

Financing business networks: an analysis of the Italian case.

Elisa Giaretta ¹

Abstract

The terms “business networks”, “firm networks” and “enterprise networks” are widely used in academic discussion and have become increasingly common in the management strategic decisions.

Business networks are becoming increasingly important to create projects and share investments, allowing firms to join without losing their autonomy. The main reasons that lead to the creation of a networks of firms are the search for technological innovation, growth in foreign markets, optimization of know-how, share of R&D and achievement of organizational synergies.

In this study we focus on the Italian contest where the "network contract" has been recently introduced in the Italian legislation (article 3 of Italian Legislative Decree no. 5/2009). To finance business networks in Italy the European Investment Bank has recently introduced an instrument - called “*Italia Growth Reti di impresa*” - that gives dedicated loans to finance small and medium size investments promoted by small and medium-sized enterprises or Mid-caps belonging to business networks.

After a description of the most important aspects of the network contract, this paper aims to provide an answer to the question “*firms that belong to networks have better financing conditions and better profitability than other firms?*”.

The purpose of the research is to explore the impact of belonging to networks of firms on funding terms, measured by financial costs and access to credit, and on profitability. For this purpose, we created a database of Italian firms that belong to networks under article 3 of Italian Legislative Decree no. 5/2009.

The study is carried out by comparing networked firms with a control sample of non-networked firms using a statistical Probit model and a OLS regression model. The sample includes around 4.000 firms that have signed a network contract in the period 2009/2013.

We found that network contracts have, on average, a positive effect on the financial aspects of the firms. The access to credit of firms that belong to networks improves.

JEL classification: G30, G32, G34, G21, G24, L14.

Keywords: Business networks, Funding, Rating, Italian enterprises.

¹ Department of Business Administration, University of Verona, Via dell'Artigliere 19, 37129, Verona, Italy. E-mail address: elisa.giaretta@univr.it Phone no.: (39) 0444393938 Fax: (39) 0444393921

1. Introduction

The recent financial crisis has highlighted the major problems of enterprises, in particular of small and medium-sized enterprises (SMEs):

- the needs of enterprises to become more competitive;
- the needs for internationalization of enterprises;
- the needs of enterprises to access to funding.

In order to survive the financial crisis, business networks are becoming increasingly important to create projects and share investments, allowing firms to join without losing their autonomy. The network contract is an "hybrid" aggregation form that allows participants the maintenance of their independence and the identity of individual firms and allows business to grow closer to a proper size to compete on global markets.

The main reasons that lead to the creation of business networks are the research for technological innovation, growth in foreign markets, optimization of know-how, share of R&D and achievement of organizational synergies (Marshall, 1919).

The Bologna Charter adopted by OECD countries encourages the formations of business networks, asserting that they can stimulate innovativeness and competitiveness for SMEs (OECD, 2001). The Bologna Charter recommends to facilitate development strategies and partnerships involving private actors, non-governmental organizations (NGOs) and different sectors of public administration in local clusters and networking. Moreover, for the Bologna Charter the public sector should play a catalytic role for network initiatives in the private sector, e.g. facilitating private investments with public incentives and facilitating seed funding. Public and private sector bodies should foster the growth of business networks by improving their access to accommodation and efficient communications and transport infrastructures; facilitating local specialization in university/industry linkages; disseminating targeted information, including on location advantages and investment attractiveness; promoting suppliers' networks, technical support services, learning circles and other collaborative undertakings. The Bologna Charter also recommends to promote support and financial services, including those carried out by intermediaries, in ways that foster international co-operation and partnership among SMEs and provide improved access to information, financial and technological resources and new markets.

Business networks are deemed important also in the Small Business Act (SBA) in 2008 – that defined lines of action to promote the development of SMEs (European Commission, 2008). The SBA promotes an entrepreneurial culture through the creation of business networks. In this sense, European states should also take measures in the fields of education, training, taxation and assistance to entrepreneurs. Moreover, the SBA should also be seen as an opportunity for entrepreneurs themselves to contribute to a better business environment by stepping up their cooperation and networking, by exploiting more fully the potential of SMEs and especially family enterprises, as important training grounds for entrepreneurship.

In this article, we aim to study business networks as an instrument for firms to growth, enhancing their performances and improving the conditions of access to credit. The study focuses on the Italian contest where has been recently introduced the "network contract" (Italian Legislative Decree no. 5/2009) – the first legislation in Europe to regulate the business networks (Ricciardi, 2009). In addition, in Italy there is a good economic environment for the development of business networks, as there are many SMEs that need

to join and grow. Besides all this, in Italy there are many cooperation forms that have preceded the formation of business networks.

In November 2012 - only three years after the introduction of the network contract - in Italy there were 1,167 network contracts composed by 5,944 firms (InfoCamere, 2012).

To finance business networks in Italy the European Investment Bank (EIB) has introduced an instrument - called "*Italia Growth Reti di impresa*" - that gives dedicated loans to finance small and medium-sized investments promoted by SMEs or Mid-caps belonging to business networks. It is a medium / long term line of credit brokered by banks selected by the EIB. Its purpose is to improve the access to credit for networked firms that wish to improve their competitiveness through product innovation and enter new markets. In practice, it gives a reduction in the interest rate for participants (EIB, 2012).

The structure of this paper is as follows: the second section discusses the literature about the business networks, focusing on the Italian context; in the second section, we develop the research hypotheses. Then, we describe the data collection process and the methodology of the research in the Section 4, and in Section 5 we report and discuss the results of the analysis. In the final section, we state the major conclusions and confer the implications for entrepreneurs and provide recommendations for further research.

2. Literature review

As the business network is a relatively new phenomenon, the academic literature about it is scarce and jagged. Anyway, business network is a phenomenon that can be studied in different scientific fields. In fact, there are legal aspects, tax considerations, business aspects, but also sociological and psychological factors that impact on firms that join business networks.

The literature about business networks derives from the one on cluster and economies of localization.

The first study about this argument is the one of Marshall (1920). Marshall (1920) defined industrial district as an area where a concentration of firms has settled down; while a localized industry is an industry concentrated in certain localities. The reasons for a geographical concentration of firms may be various: first, the needs of the manufacturers to be close to the resources on which they depended; this primitive localization is especially due to physical conditions such as climate, soil, mines, quarries, access by land or water. Second, the patronage of a court that produces a demand for goods of specially high quality. Third, the presence of one or more large cities.

For Storper (1992) it is not a simple place of externalities but an environment consisting in relevant relational components, especially for the flow of innovativeness.

Porter (1998) defined clusters as the geographical concentration of strongly interconnected companies and institutions that compete and cooperate within each other in a particular industry.

Clusters are considered as offering a means for creating higher value-added by distributing the potential of local strengths as a whole rather than as a series of individual companies (Roelandt and den Hertog, 1998).

Maskel (2000) talks about a model of spontaneous and organized development which helps to decrease the cognitive distance between firms, to promote the transfer and use of knowledge and to produce new knowledge. For the author, there are co-located firms within related industries enhance the ability to create knowledge by variation and a deepened division of labor. The interdependent development between economic activities and local institutions make it attractive to some industries and hostile to others. The very reasons why cognitive distance might be small within the cluster tend to make cognitive distance great between clusters and make inter-firms co-operation across bodies of knowledge more costly. The additional value created when clustering may justify the additional cost.

Cooke and Huggins (2004) gave a generic definition talking about firms geographically close, connected by vertical and horizontal relationships, including localized supporting infrastructure, which share the same evolutionary view of economic growth, based on competition and cooperation in a specific market segment.

For Cooke (2001) clusters have become a key mode of economic co-ordination. Cluster-thinking is important, with institutions playing a key role in promoting knowledge-development, interaction with business and policy-thinking in pursuit of the government's vision of a co-operative as well as competitive way of enhancing the economic performance. Clusters are usually fairly geographically concentrated, dynamically interacting combinations of firms, intermediaries, funding organizations and transfer agencies acting consciously to develop the cluster. They offer advantages over large hierarchical firms because of overflows enabling knowledge to flow reasonably freely and opportunities for co-operation as well as competition. Productivity, innovation and new business formation are enhanced under such circumstances. Clusters work by acting as an economic community based on informal and formal, hard and soft forms of networking between firms and agencies. Consciousness of cluster existence and a formalized, membership-based association able to keep all in touch as needed is often key to successful clustering.

For Huggins (2008) knowledge cluster development is based on wider connectivity and consolidation: these patterns of connected clusters and broadened knowledge networks are what firms and policy makers attempt to foster. In particular, clusters can positively influence economic growth by increasing the productivity of companies based in an area; by driving the direction of innovation, underpinning future productivity growth; and by stimulating the formation of new businesses. The requirements for specialized technological research, supply, and servicing mean that knowledge industries are bound by a specific knowledge base, limiting the number of locations within which such development across the globe has so far occurred. Cluster policies must be increasingly attuned to positioning within a global network environment.

The first Italian definition was given by Becattini (1979) who talked about a population of industrial SMEs specialized in the production of one or a few goods and interacting with each other through forms of division of labor.

In accordance to the definition contained in the Legislative Decree no. 5/2009, with the network contract *«more entrepreneurs pursuing the objective of enhancing their innovative capacity and competitiveness in the market - individually and collectively - and to that scope undertake on the basis of a common network to cooperate in predetermined areas relevant to the exercise of their enterprises or to exchange information or services related to their industrial, commercial, technical or technological activities, or even to engage in one or more common activities under the scope of their business»*.

The purpose of the network contract is to improve individually and/or collectively the participants' ability to innovate and the competitiveness of the firms. The general objective of enhancing the innovative capability and competitiveness in the market can be achieved through vertical integration, horizontal cooperation, or carrying out joint activities (e.g. R&D activities).

The network contract may simply be structured as an agreement for the exchange of information, or it may extend to the joint exercise of an economic activity.

The Italian legislation for network contracts gives to the participants the freedom to organize their networks and the relationships between the parties. The Italian legislation leave the regulation of many aspects to the choice of the parties, although respecting the underlying principles. The network contract responds to the need for flexibility of the parties. However, the vagueness of its contents may reduce the reliability of the instrument: there can be some benefits for entrepreneurs from a standardization of the content of the contract.

Under law no. 5/2009, there are some items that are mandatory for network contracts, namely:

- presence of at least two entrepreneurs. All possible types of firms are considered to be entrepreneurs: limited companies, partnerships, individual companies, consortiums, joint venture companies, non-profit companies. Also subsidiaries and affiliated firms can subscribe a network contract since they are autonomous firms. Foreign firms may also join Italian network contracts;
- indication of the strategic objectives;
- network program, under which entrepreneurs are bind to cooperate in specific areas related to the exercise of their firms and/or to exchange information, and/or exchange industrial, commercial, technical or technological services, and/or exercise in common one or more activities related to the scope of their business. It must contain the rights and the obligations of each participant, and how to implement the common goal;
- the procedures agreed to measure progress towards these goals;
- duration of the contract;
- rules on how to join the network;
- rules for decision-making;
- the registration in the separate section Italian Chambers of Commerce in which each participant is registered.

The name and the address of the network is always present in each network contract although it is not legally required.

The contract may also provide the establishment of a common fund and the appointment of a joint body responsible - in the name and on behalf of the participants - for the administration and the execution of the contract or individual parts or phases of the same. The network contracts that are provided by common funds and decision-making bodies can enroll in the ordinary section of the Chamber of Commerce and obtain legal personality. In this case we talk about «subject networks» instead of «contract networks».

The Italian legislation gives a tax advantage for firms that sign a network contract: a share of the profits (up to a limit of € 1,000,000) set aside in reserves are exempt from taxes. The legislative decree no. 78/2010 provides a suspension of taxes for profits that are set aside a special reserve fund in the balance sheet. The requests for suspension for the first year have been accepted for an amount equal to 75% of the profits allocated (Agenzia delle

entrate, 2011). Tax incentives are admitted to all firms belonging to contract networks, regardless their degree of activity, size, type of investment. There is also an additional regional discipline on tax incentive.

There are many benefits from operating in a business network. We should note that the cooperation brings benefits among the participants in a manner not necessarily uniform for the participants (Ricciardi, 2009). It is also easier to just “see and replicate” the structures of business networks than it is to understand and apply the lessons of facilitating softer infrastructure such as networking and collaboration. Replication is no guarantee of success, as networks vary across industries, location, and operating dimensions, meaning there is no one set of policies that will make a cluster successful (Cortright, 2006).

In any case, networked firms can benefit of economies of scale. The fixed costs go down and the structure becomes more flexible, with positive effects on operational risk and the value of the companies that participate to the network (Porter, 1998).

Business networks allow forms of coordinated division of labor specialization that enable flexibility: firms become able to adapt to technological changes and other external shocks better than their larger competitors (Marshall, 1920).

By organizing business networks, SMEs get the benefits of large size without exchanging of shares and without establishing operations of Mergers and Acquisition (M&A). Moreover, the formation of business networks also helps the merging process between firms, creating the basis for stable partnerships (RetImpresa, 2013).

It is important to note that the coordinated division of labor specialization results in an increase in the efficiency and a benefit for the economy as a whole as it eliminates the excess capacity of the system.

By joining into business networks, firms can increase their market power, and thus their bargaining power. The increase in the bargaining power therefore involves increasing the capacity to assert their own preferences with their counterparts (Becattini, 1987).

Establishing a lasting relationship with the others participants reduces both the cost of searching for new partners and those relating to the achievement of an agreement (Marshall, 1920).

The business networks based on R&D activities can perform useful functions that exceed the minimum thresholds of investment and avoids duplication of spending and leverages complementary assets (D'Aspremont and Jacquemin, 1988). However, the innovative contribution of each participant is not easily identifiable. In any case, business networks gives to the members the opportunity to exchange ideas (Marshall, 1919).

Working in a business network also helps to reduce the time to market for new products.

From an economic point of view business networks through a combination of certain factors (economies of scale, learning and innovations) involve an overall reduction in operating costs compared to those incurred in the case in which the production is totally within a single enterprise. Therefore this conduce to a decrease of the company risks. So the sharing of the investment leads to a spreading risk among firms.

Firms that belong to networks should attract capital on more favorable conditions – both in terms of cost and amount. The increase of total loans should come on the basis of the examination of network program, and because of the favorable access to credit due to EIB funding.

Banks and financing institutions are reluctant to borrow money to SMEs. On the other hand, SMEs are usually reluctantly to take big risks, so they try to contain the amount of borrowing request. Moreover, small firms may not receive loans because they have limited warranties. The integration in business networks can remedy these problems: a group of firms with joint and several liability in the event of default of a member allows firms to get a loan that the individual components would not have otherwise. Cost sharing allows sharing losses then the survival and also to diversify investments by increasing the chances of success (Boari, 2007). In this sense, the business network notify third parties the quality of the participants.

The interdependence of firms part of the same business network ensures that all the entities in the network “give warranties” to the other firms. This conduce to the possibility of a rating system that evaluates the network as a whole. In fact, the network project is a crucial factor for the success of the network, then the evaluation of the network as a whole cannot transcend an evaluation of the project. So a network rating it is not the sum of the single ratings, but the it is tied to the network project.

Networked companies should benefit also from a reduction of operational risk that lead to a variation of the risk evaluation from banks. In this regard, the “specialized lending” introduced with Basel II (2004) gives banks the possibility to establish a “network rating”, considering the system of relations between firms. The term specialised lending is associated with the financing of individual projects where the repayment is highly dependent on the performance of the underlying pool or collateral. For all but one of the specialised lending sub-categories, if banks can meet the minimum criteria for the estimation of the relevant data inputs, they can simply use the corporate IRB framework to calculate the risk weights for these exposures. Banks are required to give their internal ratings for specialized lending to five supervisory categories, each of which is associated with a specific risk weight. For a subclass of specialized lending, i.e. loans granted in the face of high volatility commercial real estate (HVCRE), banks are able to estimate the inputs required under the IRB approach will be able to use a specific formula risk weight that, compared to the general expected claims corporate, is marked by greater caution given the risk characteristics of this type of loans. Banks that are not in condition to estimate the required inputs classify their exposures HVCRE in the five levels of quality, by applying the corresponding weightings shown in CP3.

The banking system gives a better rating to the networked firms that have a good joint innovative project. The networks facilitate the access to credit and therefore allow firms to obtain significant discounts in terms of spread.

This vision completely changes the approach for banks to analyze firms: in addition to normally analyzed data (e.g.: turnover, leverage, profit, etc.) banks consider data derived from the system of relations in which firms operate.

We should note that it is too expensive for a bank to assess network ratings “bottom up” or from data such as sales, margins and other individual data, in order to assess the creditworthiness and then make an additional assessment. A reversal perspective is then necessary - starting from the project and the program of the network and the predisposition of a business plan and report network “readable” by the banks, and then getting to the credit of the network nodes. To implement this reversal evaluating process, ratings should borrow even technical characteristics of venture capitalists or a private equity funds.

In view of the application of Basel II, the Italian Law no. 266/2005 of 23 December 2005 stated the importance of business networks and established to facilitate the creation

of appropriate external agencies to assess the credit worthiness of specific districts and business networks.

Networked firms are not very diversified. Although networked firms can operate in different sectors and in different areas, financing a business network can enhance the risk, specially for local banks, because there is a decrease in the portfolio diversification. For this reason banks should diversify their portfolio by operating on many business networks not related to each other. Belonging to a business network can significantly change the risk profile for better or for worse (Ricciardi, 2009).

In the study of Cafaggi (2007) for 50% of the surveyed banks, the membership of a business network fosters the conditions for access to credit. There are two profiles for which business networks have relevance on financing:

- adopting a notion of systematic risk rather than an individual one, that is, achieving forms of risk sharing, and pooling relevant to the assessment of creditworthiness;
- the participation of the bank to business networks reduces the information asymmetry making it easier to acquire information about other networked firms.

Considering what we have showed up to this point, in this paper we identify the following research question: “*firms that belong to networks have better financing conditions and better profitability than other firms?*”.

3. Hypotheses development section

In this section, we develop hypotheses of the performance of companies that have sign a network contract. The hypotheses are derived from the academic literature described in Section 2 and are tested in Section 6.

The main research hypothesis aims to compare the performance of the networked firms with the performance of the firms that operate alone.

There are few studies that demonstrate that networks bring benefits to the companies that belong to them. The probability that a firm belongs to a company network is positively correlated to its growth, but it is negatively correlated with its profitability (Bank of Italy, 2013). A study of Unioncamere (2013) demonstrate that networked enterprises have a competitive positioning 17% higher than companies that do not participate to network of firms.

We assumed that the performance of the former is better than the performance of the latter.

H₁: Firms that belong to networks perform better and have better financial conditions than firms that do not.

Secondly, we aim to analyze the relationships between the performance of the networked firms and the characteristics of the contract they made.

H_{1A}: There are some characteristics of the network contracts that improve the financial conditions for the networked firms.

4. Research method and sample description

Our data sources, sample selection scheme and research methodology are detailed in this section. We provide descriptive statistics for samples and we explain how we conducted our research methodology.

With this analyses we want to answer the main research question – we want to compare the performance exhibited by firms that belong to business networks and the performance of non-networked firms.

A. Data description

In this sub-section are our data sources and sample selection scheme.

In Italy there are 1,167 network contracts networks under article 3 of Italian legislative Decree no. 5/2009 (InfoCamere, 2012). 5,944 enterprises have sign a network contract, 4,010 of them are limited companies (Table 1).

Table 1: Legal form of firms.

Limited companies	4,010
Cooperative companies	415
Consortiums	111
Partnerships	770
Individual companies	610
Other companies	28
Total	5,944

Source: our elaboration on data from InfoCamere.

Our sample include only limited companies, cooperative companies and consortiums that have sign a network contract. Data are obtained from InfoCamere database carried out by the Italian Chambers of Commerce² and are crossed with financial data from AIDA Bureau Van Dijk database³. We decided to not include partnerships and individual companies because of data availability. To analyze investments we constructed a sample of firms belonging to business networks (network sample) in the period 2009-2012. The initial dataset consisted of 4,536 companies from which we eliminated 416 companies with incomplete or missing data. The final sample consist in 4,120 firms.

² InfoCamere is the IT company for the Italian Chambers of Commerce, and support the Chamber system in managing its information stores and providing its services. By devising and developing the most up-to-date and innovative IT solutions, it unites the Chambers of Commerce on a daily basis, across a network also accessible to all involved in the Italian productive system: businesses, members of the public, Public Authorities, business associations, professional bodies and anyone involved with economic data. InfoCamere manages the high-speed and high-security communication network interconnecting the nerve centres of the Chamber system (105 Chambers of Commerce and 300 branch offices). The company is involved in activities ranging from managing the data held by the Chambers, to the computerization and simplification of the services provided to businesses by the Chambers themselves, especially in their dealings with the Public Authorities. It also develops the information services needed for their back office activities.

³ The AIDA Bureau Van Dijk database is a database containing approximately 1 million companies in Italy, with a maximum of five years history. Data include around 50 financial ratios.

We study the sample in the period 2007/2012 – 2 years before the establishment of the network contracts, in the year of the sign of the network contracts and 1year after the establishment of the network contracts.

The impact of network contracts on firm performances was directly analyzed by comparing firms belonging or not to business networks through a paired sample design approach. We created a control sample of 9,000 non in network firms to compare with the network sample. For each company in the network sample, from the AIDA Bureau Van Dijk database we generated three draws of firms with the following characteristics:

- Same industrial classification code (two-digit NACE code);
- Similar (+/- 20%) amount of total assets;
- Registered office in the same area.

Each randomly selected firm was “matched” to its corresponding firm in the network sample in the sense that we measured the variables over the same calendar period. We used the terms “before the instauration of the network contract” also for firms in the control sample indicating the years prior to the network contract for the corresponding firm in the network sample. In the same way, we used the terms “after the instauration of the network contract” for firms in the control sample by indicating the periods after the sign of the network contract for the matched firm.

We should note that in the control sample there can be some overlaps, in the sense that we can include:

- Companies belonging to other kinds of networks (e.g.: clusters);
- Companies not formally belonging to networks but that operate in networks (informal networks).

Table 2 represent the distribution of firms by the number of firms involved per contract. As we can see from the table, the majority of firms belongs to networks made up by 3 firms (29.97%), followed by networks made up by 4 or 5 firms (29.87%). Business networks made up by only 2 firms represent the 13.12% of the total, while networks made up by 6 or 7 firms represent the 11.40% of total. Firm networks composed by a number of firms between 8 and 11 represent less than 10% of total, while networks composed by 12 or more firms are around 7% of total. This table evidence that the business networks are biased toward the small size; near 50% of firms belongs to business networks composed by 3 or less firms.

Table 2: Distribution of firms by number of firms involved per contract.

2 firms	13.12%
3 firms	29.97%
4-5 firms	29.87%
6-7 firms	11.40%
8-9 firms	5.35%
10-11 firms	3.34%
12 or more firms	6.96%
Total	100.00%

Source: our elaboration on data from InfoCamere.

The distribution of firms by number of regions involved per contract is exhibited in table 3. More than 70% of firms belongs to mono-regional business networks (73.56%). Dual-

regional business networks include 18.16% of firms while networks made up by 3 or 4 regions account for 6.86% of the total of the firms involved. Only the remaining 1.41% of firms belong to networks composed by 5 or more regions.

As we can see from the table, there is a spatial proximity in firms that belong to the same network. In most cases, firms are located near each other. It is important to say that firms that have signed network contracts are localized in areas characterized by high intensity of clusters. However, the geographical boundaries of business networks are broader than the traditional cluster boundaries. In fact, the advantage of geographical proximity of clusters has been reduced, and the informality of cluster relationships do not provide the appropriate level of commitment for firms. Firms belonging to the same network are located on average about 68 km away against 11 km of industrial clusters.

Table 3: Distribution of firms by number of regions involved per contract.

1 region	73.56%
2 regions	18.16%
3-4 regions	6.86%
5 or more regions	1.41%
Total	100.00%

Source: our elaboration on data from InfoCamere.

Table 4 show the distribution of networked firms by the scope of the contracts. First, the research of production efficiency and share of know how stands out with a 26.03% of total of companies. The sharing of R&D activities follows with 23.31% of total, while the activities related to promotion and/or marketing account for 21.80% of total. Network contracts signed with scopes related to technological innovation account for 17.76% of companies and the contracts related to export account for 9.38%. Data on the remaining 1.72% of companies is not available.

Table 4: Distribution of firms by the scope of the contracts.

Production efficiency / Know how	26.03%
R&D	23.31%
Promotion / marketing	21.80%
Technological innovation	17.76%
Export	9.38%
Not available	1.72%
Total	100.00%

Source: our elaboration on data from InfoCamere.

The distribution of firms by industry is summarized in table 5. We can see a wide variety of industries involved. However, there is a prevalence of firms belonging to the same sector in the same network. The most important industry in which networked firms operate is the service (35.15%) followed by metallurgy and mechatronics (26.26%) and food and personal goods (14.21%). The remaining industries account for less than 10% each; respectively constructions accounts for 7.66%, trade accounts for 6.05% and primary activities account for 0.89%.

Table 5: Distribution of firms by industry.

Services	35.15%
Metallurgy and mechatronics	26.26%
Food and personal goods	14.21%
Constructions	9.27%
Other manufacturing and utilities	7.66%
Trade	6.05%
Primary activities	0.89%
Not available	0.50%
Total	100.00%

Source: our elaboration on data from InfoCamere.

The descriptive statistics for networked firms and the control sample are detailed in table 6, table 7, table 8, table 9, table 10 and table 11, respectively for 2007, 2008 2009, 2010, 2011 and 2012. For every variable analyzed we compute the mean and the standard deviation for the two samples and we run a Student's T test for equality in mean in order to test the statistical differences between the two samples.

Table 6: Descriptive statistics in 2007.

Variables	Network sample	Control sample	Student's T test
Short term debt	0.86 (0.95)		
Long term debt	0.14 (0.05)		
Net financial position	2,281,405 (150,608)		
Debt/Equity ratio	3.15 (0.85)		
Debt/Ebitda ratio	2.09 (1.56)		
Current ratio	1.23 (1.04)		
Liquidity ratio	1.02 (0.83)		
Solvency ratio	23.66 (17.91)		
Roa	5.78 (5.08)		
Roe	10.10 (7.32)		
Roi	5.78 (5.08)		
Ros	-613.44 (4.58)		

Source: our elaboration on data from AIDA Bureau Van Dijk.

Table 7: Descriptive statistics in 2008.

Variables	Network sample	Control sample	Student's T test
Short term debt	0.85 (0.94)		
Long term debt	0.15 (0.06)		
Net financial position	2,926,795 (212,816)		
Debt/Equity ratio	3.27 (0.80)		
Debt/Ebitda ratio	0.35 (1.81)		
Current ratio	1.24 (1.04)		
Liquidity ratio	1.04 (0.82)		
Solvency ratio	26.18 (20.30)		
Roa	4.87 (4.49)		
Roe	8.41 (5.31)		
Roi	4.08 (4.49)		
Ros	-1,868.73 (4.19)		

Source: our elaboration on data from AIDA Bureau Van Dijk.

Table 8: Descriptive statistics in 2009.

Variables	Network sample	Control sample	Student's T test
Short term debt	0.83 (0.93)		
Long term debt	0.17 (0.07)		
Net financial position	2,847,626 (189,224)		
Debt/Equity ratio	-0.74 (0.75)		
Debt/Ebitda ratio	1.55 (1.83)		
Current ratio	1.24 (1.03)		
Liquidity ratio	1.04 (0.83)		
Solvency ratio	26.20 (20.70)		
Roa	3.38 (3.15)		
Roe	4.58 (3.73)		
Roi	1.67 (3.15)		
Ros	737.03 (3.33)		

Source: our elaboration on data from AIDA Bureau Van Dijk.

Table 9: Descriptive statistics in 2010.

Variables	Network sample	Control sample	Student's T test
Short term debt	0.83 (0.92)		
Long term debt	0.17 (0.08)		
Net financial position	2,897,081 (188,493)		
Debt/Equity ratio	6.19 (0.76)		
Debt/Ebitda ratio	-100.76 (1.90)		
Current ratio	1.22 (1.03)		
Liquidity ratio	1.03 (0.83)		
Solvency ratio	25.22 (19.62)		
Roa	3.94 (3.36)		
Roe	7.67 (4.92)		
Roi	3.21 (3.36)		
Ros	-84.19 (3.54)		

Source: our elaboration on data from AIDA Bureau Van Dijk.

Table 10: Descriptive statistics in 2011.

Variables	Network sample	Control sample	Student's T test
Short term debt	0.84 (0.92)		
Long term debt	0.16 (0.08)		
Net financial position	2,630,404 (145,552)		
Debt/Equity ratio	3.07 (0.70)		
Debt/Ebitda ratio	5.55 (1.60)		
Current ratio	1.23 (1.03)		
Liquidity ratio	1.03 (0.84)		
Solvency ratio	25.17 (19.69)		
Roa	4.10 (3.54)		
Roe	6.62 (4.39)		
Roi	2.48 (3.54)		
Ros	-1,000.95 (3.53)		

Source: our elaboration on data from AIDA Bureau Van Dijk.

Table 11: Descriptive statistics in 2012.

Variables	Network sample	Control sample	Student's T test
Short term debt	0.84 (0.92)		
Long term debt	0.16 (0.08)		
Net financial position	2,532,974 (167,875)		
Debt/Equity ratio	4.64 (0.71)		
Debt/Ebitda ratio	-2.64 (1.74)		
Current ratio	1.24 (1.03)		
Liquidity ratio	1.05 (0.83)		
Solvency ratio	25.28 (20.08)		
Roa	2.28 (3.18)		
Roe	6.08 (5.01)		
Roi	-3.08 (3.17)		
Ros	-318.40 (3.27)		

Source: our elaboration on data from AIDA Bureau Van Dijk.

B. Methodology

In this sub-section, we describe the methodology applied to analyze networked firms.

We decided to analyze some financial and profitability variables from the balance sheet to explain the main features of business networks.

First, we implement a comparison of firms that belong to networks with firms that do not, in order to verify whether the profitability of the networks is higher than the profitability of the other firms. The period of analysis is 2007-2012. The study is carried out using a Probit model. The dependent variable is a dummy variable that takes the value of 1 if the firm belongs to a network and 0 otherwise. The independent variables are performance variables for the two samples and are selected to reflect the traditional performance evaluation within the limits of data availability. The specific constructs are in the Appendix (Table A.1). We expect that networked firms should show higher returns than the other firms do. Precisely, we study the following Probit model:

$$Prob_{Network} = \beta_0 + \beta_1 STD + \beta_2 LTD + \beta_3 NFP + \beta_4 D/EQ + \beta_5 D/EB + \beta_6 CR \\ + \beta_7 LR + \beta_8 SR + \beta_9 ROA + \beta_{10} ROE + \beta_{11} ROI + \beta_{12} ROS$$

where:

- $Prob_{Network}$: dummy variable that explain that the firm belongs to a network contract (1 the firm belongs to a network contract; 0 otherwise);
- STD : Short term debt;
- LTD : Long term debt;
- NFP : Net financial position;
- D/EQ : Debt/Equity ratio;
- D/EB : Debt/Ebitda ratio;
- CR : Current ratio;
- LR : Liquidity ratio;
- SR : Solvency ratio;
- ROA : Return on Assets (Roa);
- ROE : Return on Equity (Roe);
- ROI : Return on Investments (Roi);
- ROS : Return on Sales (Ros).

We study the Probit model in two different period: before the sing of the network contract and after the establishment of the network contract. In the first case we analyze the characteristics of the firms that conduce to the formation of the networks and in the second case we study the performance of the firms after the implementation of the networks.

The analysis continues by using a regression model with the method of the Ordinary Least Squares (OLS). Within the regression, we seek to analyze the performance of Italian networked firms according to the characteristics of the networks implemented. The regression used in the analysis is the following:

$$Y = \beta_0 + \beta_1 NOF + \beta_2 AGE + \beta_3 BAN + \beta_4 MAR + \beta_5 EFF + \beta_6 TEC + \beta_7 RED \\ + \beta_8 EXP + \beta_9 IND$$

where:

- *NOF*: Number of firms per contract;
- *AGE*: Age of the contract;
- *REG*: Dummy variable for the presence of one or more regions per contract (1 for 1 region, 0 otherwise);
- *BAN*: Dummy variable for the presence of one or more banks in the contract (1 there is one or more banks, 0 otherwise)
- *MAR*: Dummy variable for the motivation of contract (1 promotion / marketing, 0 otherwise);
- *EFF*: Dummy variable for the motivation of contract (1 production efficiency / know how, 0 otherwise);
- *TEC*: Dummy variable for the motivation of contract (1 technological innovation, 0 otherwise);
- *RED*: Dummy variable for the motivation of contract (1 R&D, 0 otherwise);
- *EXP*: Dummy variable for the motivation of contract (1 export, 0 otherwise);
- *IND*: Dummy variable for the presence of one or more industries per contract (1 for 1 industry, 0 otherwise).

We run the regression for different dependent variable Y, namely: short term debt, long term debt, net financial position, debt/Equity ratio, debt/Ebitda ratio, current ratio, liquidity ratio, solvency ratio, Roa, Roe, Roi, Ros.

The period of analyses is 2009/2012.

5. Results

Work in progress

6. Conclusions

Work in progress

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