NETWORK AGREEMENTS AND FIRMS' ECONOMIC PERFORMANCE: NEW EMPIRICAL EVIDENCE FROM ITALIAN SMES

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1. Introduction

Firms, as social and economic actors, are members of numerous networks, which can be formal or informal, structured or de-structured, managed or not managed. The economic and managerial literature substantially agrees on the presence of a positive economic return from those interactions, arguing that isolated firms show systematically a worse performance with respect to firms interacting with different subjects. Networking activities of firms have been deeply investigated in the entrepreneurial and managerial fields, with a long standing theoretical and empirical research that remains particularly active also in recent years. The numerous quantitative analyses and surveys on the effect of networking have been accompanied by a parallel qualitative research aimed at explaining the contents of relationships trying to complement existing studies (Jack, 2010). One of the most problematic aspects that emerges by analyzing the literature relies in the absence of a coherent and observable definition of alliances or networking activities. It is very rare to find works adopting the same angle of analysis so that the obtained results are difficult to compare, as highlighted by Olivers and Ebers (1998). While scholars unanimously recognize that networks are important, they cannot clearly define a general definition of network for condensing information on the nature, intensity and functioning of network activities.

Li *et al.*, (2015) identify important social networks among entrepreneurs in the extensive inter-firms linkages within industrial clusters as instrument for supporting co-opetions, innovation and sharing information flows. Other authors like Birley, (1985), Chell and Baines, (2000) or Robson and Bennet (2000) identify other kind of entrepreneurial social networks including among them chamber of commerce, contracts with governments or

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specialized agencies and trade organization as informal networks able to promote information sharing. On the contrary, Parker (2008) defines formal business networks as organizations that bring together entrepreneurs for sharing information and experiences. Another, more restrictive definition by Huggins (2001) define formal networks as "initiatives to bring together firms to co-produce, co-market, co-purchase or co-operate in product or market development trough contractual agreements".

Our paper, based on an empirical investigation on a very large sample of Italian small and medium enterprises (SMEs), propose an extensive investigation on the effects of formal network agreements on different measures of firms' performance. Thanks to the formal nature of the agreements considered, detailed information on the characteristics of the network can be collected on large scale, opening important opportunity for analysis. After merging information on alliances with economic and financial data, we propose to investigate the effects of networks on different measure of competitiveness and performances in the short and medium term, with the idea that also in the short run networking can create benefits. The results of a fixed-effect panel estimation, which tries to solve the potential problems coming from self-selection of best firms, show that, even in the short run, network agreements increase the value added created per unit of sales, as well as the export propensity of participating firms, while the immediate effects on profits are mixed. Many differences emerge in terms of the prevailing effect according to firm's size, geographical location and sector of activity, creating new interesting directions for research. The applied methodology is similar to that applied by Schoonjans *et al.* (2013) for estimating the effect of the government networking program for East-Flanders SMEs (Plato program), but has been applied for identifying the effect from networks on competitiveness and profitability instead of growth trends.

The remainder of the paper is organized as follows. The next section reviews the most relevant literature on networking and economic performance. Section 3 presents the Italian case, section 4 reports the methodology, data are described in Sections 5, while Section 6 presents our main results, while the final section concludes and discusses some interesting implications.

2. Literature review
2.1 Networks and members' performances
The long standing idea that belonging to a network is beneficial for firms has been the main focus of a boundless bulk of literature in the managerial,

entrepreneurial and economic field. There are several channels through which networking can sustain performance. Networking reduces transaction costs (Lin and Lin, 2016), can supply firms with resources in a flexible manner at a reduced cost (Li *et al.*, 2015), can facilitate knowledge flows and technological improvements (Vanhaverbeke *et al.*, 2009), as well as stimulate innovation and new product development (Mazzola *et al.*, 2016). However, despite a strong convergence on the positive effects of networks on performances in the theoretical literature, the empirical results remain still weak, even if a general consensus on the existence of some general positive benefits has been substantially reached, mainly for SMEs (Schoonjas *et al.* 2013).

Havnes and Senneseth (2001), analyzing a sample of more than 1700 firms operating in eight different European countries, find no benefits from networking in the short run in terms of employment or sales growth. However, in the long term firms involved in alliances and networks show an increasing geographical extension of their market. Watson (2007) proposes one of the larger cross-sectional studies available in the literature, using data on Australian SMEs with less than 200 employees. Formal networks are defined as those related to external accountants and industrial associations. He finds through a Logit analysis that firms involved in such weak formal networks show a higher survival probability and a higher economic performance, in terms of the probability of being over the 25th percentile of ROA and sales growth[5].

Mixed results are reported by Koka and Prescott (2008) who analyze firms' alliances (medium and large firms) in the steel industry in 40 different countries, using sales per employees as a performance measure. By applying a random-effect panel estimation, they find that firms benefit from alliances in relatively stable environments. However, in case of radical changes, networks are negative related with performance. Positive effects on profits (measured by a scale variable condensing market performances) are found by Ritala (2012), even if the focus is limited to study the collaboration among competing firms in Sweden.

On the Italian context, Bentivogli *et al.* (2013) propose an extensive analysis of the determinants of networking, using a sample of 1.000 firms involved in network agreements. They estimate through a probit model the probability of entering such contracts, and find that firms located in Southern or North-Eastern regions of the country, firms characterized by larger size

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[5] Therefore, the reported effect is only about the probability of showing high performances rather than the direct impact on profitability or on growth.

and by larger revenue growth show a higher probability of entering network agreements. More recently, Confindustria (2016), by applying a propensity score matching to identify a sample of similar firms not involved in network activities, argued that most productive firms are those entering network agreements as well as firms more oriented to foreign markets. Finally, Colombo *et al.* (2014), after substantially confirming the above findings for Italian firms, proposes the first investigation on the effect of the Italian network agreement on performances. Using a sample of 6.000 networked firms and 70.000 non-networked firms, they show that the probability of having an EBIT improvement is positively (even if marginally not significant) related to networking, while sales growth seems not being significantly related to networks.

The most recent economic literature starts highlighting potential endogeneity problems regarding the relationship between signing network contracts and unobservable firms' characteristics, aspects which were substantially ignored in previous studies trying to estimate the economic outcomes of networking. Bodnaruk *et al.* (2013) argue that the probability of engaging business alliances, and then to participate to network agreements, is strongly influenced by the quality of governance. The latter strictly depends on the quality and ability of managers (or of owners in case of small firms without managers), so that the identification of the causal effect crucially depends on the possibility to separate these unobservable factors, as well as other observable factors, from the presence of network alliances. In the methodological section, we will take those issues in due account

Our first hypothesis is therefore related to the link between network participation and performance.

H1: entering a formal networks stimulates cooperation, coordination along the supply chain and resources sharing and it is expected to increase value added creation and profitability, also in the short run.

Having access to additional resources at lower cost and to additional information are the main aspects linking networks and international activities. Network partners can help SMEs characterized by low export propensity to accumulate experience and information, which can be used increase sales in foreign markets. This can be favored also by sharing resources, transaction costs and risks relative to making business abroad (Lu and Beamish, 2001). Consequently, the participation to alliances and networks can increase the probability of selling abroad as well as the intensity of the internationalization process. Recent contributions, reviewed by Fernhaber and Li (2013), are mainly focused on the participation to international network agreements, rather than to networking in general. Yu

et al. (2011) is one of the rare cases of recent empirical works highlighting how networking can enhance international sales by stimulating entrepreneurs or managers to recognize international opportunities. In particular, they show that the probability of making business abroad is positively related to technology and marketing alliances.

H2: networking activities allow firms to have low cost access to important resources and sources of information, and are expected to increase member firms' export shares.

The context in which firms operate, as well as their intrinsic characteristics can deeply influence the potential outcome in term of economic performance. This aspect has been implicitly argued in different works, but rigorous empirical tests are uncommon. According to Huggins (2000), the socio economic environment in which the firm operates deeply influences the potential benefits of networking activities, affecting the firms' ability to take advantage from (Szarka, 1990). In Italy, the socio-economic environment is very different across regions. If, on the one hand, the lack of resources or infrastructures of a region can affect the decision of entering networks for firms located in that area, on the other hand, the potential benefits from being a network member could be stronger in underdeveloped areas. Similar motivations on the general environment in which firms operate are also related to potential differences among industries or groups of industries. Finally, even if networking is a phenomenon of interest mainly for SMEs, a more precise investigation of the network effect for different firm size classes are indirectly reported by different authors (Watson, 2007).

H3: different firms enter networks for different objectives with different results in term of economic outcomes. Small firms enter network for reducing cost and increasing performance. Medium firms already characterized by an average higher efficiency thanks to their size, enter networks mainly for opening new market opportunities abroad.

3. The Italian network contract

In an attempt to stimulate technological innovations and improve the competitiveness of SMEs, Italy adopted in 2009 a regulation for "Enterprises network". Article 3 paragraph 4-ter and following of Decree 5/2009 (converted into Law 33 of 2009)[6] defines the "network contract" as a contract allowing two or more enterprises to pursue the goal of individually and

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[6] The law of April 9, 2009, n. 33, enacting, with amendments, the Law Decree 10 February 2009, n. 5 concerning urgent measures to support industrial sectors in crisis. The law was amended by Art. 42 of Decree 78/2010 translated into Law 122/2010 and subsequent amendments.

collectively increase their innovative capacity and market competitiveness. On the basis of a shared framework program, enterprises mutually undertake to collaborate, to exchange industrial, commercial, technical or technological information or services, or to jointly perform one or more activities. As such, the network agreement features a model of legal cooperation inspired by the logic of auto-regulation between contracting parties: the regulation does not prescribe any particular right or obligation for members, who are free to choose the details and specifications of the agreement.

The flexible normative background is intentionally weak in terms of binding constraints, in order to support any kind of collaboration: it allows companies to specify in detail "the common program and cooperation procedures between joining enterprises". The fact that the legislator does not state prescriptive rules promotes the creation of heterogeneous kinds of network, from horizontal models, where members are similar SMEs, to the more popular vertical model, in which a leading company strengthens the link with its suppliers' chain.

The basic requirements of the network contract include the statement of the strategic goal and common scopes in order to reach improvements in terms of innovative capacity and competitiveness, the identification of a network program that contains the activities and investments needed for the implementation of the strategic goal, as well as the specification of rights and duties assumed for each participant. The establishment of a common budget is not mandatory, as well as the definition of a common representative body. The firms can also establish entry and exit rules, and ending conditions for the network.

4. Methodology

To investigate the impact of firm networking activities on performances, we consider the following regression model, applied at a large scale on a very large and representative sample of Italian SMEs, for which we have complete financial statement data.

$$\pi_{it} = \alpha + \beta N_{it} + \delta Z_{it} + \eta D_t + \omega_{it} + \varepsilon_{it} \qquad (1)$$

π_{it} represents the selected measure of performance (value added created, profits of export propensity), N_{it} is a dummy variable identifying the networking status that changes over time, and becomes active when the firm enters a network agreement. Z_{it} is a vector of firm-level time-variant controls, including standard indicators able to explain performance such as firm age, firm sixe, the degree of mechanization, an index of vertical

disintegration. D_t is a vector of dummies indicating a specific year of analysis. The last part of the equation, $\omega_{it} + \varepsilon_{it}$, indicates the error term: the first component ω_{it} is correlated with the presence of network alliances, while the second component ε_{it} is not correlated with networking activities.

In order to identify the causal effect of networking on performance, it is crucial to identify observable and unobservable factors influencing the choice of enter a network. As observable controls, we include some indicators reflecting differences among firms in relation to financial/economic aspects (i.e. mechanization, vertical integration, age, size). Moreover, we include dummies able to capture structural differences in performance, due to regional, time and industry specificities.

It is more difficult to deal with unobservable factors, which enter the error term ω_{it}, creating potential endogeneity problems. Such aspects can be seen as specific features such as the firm tradition and culture, or firm "quality" that substantially coincides with the ability or quality of the main decision maker within the firm. Since such unobservable factors undoubtedly influence the probability of being involved in network agreements, ignoring them can lead to an over-estimate of the real causal effect of networking on performance. If we are willing to assume that the firm culture or the ability/quality/capacity of the managers7 are stable over time, any potential endogeneity problem can be solved through the fixed effect estimator, based on the within group transformation of equation (1).

5. Data

Our main source of information is the Infocamere database on Italian network agreements that collects data on all the network contracts signed since the introduction of the network contract until the 31/12/2015. The total number of firms involved in such kind of contracts is 11,927, while the total number of networks is 2,282. For each contract, we are able to identify each member and classify it as self-employer, micro-firm, SME or large firm. We have information on the network name, number and name of partners, main objects, month and year of the network creation.

In order to evaluate the effect of the network agreement on performance, we need to recover economic information for each firm. We decided to focus on Italian SMEs, as anticipated in the introduction, in order to reduce heterogeneity and because of the relevance of networking for them. We considered the whole population of Italian firms that are compelled to

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[7] Notice that, since our sample is largely based on SMEs, in many case managers are not specifically part of the workforce, but coincide with the owners.

register the balance sheet, i.e. limited companies and corporations, and we selected only firms with a number of employees between 10 and 250. In Italy, only for those firms it is possible to obtain reliable economic and financial data. Using the tax code as a firm identifier, we matched the INFOCAMERE data with the AIDA dataset (provided by Bureau Van Dijk, which contains the balance sheets of all Italian firms. Notice that, for each firm in the AIDA database that enters a network agreement we have information on the whole network, even if for some members we do not have financial data. Finally, we completed the economic information by merging data on international sales included in the ISTAT-COEWEB dataset at individual level, using again the tax code as a firm identifier.

We were able to collect financial statement information for the period 2008-2014 for a sample of 167,623 firms. We structured our database as an unbalanced panel, using all available information on Italian SMEs, including firms that were not active along all the period considered.

Table 1 shows some statistics on the adoption of network agreements for the whole population of SMEs which are included in the AIDA database. As it is clear from the figures, the most consistent participation to the network agreement is very recent. There has been has a jump in 2012, and this represents one of the main limits of our analysis. The effects we try to estimates are essentially short run effects, but we have to introduce a certain lag on economic performance.

Table1: Number of SMEs participating to the Italian network agreement

Year	N. of firms
2010	33
2011	327
2012	1,051
2013	2,080
2014	2,792
Total	6,283

Even if the network agreement is immediately effective, it is reasonable to assume that its economical effects take some time to emerge: it is very difficult that a formal network officially born during the year can materialize its effect before the end of the year. Therefore, we consider the year of the contract as a sort of "transition period", where the network has been formed, but its effects cannot influence the balance sheets, irrespective of the month

in which the contract has been signed. The financial variables relative to such year have been classified as "pre-network" observations, but the results are substantially stable if we treat such observations as missing values.

The complete information on the network characteristics are not ignored, even if only corporations and limited companies can be used for evaluating the effects of networking on performance. In this vein, we create specific indicators considering all network members, including micro-firms, self-employees, very small entrepreneurs and their specific characteristics. First of all, an index representing the geographical dispersion in terms of number of provinces has been computed as the ratio of the number of provinces over the total number of network members. Secondly, another indicator representing the network dispersion along the value chain has been computed using information on the activity code (ATECO2007) for each member. Similarly to the previous case, we use the ratio of the number of two-digit sectors characterizing network members over the number of network members.

5.1 Variable used in the analysis

Our empirical strategy is mainly based on estimating equation 1 for the whole sample and for different subsamples, following different models specification in order to test the robustness of the results. The main point of interest is the coefficient for the dummy variable "Network agreement" which takes the value of one the year after the firm enters a network. All the estimates keep into account the panel structure of the database and include firm fixed effects, controlling for self-selection and firm specific unobservable features, which are able to shift the probability of networking.

We use four different measures of performance at the firm level. First of all we consider the value added created, computed as the ratio of value added over revenues, it indicates the capacity of generating value added per unit of revenues and it can be considered a measure of competitiveness. Secondly, we analyze the profitability level using two different indicators: ROA and ROS. ROA is defined as EBIT margin over Total Assets. ROA is one of the most commonly used measures of profitability, and it has been already adopted in the context of networking effect on performance by Goerzen and Beamish (2005) in the context of Multinationals. ROS is computed as EBIT margin over total sales, and it is another popular measure of profitability, indicating the profitability margin in respect to revenues. Finally, we focus on the capacity of entering foreign markets by analyzing the export propensity, defined by the ratio of foreign sales over total sales. The

internationalization capacity represents another important indicator of firm competitiveness.

Following the managerial literature on the empirical studies on the determinants of performance, other firm time specific control variables have been included in the regression (see Nickell *et al.*, 1997 for a review). Such variables enter gradually in the model specification in order to test the stability of obtained results. Table 2 presents the descriptive statistics of the explanatory variables used in the analysis.

Table 2: Descriptive statistics

Variables	Description	2010		2014	
		mean	sd	mean	sd
VA/RT	Value added / Sales ratio	0.33	0.19	0.35	0.19
size	Ln of total Sales	14.64	1.36	14.65	1.28
age	Years after foundation	17.45	18.66	21.30	17.51
dis_vert	External costs over Total costs	0.68	0.21	0.65	0.20
K/RT	Physical Assets over Sales	0.42	1.59	0.43	1.71
ROS	EBIT over sales	0.03	0.84	0.03	0.18
ROA	EBIT over total assets	0.05	0.25	0.04	0.62
EXP/RT	Export sales ratio	0.06	0.16	0.06	0.17
Dummies					
Export	Probability of exporting	24%		26%	
Networking	Probability of entering networks	---		2%	

6. Results
6.1 Empirical findings on the whole sample of Italian SMEs

First of all, we address the first 3 hypotheses on the general effect of networking on performance. The effects can be considered as short term impacts, given the recent introduction of the specific network agreement in the Italian legislation. As already discussed, this represents one of the limits of the present research and leaves many questions open for future analysis.

Columns 2/4 of table 4 (http://www.sidrea.it/network-agreements-economic-performance-italian-smes/) report the estimates of three model specifications using the value added created per unit of sales as dependent variable. Firms involved in formal network agreements show a higher capacity of producing VA per unit of revenues, as suggested by the positive and significant coefficient estimated on the dummy Network agreement.

Therefore, a firm signs a network contract and decides to cooperate and to share resources with other firms, and after one year there is an increase of value added created per unit of revenues. The results is robust to different model specifications which always control for firm fixed effects, year specific effects, as well as different time-variant firm characteristics, among which vertical disintegration, degree of mechanization and export intensity. The effect of formal networks on value added created is limited in term of magnitude, but positive and always statistically significant. When a firm signs a network contracts, in the following years, its value added per unit of revenues increase of half percentage point in absolute term, with an increase near 2%. This increase remains significant also after controlling and isolating other firm specific characteristics which can influence value added created. If we focus on the other two performance measures, EBIT over Assets (ROA) and EBIT over Sales (ROS), the sign of estimated coefficients is negative, contrary to HP1, but the effect is significant only for ROS. This evidence suggests that the effect of networking on profits in the short term is negligible or negative, probably due to the initial cost of forming the network agreement. The results are substantially robust to different model specifications. Therefore, HP 1 seems to be supported by data only if the attention is focused on value added creation, while the positive effect of network agreements on profitability is not confirmed.

The last two columns of table 4 (http://www.sidrea.it/network-agreements-economic-performance-italian-smes/) report results of the estimates of networking effects on export propensity, measured as the ratio of exports over total sales. Firms involved in network agreements show a higher EXPORT propensity, and also in this case, the result is robust to different model specifications. The Italian network agreements seem to be valid instruments for sharing resources, experience and information with the goal of improving the firms' presence in foreign markets. In fact, our estimates show that after entering network agreements, SMEs show a higher share of foreign sales, even when the general trend in increasing exports has been removed using year fixed effects. The effect of the network contract is estimated to be 0.006, a little bit more than a half percentage point. Given the average level of exports, near 25% of total sales in 2014, the networks increase the share by about 3%, a small but positive and significant effect. Therefore, our evidence substantially supports HP 2: SMEs share resources and information through networking also with the aim of increasing their presence in foreign markets.

6.2 Networking, different firms and different contexts

If, intuitively smaller and larger firms should gain differently from networks, the direction of such differences cannot be easily predicted. We decide to split our sample of SMEs into two groups, identifying small (up to 50 employees) and large SMEs (between 50-250 employees). The same empirical model (1) has been run separately for each subsample, as if the two categories of firms enter networks for different objectives. As shown in table 5 (http://www.sidrea.it/network-agreements-economic-performance-italian-smes/) the empirical evidence is supportive of a different impact for the two subgroups. First of all, the evidence on value added created per unit of sales seems to be driven by the subsample of small SMEs. The coefficient (0.0065) is larger than the one reported for the whole sample (0.0053), and the statistical significance is higher, too. For the subsample of large SMEs, instead, the sign is negative but not statistical significant, suggesting that the main effect of networking is not to be found in the value added created. On the contrary, the evidence on profitability, measured by ROA or ROS, does not highlight any interesting differences among the two subsamples, for which it is confirmed a substantial neutrality of profits, irrespective of firm size.

However, considering the effects of networking on exports, it seems that the impact is much larger (0.017 as compared to 0.004) for firms employing more than 50 workers. This suggests that networking helps to increase exports, and the effect is stronger when firms are more structured, with an increase in export propensity near 20%. Therefore, HP2 is confirmed for both small and medium sized firms, and for the latter group effect is much larger, confirming HP3.

Table 6 (http://www.sidrea.it/network-agreements-economic-performance-italian-smes/) investigates in details the influence of the general socioeconomic environment in which firms operate, presenting separate regressions for different Italian in macro areas.[8] In particular, we distinguish four macro areas: North-West, North-East, Centre and South Italy, the same used by the Italian national statistical institute (ISTAT) for data gathering. The South is commonly recognized to be the most underdeveloped area, with lacking infrastructure and services for firms, the Centre represents an intermediate situation, while the North-East and the North-West are both more developed, but regions characterize by a prevalence of smaller manufacturing firms and larger firms respectively.

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[8] The approach of grouping firms according to homogeneous socioeconomic subsystems is very common for empirical studies focusing on Italy.

The results show that in the North-West, network agreements never affect significantly the outcome we are interested in. Similarly, in the North-East, the network effect is limited to export propensity, that increases in line with the coefficient estimated for the whole sample of Italian SMEs. The situation is very different for firms located in the Centre and South Italy, for which, as expected, the positive outcome of networking is higher, both in terms of value added created and export propensity. After entering networks, value added per unit of revenues increases by 0.009 in magnitude (with respect to 0.005 for whole sample), while export share increases by 0.08 (as compared to 0.005 for the whole sample) in both central and southern Italy [9]. We can conclude that formal network agreements are more effective in less developed areas, where resource sharing represents a practical and cost-saving way that partially compensates for the lack of infrastructure and services.

The last angle of analysis is based on the innovative/operative environment characterizing each industrial activity, using homogeneous groups of sectors based on the Pavitt taxonomy.[10] Table 7 (http://www.sidrea.it/network-agreements-economic-performance-italian-smes/) presents the results from estimating equation 1 for separate sectoral sub-samples. Using the two-digit Ateco classification, we are able to classify manufacturing activities and services according to the Pavitt taxonomy[11]. Accordingly, SMEs in our sample are divided into four groups of industries: Science Based, Specialized Suppliers, Scale and Information Intensity and Supplier Dominated. Also in this case, the intrinsic industry characteristics matter in influencing the outcomes of networking, even if firms' fixed effects and years' fixed effects are considered. In terms of the number of firms, 2/3 of Italian SMEs operate in specialized suppliers or supplier dominate sectors. This is in line with expectations considering that Italian firms are more focused on traditional industries than other European developed countries (Germany, France and the UK, for example). The estimates reported in table 7 (http://www.sidrea.it/network-agreements-economic-performance-italian-smes/) highlights that firms operating in specialized suppliers industries

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[9] Unfortunately, the effect on profits, measured by ROA, does not clarify the picture. The estimates of the same model using ROS as dependent variable have not been reported (but are available upon request), but are substantially equivalent to those based on ROA.

[10] In the industrial economic literature (see Archibugi, 2001 for a review) many different works adopt the Pavitt taxonomy for classifying sectors according to their main innovation characteristics.

[11] Bogliacino and Pianta (2015) have recently extended the Pavitt taxonomy by including also the services sectors, while previous taxonomies were manly limited to the manufacturing industry.

benefit more from network agreements. For such firms, entering a network implies an increase in value added per unit of revenues (+ 0.009), an increase in export share (+0.007) and an increase in profits measured through ROA (+0.01), and in all the cases the impact is higher with respect to the results for the whole sample. Similar considerations, but limited to the case of export share, are also valid in the case of supplier dominated industries, in which networking is found to increase the propensity to export: the coefficient (0.008) is larger than the one recorded for the entire sample.

7. Conclusion

This paper proposes one of the first empirical analyses on a very large scale of firms' networking activities. We analyze a large and representative sample of SMEs, defined as firms employing between 10 and 250 employees, operating in Italy in the period 2008-2014, for which we collect financial statements information. Taking advantage from the recent introduction of a specific formal network agreement in Italy, we estimate the short run advantage in terms of economic performance from entering this specific typology of networks. The Italian formal network is a specific contractual agreement "bringing together firms to co-produce, co-market, co-purchase or co-operate in product or marked development"[12]. The main advantage is that there is a clear distinction of firms included and not included in networks. In order to isolate the effect on performances from self-selection of firms and to take into account the impact of unobservable characteristics, we rely on a fixed effect estimator that accounts for individual and year specificities by demeaning all variables included in our econometric models. We adopt different measures of performance: the capacity to create value added per unit of revenues, profitability (measured by ROA or ROS) and export propensity. We find a general positive and significant effect of formal network agreements on value added created and on the export shares, but in both cases the effect is small in magnitude. We can conclude that a positive effect of formal networking in Italy exists on both value added created and export, but it is small, while it is slightly negative or better negligible on profits.

Moreover, we divide our sample between small (less than 50 employees) and large SMEs. The results show that value added created mainly increases for small SMEs, while the export propensity mainly increases for large SMEs. Then, we divide our sample according to the geographical location of firms, in order to account for socio-economic differences among Italian

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[12] This definition of a formal network is very similarly to the one proposed by Huggins (2001).

macro-areas. Our results show that the advantage from networking is stronger, in terms of both value added created and export propensity, for firms located in more underdeveloped areas. Regressions based on subsamples of sectors show that the results on value added created and export are mainly driven by firms operating in industries classified as specialized suppliers and supplier dominated which can be considered as clusters of traditional industrial sectors. Our empirical evidence seems to support the idea that networks are more beneficial for firms operating in less favorable environments or characterized by an intrinsic weakness. In this sense, stimulating resources sharing as well as firms' interactions or information exchange through networking can be win-win opportunities for Italian firms. On the one hand, networking can represent an alternative to dimensional growth in order to reach a critical mass of information and experience. On the other hand, networks can represents a valid way to overcome infrastructure lacks and isolation problem typical of less developed area where high-level services are not always guaranteed.

The fact that this analysis focused on a specific network agreement is both a strength and a weakness of our analysis. In fact, we are able to identify clearly the moment and the characteristics of those formal networks, but we are unable to identify other kinds of informal cooperation among firms that are not formalized throughout the network contract and we cannot isolate other formal agreements such as joint ventures or supplying contracts.

Moreover, even if the estimation techniques sound appropriate for eliminating self-selection issues and unobservable characteristics, which are both potential source of endogeneity, the interpretation of results in terms of direct causality effect between networking and economic performance should be taken with care. Observations for the years after entering a network agreement are limited by the short period available, and the fact that networking overlaps with the recent economic crisis can increase the potential uncertainty of obtained results. Probably our outcomes should be more consistent and robust in the future when more observation of firms entering formal networks will be available. At the present stage of research, we are able to catch only short-term effects.

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