conducted on the innovative start-up firms registered in the Italian Innovative Business Register, with the financial statements for the years 2014, 2015 and 2016 available on AIDA database by Bureau Van Dijk. Companies have been subdivided into quartiles on the basis of total assets per year and the analysis focus on the companies of the 1st and 2nd quartile. The results show that companies have a good level of liquidity, while profitability is negative due to the start-up phase. The financial structure indicators highlight a limited ability to obtain credit from third parties and a low level of capitalization.

The work is organized as follows: the first paragraph introduces the topic of research, presenting the main findings of the literature on the subject, the second paragraph presents the updated data in May 2018 in relation to the innovative startup registered in the special section of the Italian Business register; the third paragraph presents the results of the analysis; the last paragraph is for the conclusions.

1 The problem of innovation financing: introduction and literature

There is a correlation between the development of the economy and growth of the financial system but it is not clear the nature and intensity of the causal link between the two variables (Calzoni and Rossi 1980). Some authors, for example, postulate that variations in the size and structure of the financial system are a consequence of the economic development (Levine 1997). However, the level of financial development can be considered a good indicator of the economic growth, especially when it contributes regularly to provide funds for the development of investments in the industrial sector and, in particular, when it selects the activities characterized by the highest rate of innovation (Demirguc-Kunt and Levine 2001, Tadesse 2001). The literature recognizes that the efficiency of the financial system influences the real sector of the economy through the financing of technological innovation.

The theme of the start-up financing of business activities and, in particular, of those highly innovative leads us to reflect on the essential role of the information availability and dissemination, especially regarding the credit worthiness assessment by financial intermediaries. In fact, in many cases, the information available on innovative companies is poor or incorrect, and this makes it difficult for intermediaries to evaluate them, determining a weakening of innovation processes (Capolupo and Celi 2004). In addition, the speculative trends emerged with the abnormal growth of the financial sector in recent decades may have taken away resources from the so-called "patient capital", more suited to financing of new businesses.

The relationship between finance and economic development should be investigated with long-term analysis, to avoid the distorting effects caused by cyclical fluctuations[1]. It is also worth mentioning the existence of important non-financial structural elements that affect the evolution of the "innovation system" , such as the institutional and regulatory framework, the level of evolution in the use of new technologies or the financial market model (intermediaries or market oriented).

The causal relationship between financial development and economic growth would be more obvious, however, if it could be possible to give an exact measure of the efficiency of markets and intermediaries, increasing the overall amount of resources available for investment in research and development and other fixed assets, essential for product and process innovations, key-factor for long term growth (Parisi, Schiantarelli and Sembenelli 2005). In this regard, the so-called "endogenous growth theory" has been affirmed over recent years. The basis of this interpretive theory lies in the attribution to the financial system of the ability to improve the efficiency of the aggregate investment, compensating for the reduction in marginal productivity of capital.

Fig. 1: Diagram of the relationship between financial system, information efficiency of markets and Funding for Innovation
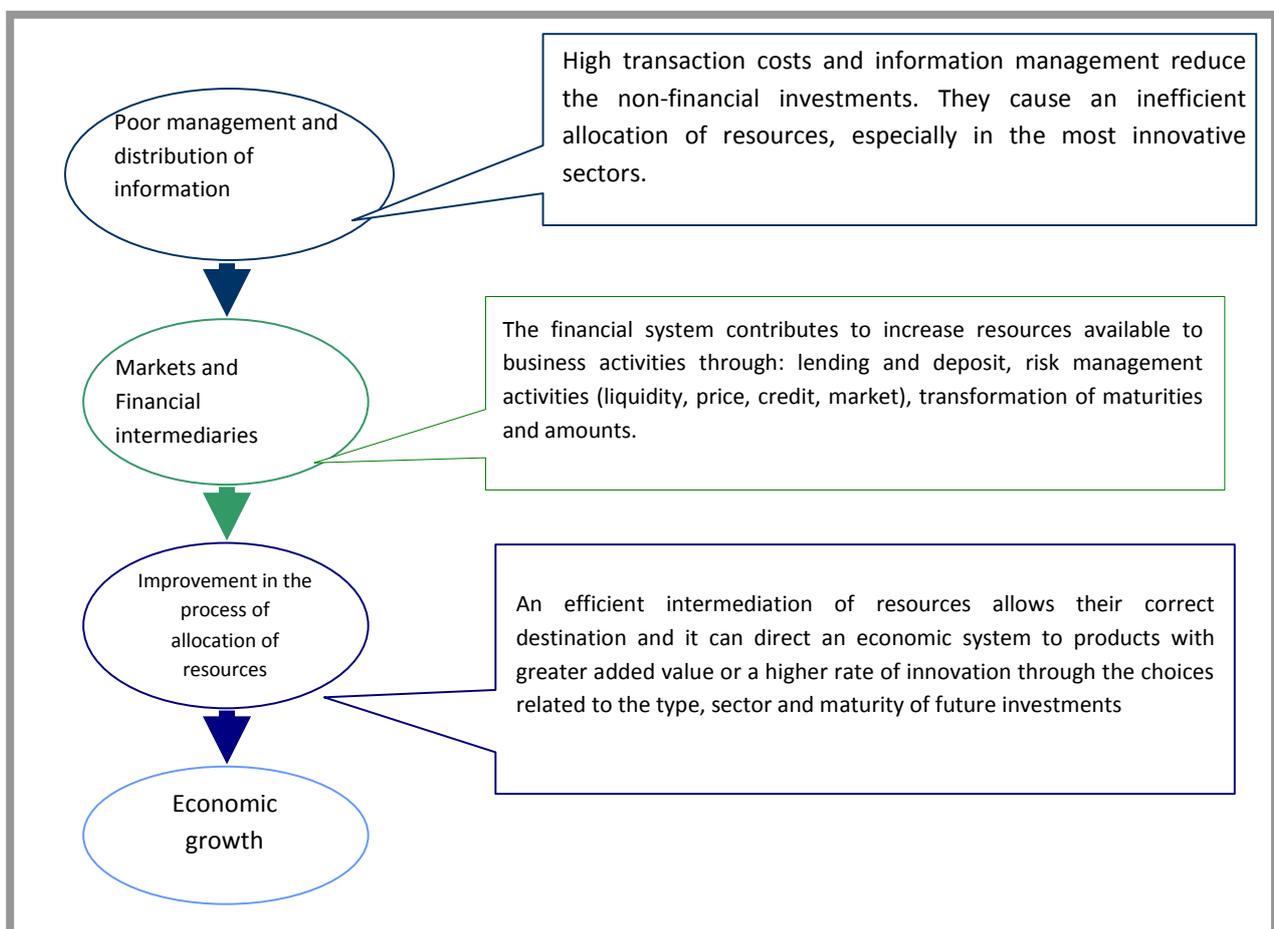
Source: author's elaboration.

This approach can be attributed to the core principles of financial intermediation theory, which bases the existence of financial institutions on their ability to enable production and distribution processes also through the transfer and management of risks.

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[1] In that regard it is sufficient to observe that, in the late '90s and the early years of the new millennium, the financial-speculative bubble linked to the so-called "net economy" has had little positive effect on innovation funding streams destined for the Web and in Information and Communication Technologies (ICT).

According to another approach, it is possible to estimate the ability of financial markets to influence the processing and application of innovations through an assessment that considers just two kinds of technologies, alternative between themselves. One of them is more flexible but with a lower rate of productivity, the other one is rigid, with greater functional specialization, but, for this reason, it is the most productive one. According to this approach, it is possible to recognize two different equilibrium situations. Without the intervention of financial intermediaries, the system stands at the most rearward equilibrium levels because the providers of funds, due to the low risk appetite, prefer investing resources in the most safe alternatives, easily adaptable to different economic trends (Saint Paul 1992). Obviously, considering the direct relationship between risk and return, this choice also implies the acceptance of a lower rate of return by investors, with negative consequences on the amount of available funds to other productive investments and, in general, on the propensity for investing on innovations. We can say that, in theory, without the intervention of the markets and the financial intermediaries, the system equilibrium point will come in at the lower levels than those defined by a hypothetical efficient frontier, because of the overestimation of the risks and the consequent waiver of greater rates of return on productive investments. The existence of efficient financial markets and the actions of financial intermediaries will, instead, increase the probability of a good allocation of funds, also in favour of riskier alternatives, more profitable and potentially able to push the whole system toward more advanced equilibrium points and higher growth rates. Following Schumpeter's economic development theory, many studies suggested different theoretical approaches that consider the financial system as a driver for economic growth. The common denominator of this literature is the awareness that intermediaries and financial markets should favour capital allocation into investments with higher rate of risk, performance and innovation. In this way, financial system affects the development of real economy, thanks to two types of effects: in one hand, through the screening of projects to be finance and, secondly, through the assessment of the financial sustainability and profitability of innovative projects, that is a consequence of the ability of markets to collect and process information. These studies consolidated the idea that institutions and financial markets play an irreplaceable role in economic development, especially when it is triggered by so-called "intangible factors" (*intangibles*), such as research, knowledge and attitude to innovation, which intensively interact with other factors that influence the behaviour of economic agents, such as the risks and uncertainty of economic results.

The studies analysed lead us to endorse the hypothesis of a virtuous relationship between the development of the financial system as a whole and innovation and economic growth, while it remains unclear what is the relation considering separately markets and intermediaries.

This topic, already in the years before the crisis of 2008, was placed in the midst of a lively theoretical debate, from which it is explicitly shown the difficulty in estimating the role of banks and markets independently from each other, because of the effects, in terms of lower transaction costs and information, that these players have among them. For these reasons, it is not possible to clarify and measure whether it is the transit of resources through markets or, alternatively, through intermediaries that facilitate and accelerate the economic growth (Black and Gilson 1998; Ueda 2002). However, a developed and efficient financial system should be able to promote growth through careful investment selection policy, giving priority to those investments aimed to improve the rate of innovation and competitiveness of the economy.

Given that there are not systems fully characterized as "market oriented" or "intermediary oriented", it is possible to observe, however, situations in which the transfer of resources takes place mainly through the direct exchange between borrowers and lenders in the market and, conversely situations in which the action of intermediaries is decisive (Cesarini 2003). In market-oriented systems, companies pursue the medium-long term goal of becoming public companies, by the admission to trading on regulated markets. In such systems, the role of intermediaries is that one of broker or dealer; instead, in intermediaries oriented systems, there is a particularly strong link between banks and enterprises, so that the intermediary can even become a company partner, i.e. as an informed investor (*shareholder*) (Elsas and Krahnen 2003).

The structure of the financial market also affects the ways of financing innovative enterprises. In market-oriented systems, there are high investments in risk capital of companies by institutional investors, especially venture capitalists. The entry of an institutional investor in the capital structure of an innovative company is a positive thing also because determines a wide series of benefits hard to quantify (Bottazzi and Da Rin 2002), attributable, among others, to a greater credibility of the company and to the system of competences and relationships that venture capitalists share with the firm. The managerial experience of venture capitalist is often a decisive element for the success of high-tech enterprises. The venture capital industry is more developed in the financial markets where the exit phase is less complex, especially when the stock markets are efficient, with frequent transactions, and so the easy access to the market through the organization of an IPO (initial public offering) accelerates management changes (Black and Gilson 1998). In intermediaries oriented markets, the role of banks is crucial, in particular if the operational model is the type of relationship lending: in this context, in fact, the value of the relationship between lenders and borrowers can facilitate access to credit also for innovative startups, despite their critical issues about information availability, the lack of guarantees and high level of intangible assets, difficult to estimate (Boot 2000). The confidential information collected within the bank-firm allows, in fact, to reduce uncertainty in the valuation or creditworthiness and can be used several times, in multiple transactions with the same counterparty, thus allowing for the exploitation of the benefits of economies of scale (Carretta, Farina and Schwizer 2005). Besides, having a bank loan is a ceteris paribus positive predictor of the survival of start-up companies (Astebro and Bernhardt 2003; Cole and Sokolyk 2017). Instead, in transactional business model (transaction lending) access to credit for innovative companies is more difficult, because the possession of collateral is a discriminating factor.

The direct access to the capital market (outside finance) is possible only when companies achieve the requirement imposed by the stock exchange regulations, in terms of dimension, capitalization and information transparency. Moreover, the costs related to compliance with the technical and legal requirements imposed by regulations are too high for start-up businesses (Berger and Udell, 1998). Entrepreneurial experience impacts the extent to which key factors affect a startup's ability to obtain external equity (Zaleski 2010). To simplify the market access by innovative companies, some countries have introduced many market segments dedicated to securities issued by this kind of company., with less stringent requirements for admission to listing and lower costs. However, access to the market must not be indiscriminate, otherwise there would be negative consequences if the newly-listed company fails.

The use of so-called "informed finance" becomes, therefore, an obligatory choice even in the most market-oriented systems.

2. The Italian Innovative Start-ups

In this section, we propose a photograph of the Italian sector of innovative startups.

The definition of innovative startup was introduced in Italy in 2012, whit the Decree Growth 2.0 (Decree No. 179/2012, Law No. 221/2012), according to which this type of enterprise enjoys a special reference framework on different subjects, such as administrative simplification, labor market regulation, tax facilitations, fail fast procedures.

Innovative startups are companies with shared capital (i.e. limited companies), including cooperatives, the shares or significant registered capital shares of which are not listed on a regulated market nor on a multilateral negotiation system. These companies must also meet the following requirements:
 - be new or have been operational for less than 5 years;
  - have their headquarters in Italy or in another EU country, but with at least a production site branch in Italy;
  - have a yearly turnover lower than 5 million Euros;
  - do not distribute profits;

- produce, develop and commercialize innovative goods or services of high technological value;
- are not the result of a merger, split-up or selling-off of a company or branch;
- be of innovative character, which can be identified by at least one of the following criteria:
    1. at least 15% of the company's expenses can be attributed to R&D activities;
    2. at least 1/3 of the total workforce are PhD students, the holders of a PhD or researchers; alternatively, 2/3 of the total workforce must hold a Master's degree;
    3. the enterprise is the holder, depositary or licensee of a registered patent (industrial property) or the owner of a program for original registered computers.

According to latest available data[2], the innovative startups enrolled in the Italian Business Register are 9,095, with an increase of 704 units compared to the value at the end of 2017. This is obviously a positive sign of liveliness in the startup ecosystem, for which the problem is rather the survival over the time.

By the sectoral distribution, 75.12% of these ones is in the service sector, 18.44% in industry and 4.4% in trade (Figure 2)

Figure 2, Italian Startups by sector, percentages.
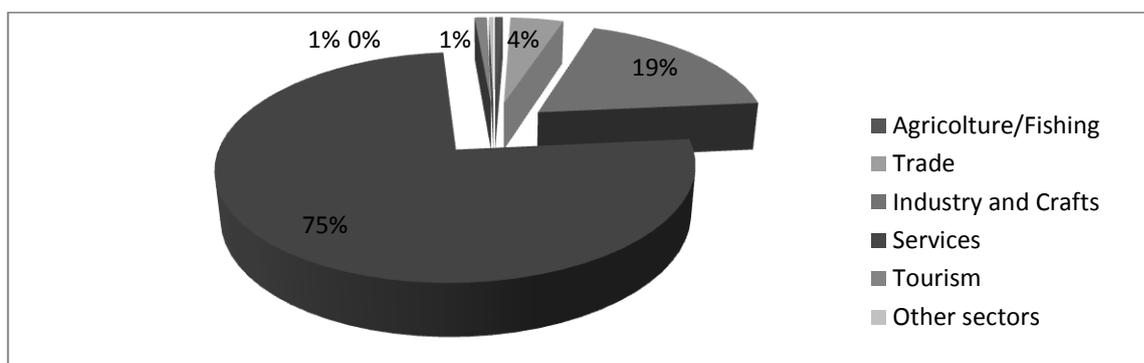
Source: Author's elaboration on Italian Business Register, May 7, 2018.

From a geographical point of view, 24.11% of businesses is in Lombardia, 10.27% in Lazio and 9.77% in Emilia Romagna (Figure 3).

Figure 3, Italian Startups by region, values and percentages.

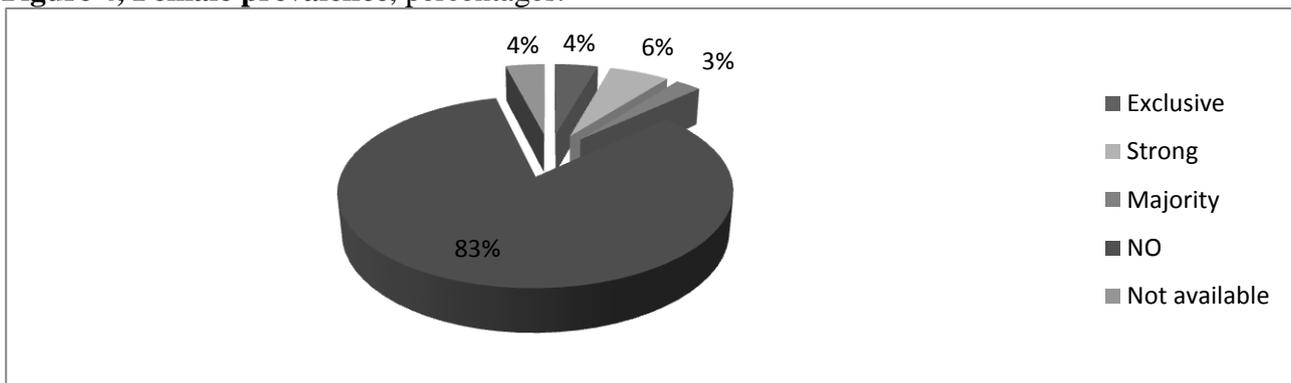Source: Author's elaboration on Italian Business Register, May 7, 2018.

Region	Absolute value	Percentages
ABRUZZO	213	2,34%
BASILICATA	89	0,98%
CALABRIA	194	2,13%
CAMPANIA	663	7,29%
EMILIA-ROMAGNA	889	9,77%
FRIULI-VENEZIA GIULIA	210	2,31%
LAZIO	934	10,27%
LIGURIA	167	1,84%
LOMBARDIA	2.193	24,11%
MARCHE	370	4,07%
MOLISE	43	0,47%
PIEMONTE	483	5,31%
PUGLIA	350	3,85%
SARDEGNA	169	1,86%
SICILIA	474	5,21%
TOSCANA	406	4,46%
TRENTINO-ALTO ADIGE	234	2,57%
UMBRIA	155	1,70%
VALLE D'AOSTA	19	0,21%
VENETO	840	9,24%
Italy	9.095	100,00%

[2] Latest available data is May 7, 2018.

By juridical nature, the most widespread type is the limited liability company (85.39%) and simplified limited liability company (11.48%). Only 1.59% of the total is represented by cooperative companies and 0.77% by joint-stock company.

Looking at the composition of corporate groups, the innovative startups with a female prevalence are 13.07% of the total (Figure 4), those with a youth prevalence 18.89% (Figure 5) and those with a foreign prevalence 3.03% (Figure 6). The analysis can be deepened on the basis of the intensity of the three phenomena (exclusive, strong or majority presence, respecting the qualifications of the Italian Business Register about female, youth and foreign presence).

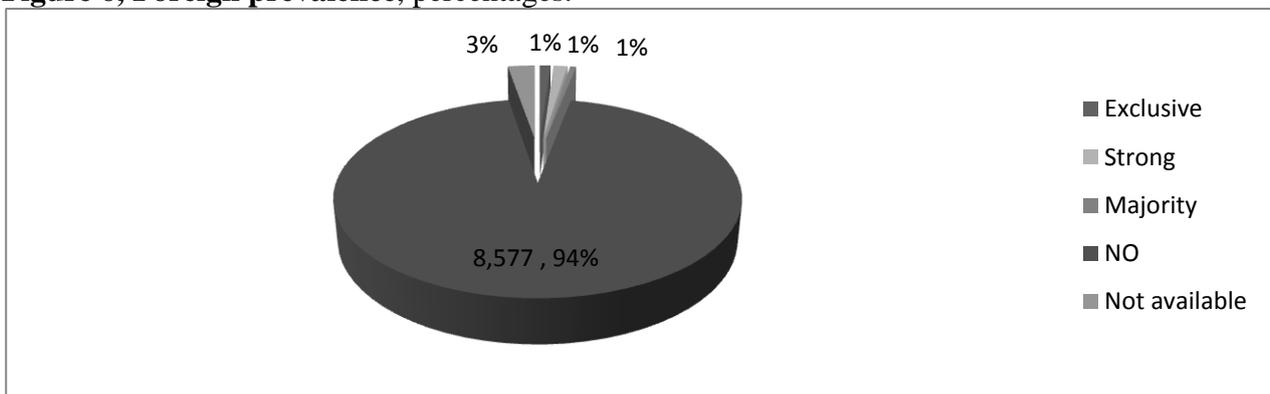**Figure 4, Female prevalence**, percentages.

Source: Author's elaboration on Italian Business Register, May 7, 2018.

Figure 5, Youth prevalence, percentages.
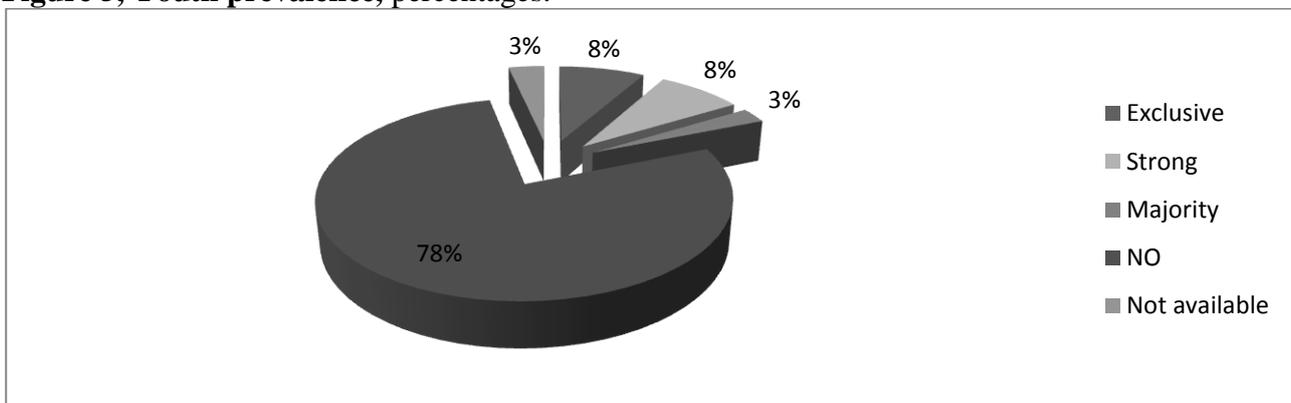
Source: Author's elaboration on Italian Business Register, May 7, 2018.

Figure 6, Foreign prevalence, percentages.

Source: Author's elaboration on Italian Business Register, May 7, 2018.

From the list of innovative startups available on the website of Italian Business Register, it is also possible to have three main values that define the size and the economic and financial capacity of innovative startups: these ones are class of capital, class of production value and class of employee, last year.

Referring to the class of capital (Figure 7), approximately 84% of the companies have a capital between 1 and 50 th. euros. These values underline the low level of capitalization that traditionally characterized these companies.

Figure 7, Class of capital, percentages.
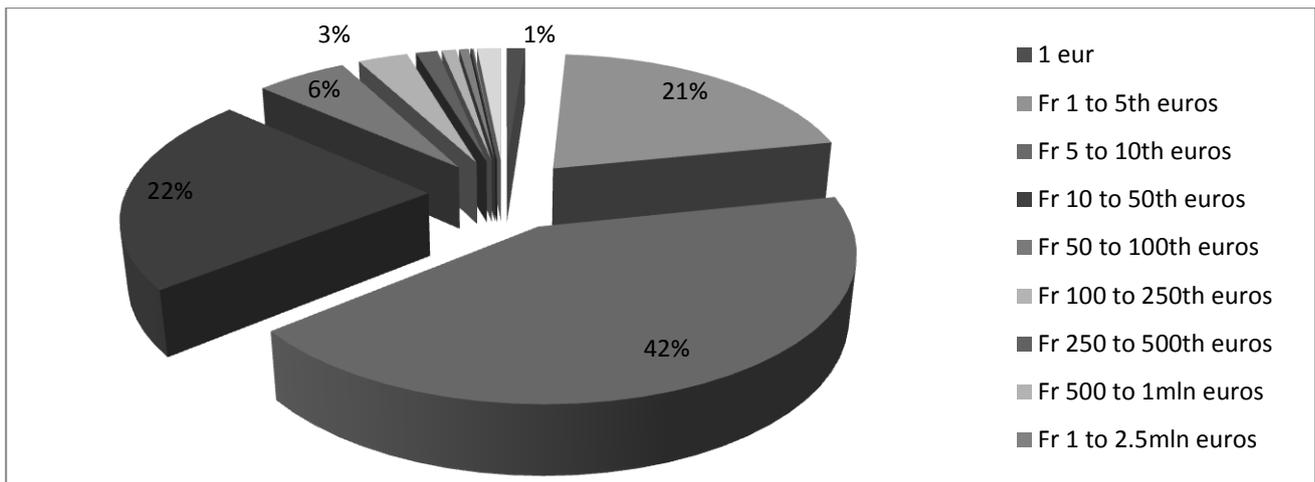
Source: Author's elaboration on Italian Business Register, May 7, 2018.

According to the class of Value of Production (Figure 8), approximately 49% of the companies have a value between 0 and 1,000 th. euros. For about 50% of companies, the value is not assigned. This lack of information depends on the fact the companies were set up in 2017, so the financial statement has not yet drawn up or were set up in 2016 but the financial statements have not yet been acquired. In any case, the values discount the particular phase of business lifecycle, in which revenues are typically limited.
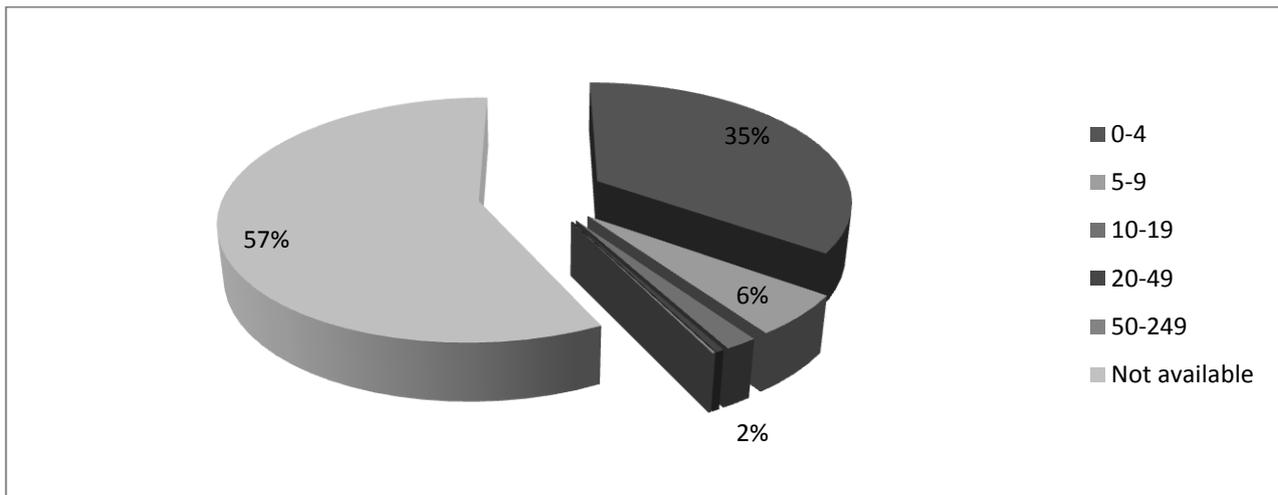
Figure 8, Class of Production Value, percentages.
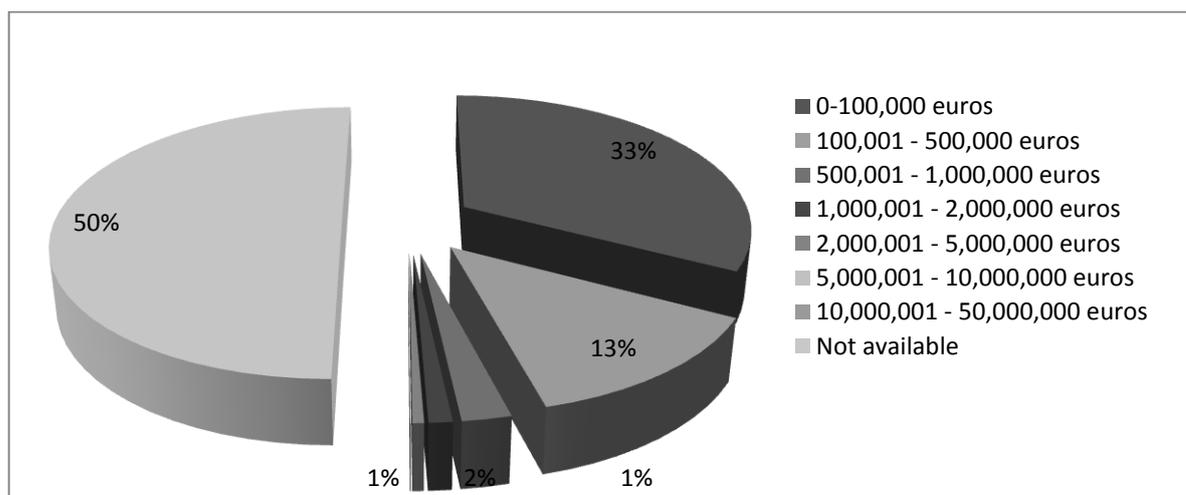
Source: Author's elaboration on Italian Business Register, May 7, 2018.

The average production value in 2016 was 155 th. euros, the median about 30 th. euros.
Finally, about the class of employees, 35% of companies has up to 4 employees (Figure 9).

Figure 9, Class of Employees, percentages.

Source: Author's elaboration on Italian Business Register, May 7, 2018.

3. Analysis of the main balance sheet indicators

Our analysis focus on firms in the special section of the Italian Innovative Start-up Register, that includes more than 9,000 companies operating in many economic sectors.

Data are from AIDA database by Bureau van Dijk, that offers comprehensive and detailed business data and financials across Italy. The number of start-up companies with available data is 1.966 in 2014, 3.519 in 2015 and 4.771 in 2016. Companies have been subdivided into quartiles, by the value of Total Asset per year, and our analysis focus on first and second quartiles, to avoid problems related to the high heterogeneity of firms' dimension. Balance sheet data are organised in many indicators of performance with the aim to analysed firms' profitability, operational and financial structure, on the average values for first and second quartiles.

3.1 Financial Structure Analysis

Table 1 show ratios used for the financial structure analysis. The first indicators reported is the *Liquidity ratio*, it compares liquid assets, excluding inventory, to the amount of current liabilities. It is used to examine the ability of an organization to pay off its short-term obligations: the higher the ratio, the better the ability of the firm to face its short-term debts. From 2014 to 2016 start-up companies present a good level of Liquidity ratio, demonstrating that firm's current assets are sufficient to meet firm's obligations in the short term.

Table n. 1: Financial ratios

	2014	*2015*	*2016*
Liquidity ratio	1.69	1.77	1.68
Asset on Equity ratio, %	8.23	13.53	12.18
Debt/EBITDA ratio, %	-1.61	0.27	-1.18
Debt/Equity ratio, %	3.19	1.05	1.19

Source: Our elaborations from Aida BvD data.

The *Asset on equity ratio* shows the relationship of firm's total assets to the capital owned by shareholders (owners' equity or self-financing). It indicates a company's leverage, the amount of debt used to finance the firm; it is a measure of firm's financial soundness. There is no ideal asset/equity ratio, it depends on the industry in which firm operates, on its size, on the economic

conditions. This value grew significantly between 2014 and 2015 and then declined slightly in 2016. It indicates how much of equity capital takes part in business risks. This indicator is commonly used in literature as a measure of agency costs within firms, because it may be interpreted as the incentive to benefit the equity holders at the expense of the debtholders (Cassar 2004). Consequently, debtholders incorporate costly monitoring devices or contractual covenants into debt agreements to restrict and monitor the firms' behavior. All these contracting mechanisms effectively increase the cost of debt capital.

The ratio between Debt and EBITDA is typically used to measures the company's ability to sustain its debts with the results of its core business. The EBITDA margin is a measurement of a company's earnings before interest, taxes, depreciation, and amortization as a percentage of its total revenue; it allows to evaluate a company's performance without having into account financing decisions, accounting decisions or tax impacts. High values of Debt/EBITDA ratio indicate an extremely indebted company, which may not be able to service its debt. Table 1 shows negative values of Debt on EBITDA ratio both in 2014 and 2016, because of negative operating results. This type of results is, however, frequent in the early stage of firm's lifecycle, when the business market prospects are still uncertain.

The Debt on equity ratio shows the percentage of company financing that comes from creditors (both banks and other financial operators) and investors. Companies with a higher value of Debt on Equity Ratio are considered riskier than others, because they show less involvement of shareholders in the firm's economic performance and a transfer of business risks to external lenders: our ratio is equal to 3.19% in 2014 and decreases to 1.05 and 1.19 in 2015 and 2016 respectively. These data, on the one hand, show a prevailing investment by the shareholders compared to creditors, on the other hand represent a limited ability of companies to obtain credit from third parties, as otherwise recurrent in the start-ups.

3.2 Profitability Analysis

Table 2 show the ratios used for the profitability analysis. The average value of sales in 2016 is equal to 61.15 th. eur, increasing of more 50% compared to the previous years. However, as it is typical for the start-up companies, they realise an operating loss equal to 7.98 th. eur in 2016, significantly growing compared to the value in 2014. The value of ROA (return of assets), calculated as the ratio between the firm's Operating Income and its Total Asset, is equal to -6.86 in 2016, in line with the values of the previous years, equal to -6.75 and -6.30 respectively for 2014 and 2015. This data highlights an ineffective use of invested assets to generate profits; thus, the current management of the company does not contribute to repaying the investments.

Even the value of ROE is negative; it is calculated only for those firms with a positive value of Equity and it is equal to the ratio of Profit (or Loss) on Equity. This ratio says as what percentage of profit firm make for every euro of equity invested; in this case, it is clear that the loss registered during the three years influenced its values, in fact in 2016 it is equal to -0.26 %, slightly lower respect to those of 2015 and 2014.

Table 2: Profitability ratios

	2014	2015	2016
Sales (th eur)	29.06	46.70	61.15
Profit or Loss (th eur)	-3.68	-5.45	-7.98
ROA (%)	-6.75	-6.30	-6.86
ROE (%)	-0.38	-1.21	-0.26
EBITDA/Sales (%)	-21.54	-30.43	-19.90

Source: Our elaborations from Aida BvD data.

3.3 Operational analysis

Table 3 show the ratios used for the operational analysis. The indicators provide information on the operating structure and main operating costs.

Coherently with their dimension (see section 2), start-up firms show an average number of employs equal to 1 and a per capita turnover growing from 2014 to 2016, in line with the characteristics of the early stages of firm's lifecycle.

The *cost per employee* increased from 2014 to 2016, but less than proportional to the number of employees, showing a careful management of operating costs and, probably, the use of alternative forms of remuneration as provided for this type of companies. The Italian legislation provides for considerable incentives in this area, such as the tax exemption for remuneration granted in the form of work for equity.

Table 3: Operational ratios

	2014	2015	2016
Employees	0,53	1,06	1,05
Sales per capita (eur)	35'200.41	42'398.05	54'547.39
Cost per employee (eur)	8'481.08	9'259.75	14'069.75

Source: Our elaborations from Aida BvD data.

Concluding remarks

The financial variable is one of the main drivers of innovation: the lack of resources to invest to create an enabling environment for competitiveness and development is perhaps the most binding limitation to the growth of modern economic systems.

This issue makes it essential to identify the most effective tools to avoid losing of competitiveness; the assessment of the type of financial support for innovation is also influenced by financial system characteristics (market based or intermediaries based) and banking model (relationship banking or transaction banking).

In particular, for innovative firms, the uncertainty about expected outcomes is a major obstacle to the access to credit (Canepa and Stoneman 2005),   that can partially be overcome through a deep relation between firms and banks. The obstacles that may prevent the realization of the business idea represent real entry barriers. In this regard, the European Commission *Innobarometer survey* in 2014 said that the lack of financial resources caused difficulties for the marketing of products in more than two thirds (68%) of the companies that have developed innovative goods or services.

There is a clear relationship between the degree of innovation and financial constraint in new businesses: the greater the degree of novelty of the new enterprise, the greater the perception and the degree of risk for third-party lenders.

The peculiarities of this type of enterprise, information asymmetry, no collaterals and high costs, associated with the estimation of technological risks, have often been impeding factors for access to bank financing. Moreover, for innovative startups also the access to risk capital is difficult, because the property is not willing to open the corporate structure to institutional investors and doesn't want to share the intangibles resources of the firm. In fact, these are companies in which the value of intangibles is high and represents the main asset that can determine the success of companies. As a consequence, the financial support to innovative companies is provided mainly by the same people promoting the business initiative or persons closely related to them (Family, Friend and Fools, as for the "3F Theory").   However, the often limited availability of these resources generates a problem of under-capitalization for new companies.

Problems related to the financing of innovative companies should be mitigated by specific regulatory measures aimed at favouring investments in these companies. In this sense, in Italy it

was introduced the figure of the innovative start-up firm: policies to support these companies recognize deep facilitations to access to the capital and credit market.

The paper intended to study this specific case, the Italian innovative startups, with particular attention to the financial structure of these companies. The study was carried out by analyzing the financial results in the period 2013-2016, for the companies with available data in the AIDA database by Bureau van Dijk. The length of the analysis period is an obligatory choice by the fact that these companies cannot have been established before 18 December 2012, so 2013 is the first year with available financial data. Companies have been subdivided into quartiles, by the value of Total Asset per year, and the analysis focused on first and second quartiles to avoid problems related to the high heterogeneity of firm's dimension. The results show a low level of indebtedness, confirming the literature that has long highlighted the difficulties in accessing credit for innovative firms. Also the value of equity, compared to total asset, is low, validating the issue of under-capitalization that often affect innovation-based companies.

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