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Formal business networking and SME growth

Bilitis Schoonjans · Philippe Van Cauwenberge · Heidi Vander Bauwhede

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Abstract This paper provides new empirical evidence on the impact of formal business networking on small and medium-sized enterprise (SME) growth. Using a large, unbalanced panel data set of Flemish SMEs over the period 1992–2008, we examine whether participation in a government-supported program aimed at providing small business managers with structured formal networking contacts is associated with SME growth. Our results suggest that formal business networking is significantly positively correlated with net asset and added value growth.

Keywords Growth · Networking · SMEs

JEL Classifications L14 · L25 · L26

1 Introduction

A firm's network can be an important source of knowledge and competitive advantage (Dyer and Singh 1998). In recent decades, an extensive body of theoretical research has emerged about the potential effects of networking on firm success (e.g. Granovetter 1973; Hite and Hesterly 2001). Furthermore, a number of empirical papers have documented the existence of networking benefits (e.g. Ostgaard and Birley 1996; Lechner and Dowling 2003; Rogers 2004; Watson 2007; Park et al. 2010). In general, business networks are considered to be valuable assets that facilitate acquisition of resources and knowledge essential for firm survival and growth. There is evidence suggesting that small and medium-sized enterprises (SMEs) in particular benefit from networking (e.g. Julien 1995). SMEs often lack sufficient resources and knowledge to deal with the rapidly changing environment in which they operate. Through networking they can obtain the knowledge and skills necessary to remain competitive. In addition, they can benefit from economies of scale without having the disadvantages of being large-scaled (Watson 2007). Notwithstanding their growing popularity amongst firm managers, the benefits of formal business-to-business networks (in which entrepreneurs voluntarily share knowledge and experiences) have been largely overlooked in prior networking studies (Parker 2008). Furthermore, the majority of existing empirical papers are primarily based on survey evidence (e.g. Havnes and Senneseth 2001; Kingsley and Malecki 2004; Li et al. 2010). Consequently, the measures of networking used are often self-reported and thus suffer from subjectivity.

B. Schoonjans · P. Van Cauwenberge (✉) · H. Vander Bauwhede
Department of Accountancy and Corporate Finance, Ghent University, Kuiperskaai 55/E, 9000 Ghent, Belgium
e-mail: Philippe.Vancauwenberge@UGent.be

B. Schoonjans
e-mail: Bilitis.Schoonjans@UGent.be

H. Vander Bauwhede
e-mail: Heidi.Vanderbauwhede@UGent.be

Using an objective measure of networking, this study investigates the effects of formal business networking on the growth of SMEs. We focus on SMEs because, as noted previously, networking is particularly beneficial for these firms. Furthermore, SMEs play an important role in the creation of social and economic wealth. In Belgium, 99.8% of businesses are SMEs and they are responsible for 66.9% of total employment and 57.7% of added value (European Commission 2009). We utilize a unique and objective measure of networking derived from a data set comprising all companies that participated in the PLATO networking program. PLATO is a program organized by a professional association of Flemish companies, named VOKA.[1] The aim of PLATO is to provide intense guidance and support for SME managers by organizing structured contacts with qualified executives of large corporations. In this program, exchanges of experiences, spillover of knowledge and creation of networks play a central role. PLATO is subsidized by the Flemish government since the project is expected to contribute to SME development and growth.

Our results indicate that participating in a formal business network like PLATO has a highly significant positive effect on firm growth. In particular, formal business networking seems to considerably enhance both net asset and added value growth. For employment growth, however, we find no significant effect.

We contribute to the literature in various ways. First, we focus on a formal business-to-business network (PLATO) that consists of groups of entrepreneurs and managers that voluntarily share knowledge and experiences. As mentioned previously, Parker (2008) points out that this type of formal network has been largely left uncovered. He advocates that there is an urgent need for empirical work on these networks and their effects on members' performance. Second, our measure of networking is objective in nature. Prior research has mainly used self-reported measures which can be very subjective, thereby causing biases in the analyses. Third, we make use of a large unbalanced panel data set covering a sample period of 17 years. The use of panel data econometrics enables us to control for unobserved time-invariant heterogeneity. As argued by Watson (2007), the use of panel data is limited in the networking literature since often only cross-sectional data are available. Finally, from a public policy point of view, it is interesting to investigate whether subsidizing PLATO programs is effective in stimulating SME development and growth. Honjo and Harada (2006) claim that this kind of research is scarce.

The remainder of this paper is organized as follows: Section 2 provides a brief overview of the networking literature and some more information about the PLATO program. Section 3 describes the applied methodology (empirical model and data collection). The empirical results of the regression analyses are presented in Section 4. In the final section, we draw conclusions, discuss the limitations of our study and provide some avenues for future research.

2 Related literature and context

2.1 Literature review

According to the resource-based view of firm performance, superior performance can solely be attributed to the unique resources and capabilities that reside *within* a firm (Barney 1991; Dyer and Singh 1998). However, as argued by Granovetter (1985), economic action does not take place in a social vacuum. The social context in which a firm operates can have a significant impact on its behaviour and performance. Amongst others, Dyer and Singh (1998) claim that the social network in which a firm is embedded also contains resources and capabilities that are critical for firm success. Through social interaction, firms are able to quickly identify and exploit opportunities and to manage their environmental uncertainties (Burt 1997; Elfring and Hulsink 2003). In addition, networking enables firms to get access to knowledge and resources in a timely and cost-effective manner (Powell et al. 1996; Gulati and Higgins 2003). Zaheer and Bell (2005) further posit that network resources can help firms to develop and strengthen their internal capabilities, which in turn may contribute to enhanced firm performance.

It is generally assumed that there are two important dimensions of social interaction that could possibly explain the beneficial effects of networking on firm performance: the relational embeddedness and the structural embeddedness of a firm in its network (e.g. Granovetter 1985; Gulati 1998). Relational

[1] See www.voka.be for more information on this program.

embeddedness broadly refers to the quality of the relationships in which a firm engages, whereas structural embeddedness relates to both the configuration of a firm's network and a firm's position within this configuration (Moran 2005).

Relational embeddedness is closely intertwined with the notion of a 'strong tie' (Gulati 1998). According to Granovetter (1973), the strength of an interpersonal tie can be determined by four factors: the amount of time spent with the tie and the emotional intensity, intimacy and reciprocity of the tie. Strong ties are generally characterized by high levels of trust and closeness between the actors. Trust and closeness are important governance mechanisms that can help reduce transactional uncertainty and diminish the risk of opportunistic behaviour by networking partners (Uzzi 1996; Molina-Morales and Martinez-Fernandez 2010). Since trust causes network members' behaviour to become more predictable and reliable, it can create an environment in which the transfer of tacit and high-quality knowledge is strongly encouraged and facilitated (Uzzi 1996). However, a possible drawback of strong-tied relationships involves the risk of becoming 'overembedded' (Uzzi 1996, 1997). When the frequency of interaction between two actors is high over a long time span, there is an increased probability that these actors will eventually have the same capabilities and knowledge at their disposal (Sosa 2011). This may result in reduced creative thinking and 'collective inertia', which can negatively affect a firm's ability to adapt to changing environments (Uzzi 1997; Eisingerich and Bell 2008). Since networking has a time and monetary cost, it is inefficient for firms to preserve overembedded and mutually redundant ties. Nevertheless, it is often observed that firms maintain redundant ties because of feelings of reciprocity and social pressure associated with strong-tied relationships (Uzzi 1997).

Structural embeddedness focusses on the informational advantages that a firm can derive from occupying a beneficial position within its network structure (Gulati 1998; Moran 2005). As pointed out by Burt (1992), firms that bridge 'structural holes' (i.e. people and/or clusters that are unconnected in the network structure) obtain the most informational benefits. The larger the number of structural holes that are spanned within the network, the more value a firm can gain from its network activities (Burt 2000). Indeed, a firm is more likely to get access to non-redundant information when its network partners do not interact and communicate with each other. The advantage of having a high number of non-redundant ties is that a very rich and diverse knowledge and resource pool can be accessed. Consequently, opportunities and threats can be more quickly identified and the adaptability of a firm can be enhanced (Moran 2005). Besides informational advantages, a firm that bridges structural holes can also benefit from control advantages (Burt 1992). These advantages stem from the fact that information and knowledge are scarce and thus highly valuable resources. A final benefit of being strategically well positioned within a network is related to the signalling property of a firm's network position. Firms that are well positioned in their network are highly visible, which engenders important reputational effects and improves the external legitimacy of a firm (Koka and Prescott 2008). Furthermore, the fact that a firm occupies a focal position can induce an important signal to potential other network partners of the firm's willingness and ability to network (Gulati 1998, 1999). This may enable a focal firm to further extend its network ties. Despite the rich benefits of bridging structural holes in the network structure, there is, however, a possible drawback associated with it. Structural holes are more likely to exist between network partners that are weakly tied to the focal firm, for it is unlikely that strongly tied network partners are unconnected among themselves (Granovetter 1973). Although weak ties are essential to access novel and innovative information, they are often characterized by low levels of trust and social control between the actors. As a consequence, there exists a higher risk of opportunistic behaviour, resulting in a lower propensity to share qualitative and tacit knowledge.

Several empirical studies have confirmed that both relational and structural embeddedness are important performance drivers (e.g. Uzzi 1999; Burt 2000; Moran 2005). Both dimensions of social capital can play complementary roles in enhancing performance, implying that it is essential for firms to combine these two aspects when managing their networks. Burt (2000), for instance, demonstrates that maximum performance can be reached when network closure (i.e. the extent to which everyone is connected within a network) is high within a subgroup of people and when, simultaneously, the number of non-redundant contacts is high beyond the different subgroups. Furthermore, Uzzi (1999) shows that networks

composed of a mix of strong and weak ties can optimize a firm's economic performance.

Given the growing interest of managers and academics in understanding the effects of networking on firm performance, there have been numerous studies empirically investigating this topic. Amongst others, networking has been linked to innovation (Rogers 2004), the amount of sales (Pirolo and Presutti 2010), the availability of credit (Petersen and Rajan 1994; Uzzi 1999) and trade credit terms (Uzzi and Gillespie 2002). The relationship between networking and growth, which we intend to investigate, has also been documented in a number of studies with mixed findings. Havnes and Senneseth (2001), for instance, use a survey-based measure of networking to capture the effects of cooperation (in sales, financing, manufacturing etc.) between firms. They find no evidence of enhanced employment or sales growth resulting from networking. Their analysis suggests, however, that networking can induce other benefits, such as high growth in the geographic extension of markets. Foreman-Peck et al. (2006) also use survey evidence in order to measure the concept of networking. They demonstrate that information networking through trade association membership negatively affects both SME growth and profitability, but suggest that their networking measure may be responsible for these findings. Based on a survey amongst Australian SMEs, Watson (2007) finds a positive relationship between formal networking and the probability of survival and growth. Park et al. (2010) examine the effect of industrial networking (subcontracting and clustering in particular) on firm growth and survival, using a survey amongst Korean companies. Their results reveal no positive relation between subcontracting and growth. Clustering, on the other hand, does seem to have a positive impact on growth.

By examining the relationship between growth and a specific type of networking, we hope to provide further insights into this topic. As noted previously, we will focus on a kind of networking that has been largely overlooked in the prior networking literature (Parker 2008), namely a formal business-to-business network in which entrepreneurs voluntarily share their knowledge and experiences.

2.2 The PLATO program

PLATO is a formal business networking program organized by an independent association of Flemish companies called VOKA. The program is subsidized by the Flemish government, as it is expected to contribute to SME development and growth. Each year new PLATO projects are initiated by VOKA. All firms having fewer than 250 employees, regardless of the industry in which they are active, can opt to participate in a project. Since 1987, more than 6,000 managers of Flemish SMEs have participated. Due to its success in Belgium, the PLATO concept has recently been exported to several other countries, including Denmark, Germany, France, Ireland, The Netherlands, Sweden and South Africa.

The purpose of PLATO is to provide intense guidance and support to SME managers (the participants) by organizing structured contacts with other SME managers under the supervision of highly qualified executives of large corporations (the coaches). The program aims to stimulate exchange of experiences, spillover of knowledge and creation of networks between the participants and the coaches and between the participants themselves. Furthermore, by improving the management and networking skills of the participants, PLATO intends to professionalize the corporate policies of small businesses.

In order to gain a deeper understanding of the actual working of the PLATO program, we organized a focus group interview among six PLATO participants, two coaches and the global administrator of the PLATO program. The interview was unstructured, and the questions posed were open-ended, as the intention was to gain a general understanding of the different aspects that could explain the potential success of the project.

A PLATO project is always organized around three different kinds of meetings: team building activities, meetings in fixed groups and coordination meetings. At the beginning of each PLATO project, there are two *team building activities* that take place. The first activity is organized only for the large firm executives who must coach and support the SME managers in the later stages of the project. During this activity, the coaches get to know each other better and, more importantly, receive intensive training that should improve their coaching skills (e.g. about how to coach their teams and build a trustful atmosphere). In addition, this common training assures that PLATO projects organized at different times and places are fairly homogeneous. In the second team building activity, both the coaches and the participants are present. This activity takes an entire weekend and is

directed towards stimulating group dynamics. According to the interviewees, this weekend is crucial since it lays the foundation on which trust among the participants is built.

The second kind of meetings are *meetings in fixed groups*, which are organized monthly. The fixed groups are composed during the team building weekend, and they each consist of approximately 15–20 SME managers to which two (sometimes three) large firm executives are designated. The main purpose of the meetings in fixed groups is to critically reflect on the management practices of the participants and to exchange experiences, best (or bad) practices and knowledge about all sorts of management topics (e.g. lean production, human resource policies, cost price calculation and finance). To ensure the themes covered are relevant for SMEs, the participants can choose the themes themselves. Furthermore, if a manager participant has an acute problem or decision to make, he or she can always ask the group for opinions or advice (i.e. joint problem solving). As argued by a number of interviewees, the meetings in fixed groups are, in effect, a form of 'free consulting' and an important sounding board for decision-making processes. Hence, participants are able to better manage their uncertainties, resulting in quicker, more effective and more confident decision-making. Furthermore, a lower risk perception may positively affect investment behaviour and growth. Of course, in order to initiate intensive knowledge transfers, there must exist a high amount of trust and openness between the participants. Von Friedrichs Grängsjö and Gummesson (2006) posit that regular personal contacts are vital to build a high-trust atmosphere. It is, therefore, very important that the participants actively take part in as many meetings as possible. According to the interviewees, all PLATO participants are highly motivated to attend the fixed group meetings, resulting in high participation rates.[2] One of the outputs of the focus group interview was that the fixed group relationships quickly evolve from rather weak to stronger ties, which considerably improves the relational embeddedness of the participating firms and, hence, the transmittance of high-quality knowledge. Besides high participation rates, there is another aspect that is important in light of the need to create trust: the composition of the fixed groups. This composition is carefully considered by the project administrators since it may have a substantial impact on the success of the fixed group meetings. Generally a fixed group is quite small, consisting of a maximum of 15–20 SME managers. This is an important criterion since, as pointed out by Moran (2005), networks that are too large are very difficult to maintain. Furthermore, direct competitors and suppliers are not allowed to participate in the same group because this could induce opportunistic behaviour resulting in lower levels of trust and communication. Finally, the groups mostly comprise firms that operate in different industries. As mentioned by the interviewees, management difficulties and needs are often quite homogeneous across industries. Zaheer and Bell (2005) argue that it can be beneficial for firms to network with firms operating in different industries since this increases their likelihood of spanning structural holes in the overall network, thereby improving their structural embeddedness and resulting in better access to non-redundant information.

In addition to the team building and fixed group meetings, the project administrators organize three to four *coordination meetings* throughout the year to which both current and previous PLATO members are invited. These meetings generally start with a guest speaker who presents an interesting and relevant topic (e.g. smart sales), thereby enlarging the knowledge base of the participants. Afterwards, the PLATO members are encouraged to network in a very informal setting which enables them to further extend their network ties. Since the frequency of interaction is rather low in coordination meetings (only three to four times throughout the year), these ties will remain quite weak. Although weak-tied relationships are often associated with a limited transfer of high-quality and tacit knowledge, they are essential to access novel and innovative information. Furthermore, this type of relationship allows the PLATO firms to bridge possible structural holes in their network, thereby enhancing their structural embeddedness in the network. As noted in the literature review, this may enable the PLATO participants to benefit from important informational and control advantages. In addition, improved structural embeddedness engenders reputational effects and may be helpful in gaining external legitimacy, which is especially important for small companies.

[2] The Flemish government evaluates the PLATO program on the participation rates, since these are likely to considerably influence the effectiveness of the program.

As mentioned in the literature review, both the relational and structural embeddedness of a firm in its network are important and complementary performance drivers. Since participating in the PLATO project seems to improve both dimensions, it can be reasonably expected that networking through PLATO will have a positive effect on firm growth.

3 Methodology

3.1 Empirical model

In order to examine the effect of formal networking on SME growth, the following regression equation is estimated using fixed effects estimation:[3]

$$\begin{aligned} Growth_{it} = {} & \beta_{0i} + \beta_1 \ln Size_{it-1} + \beta_2 \ln Age_{it-1} \\ & + \beta_3 (\ln Size_{it-1})^2 + \beta_4 (\ln Age_{it-1})^2 \\ & + \beta_5 (\ln Size_{it-1})(\ln Age_{it-1}) \\ & + \beta_6 \frac{Debt_{it-1}}{Equity_{it-1}} + \beta_7 Industry\_Growth_{it} \\ & + \beta_8 PLATO_{it-1} + \varepsilon_{it}, \end{aligned} \quad (1)$$

where β_{0i} are the unobserved fixed effects and ε_{it} is assumed to be a normally distributed disturbance term with mean zero and a possible non-constant variance. In order to mitigate the effect of outliers, all variables are winsorized at the 5th and 95th percentile. Furthermore, all monetary values are deflated (base year: 2004) by using the consumer price indices provided by the Belgian Federal Government's Service of Economics.[4]

Consistent with other growth studies (e.g. Evans 1987a, b; Harhoff et al. 1998; Almus and Nerlinger 1999; Liu et al. 1999) $Growth_{it}$ is defined as follows:

$$Growth_{it} = \ln Size_{it} - \ln Size_{it-1}.$$

Since prior research suggests that different growth measures are not necessarily correlated, several growth measures are examined for robustness purposes (Delmar et al. 2003). The use of a number of growth measures also facilitates comparison with prior research (Delmar et al. 2003). In this paper, we focus on growth in net assets, employment and added value. While growth rates in net assets and employment have been frequently used (e.g. Almus and Nerlinger 1999; Rodriguez et al. 2003; Honjo and Harada 2006; Oliveira and Fortunato 2006; Goddard et al. 2009), growth in added value is less common. As small Belgian SMEs are allowed to draw up their financial statements in an abbreviated format in which sales does not have to be reported, we are not able to use growth in sales. Therefore, growth in added value is used as an alternative measure to sales growth in this study.[5]

$Size_{it-1}$ is measured as employment$_{t-1}$, net assets$_{t-1}$ or added value$_{t-1}$, depending on which growth measure is used as the dependent variable. In 1931, Gibrat was the first to examine the impact of firm size on growth. His 'law of proportionate effect' states that 'the probability of a given proportionate change in size during a specified period is the same for all firms in a given industry regardless of their size at the beginning of the period' (Mansfield 1962). However, this law has been rejected in many empirical studies (e.g. Almus and Nerlinger 1999; Becchetti and Trovato 2002; Calvo 2006). Smaller firms generally tend to have higher growth rates than their larger counterparts. In line with the latter studies, we expect that size will have a negative impact on firm growth (e.g. Almus and Nerlinger 1999; Becchetti and Trovato 2002).

Age_{it-1} is calculated as the difference between year$_{t-1}$ and the date of start-up. Inspired by Jovanovic's 'learning model' (Jovanovic 1982), which states that firms learn about their efficiency as they operate and that only efficient firms survive, Evans (1987a, b) explored the relationships between growth and age. He found that firm growth is inversely related to age, indicating that younger firms grow faster than mature firms. The growth–age relationship has been further documented in numerous other studies (e.g. Harhoff et al. 1998; Almus and Nerlinger 1999; Farinas and Moreno 2000). Since younger firms are supposed to have higher growth rates, we expect a negative effect of age on SME growth (Evans 1987a, b).

In order to detect potential non-linearities in the growth–size and growth–age relationships, a second-order expansion of size and age (Age^2_{it-1}, $Size^2_{it-1}$ and

[3] Hausman's (1978) test is performed for all three models in order to determine which estimator should be used. In each case, the null hypothesis is rejected, indicating that the fixed effects model is the correct model to use.

[4] *Source*: www.statbel.fgov.be.

[5] Added value is calculated as sales less cost of sales.

$Age_{it-1} * Size_{it-1}$) is added to the model (Evans 1987a, b; Johnson et al. 1999). In accordance with prior growth studies, we expect that the size–growth relationship will prove to be convex, indicating diminishing marginal effects of size (e.g. Liu et al. 1999). Prior evidence on the shape of the age–growth relationship is, nevertheless, ambiguous. Almus and Nerlinger (1999) show that the age–growth relationship is concave in nature, whereas Liu et al. (1999) find a convex relationship.

The *debt-to-equity* ratio is used as a proxy for leverage (Lensink et al. 2005). Leverage can have either a positive or a negative effect on firm growth. On the one hand, more debt enables firms to increase investments and thus to grow more. On the other hand, too much debt can increase the risk of settlement problems and bankruptcy, thereby decreasing growth.

A number of growth studies include industry dummies in the regression model to control for industry effects (e.g. Becchetti and Trovato 2002; Beaudry and Swann 2009). Growth rates might differ substantially across different industries. Almus and Nerlinger (1999), for instance, demonstrate that firms in technology-intensive sectors achieve higher growth rates than firms in other manufacturing sectors. However, since our model contains firm fixed effects, it is impossible to also include time-invariant industry dummies. To control for potential industry effects we, therefore, included the variable $Industry\_Growth_{it}$, which is the median growth rate of the industry to which a firm belongs.[6]

Since we attempt to examine the effect of PLATO on SME growth, $PLATO_{it-1}$ is included as an independent variable in our model.[7] $PLATO_{it-1}$ is a dummy taking value 1 if a firm participated in a PLATO project in $t-1$ and 0 otherwise. If networking leads to increased SME growth, a positive sign is expected for the dummy.

[6] Based on the NACE-BEL classification of industries, we constructed 13 industry groups in order to calculate the median industry growth rates.

[7] Havnes and Senneseth (2001) point out that there often exists a time delay between the networking 'event' and its outcomes. This implies that a firm that networks in $t-1$ will probably perform better at time t, but not necessarily at time $t-1$. Consequently, we included a time lag for the PLATO dummy in our regression equation.

3.2 Data collection

Our data set merges information from two databases: the Belfirst database of Bureau Van Dijk and the PLATO database provided by VOKA. From the Belfirst database, we retrieved financial account data on all East-Flanders SMEs for the period 1992–2008. We consider a business to be an SME if it has fewer than 250 employees in its last available year. This is in line with the European Commission's employment criterion of small and medium-sized enterprises. The PLATO database contains all the companies that joined a PLATO project between 1991 and 2008 in the East Flanders region. Hence, we could identify the companies that participated in a PLATO project in a certain year in the Belfirst database.

From the initial sample of SMEs in the Belfirst database, we deleted a number of observations. First, we removed all firms operating in an industry in which no PLATO participants were active (these industries include agriculture, mining and utilities). Second, in order to calculate growth rates, the firms in our sample had to exist for at least two consecutive years. However, we did not require the SMEs to have survived the whole sample period, yielding an unbalanced panel. Potential survivorship bias was, therefore, considerably reduced. Third, we deleted all observations with non-positive values for the size and age variables. This deletion was unavoidable since we take the natural logarithm of these variables in our analyses. Finally, we omitted all observations with missing values for one or more of the variables used in our empirical model.

As noted previously, several growth measures are used in the regression models: employment, net assets and added value. Depending on the growth measured used, we obtained three different subsamples. The subsamples consist of 108,794, 284,996 and 303,567 firm-year observations from 19,518, 39,254 and 40,882 SMEs for the employment, net asset and added value growth models, respectively. The differences in sample sizes are caused by differences in both the number of missing values and the number of observations having non-positive values for each size measure.[8] The number of PLATO observations is

[8] We took the natural logarithm of all size and age measures in our models. Since the natural logarithm of zero is undefined, the number of observations will decrease when the value for size

Table 1 Descriptive statistics: PLATO versus non-PLATO

	PLATO SMEs			Non-PLATO SMEs			*t*-stat
	N	Mean	SD	*N*	Mean	SD	
Panel A: Employment growth							
Employment growth	553	0.0600	0.0097	108,241	0.0491	0.0007	1.0567
Size	553	11.8843	11.1496	108,241	8.2960	10.4360	8.0622***
Age	553	14.3400	8.5319	108,241	13.6767	8.7109	1.7861*
Leverage	553	3.5553	4.8591	108,241	3.5295	5.3988	0.1121
Industry growth	553	0.0001	0.0029	108,241	0.0001	0.0031	0.0675
Panel B: Net asset growth							
Net asset growth	765	0.0933	0.0084	284,231	0.0718	0.0005	2.2776**
Size (in 000)	765	415.1318	450.5083	284,231	281.9683	410.8549	8.9501***
Age	765	13.7203	8.6312	284,231	11.1349	8.0900	8.8255***
Leverage	765	4.0732	4.2860	284,231	3.8511	4.7205	1.2999
Industry growth	765	0.0451	0.0205	284,231	0.0463	0.0296	−1.1105
Panel C: Added value growth							
Added value growth	825	0.0410	0.0112	302,742	0.0015	0.0007	2.8431***
Size (in 000)	825	520.3408	416.7489	302,742	228.9370	328.6509	25.412***
Age	825	13.5309	8.6127	302,742	10.9287	8.0089	9.318***
Leverage	825	3.5417	5.0045	302,742	3.2772	5.4475	1.393
Industry growth	825	0.0013	0.0492	302,742	0.0024	0.0459	−0.6926

SD standard deviation, *N* number of observations; the reported *t*-statistics are two-sided

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

small, ranging from 553 in the employment sample to 825 in the added value sample.

4 Empirical results

Table 1 presents descriptive statistics for all variables for both PLATO and non-PLATO firms. Since different subsamples are used in the three growth models, separate statistics are reported for each subsample. Panel A shows the summary statistics for the employment growth model. In this model, the average logarithmic growth rate is positive for both groups of firms, indicating that the number of employees of the SMEs has increased on average. Although the average employment growth is higher for PLATO than for non-PLATO firms, this difference is insignificant. Panels B and C document the descriptive statistics for the net asset and added value growth subsamples, respectively. It appears that PLATO SMEs have significantly higher net asset and added value growth rates than non-PLATO SMEs. This may signify that networking through PLATO has a positive effect on SME performance. Table 1 further indicates that PLATO firms are, on average, larger and older than non-PLATO firms in every subsample.

In line with prior research (e.g. Delmar et al. 2003), Table 2 documents that the three different growth measures used in this study are not strongly correlated. Consequently, to test the robustness of our findings, we estimate three regression models: employment growth, net asset growth and added value growth.

Table 3 reports the results of the fixed effects regression analyses. In order to control for macroeconomic circumstances, we included year dummies in all growth models. Jovanovic (1982) predicts that

Footnote 8 continued
and/or age equals zero. As small businesses often do not have any employees, employment size will equal zero in many cases. Therefore, the number of observations in the employment growth sample is markedly lower than in the net asset and added value growth sample.

Table 2 Growth pairwise correlation matrix

	Employment growth	Net asset growth	Added value growth
Employment growth	1.0000		
Net asset growth	0.0931	1.0000	
	(0.000)		
Added value growth	0.3104	0.3130	1.0000
	(0.000)	(0.000)	

Note: *p*-values in parentheses

the variance of firm growth is inversely related to firm age, which causes concerns for heteroskedasticity. Therefore, White's heteroskedasticity robust standard errors (White 1980) are reported in Table 3.

We first examine the growth–size relationship. In all three models, size has a highly significant negative effect on firm growth, suggesting that smaller firms have, ceteris paribus, higher growth rates than their larger counterparts. The quadratic terms of firm size are also significant in all models, indicating that the growth–size relation is non-linear. The coefficient is found to be positive in each case. In order to determine whether the overall size effect is positive or negative, we calculated the partial derivatives (elasticities) of growth with respect to a percentage change in size as follows (Heshmati 2001):

$$\varepsilon_{Size,it} = \frac{\partial \ln(Growth_{it})}{\partial \ln(Size_{it-1})} = \hat{\beta}_1 + 2\hat{\beta}_3 \ln Size_{it-1} + \hat{\beta}_5 \ln Age_{it-1}.$$

Table 4 shows the mean and standard error of the calculated elasticities. The size elasticities are negative in all three models, indicating negative growth–size relationships. Consequently, and in line with many other studies, Gibrat's law is rejected; small firms grow faster than their larger counterparts. With respect to age, the results differ between the three growth models. In both models 1 and 3, age has a significant negative effect on firm growth. By contrast, in model 2 the coefficient of age is significantly positive. The quadratic terms of age are significant in all three models, indicating that non-linearities exist in the growth–age relationship. The signs of the quadratic terms, however, diverge: in models 1 and 2 the square terms are positive, while a negative coefficient is found in model 3. In order to determine the overall age effect on firm growth, the age elasticities were calculated as follows:

$$\varepsilon_{Age,it} = \frac{\partial \ln(Growth_{it})}{\partial \ln(Age_{it-1})} = \hat{\beta}_2 + 2\hat{\beta}_4 \ln Age_{it-1} + \hat{\beta}_5 \ln Size_{it-1}.$$

Table 4 demonstrates that the age elasticities are positive in all models, suggesting that mature firms have higher growth rates than young firms. This contrasts with most of the prior literature, which generally reports a negative growth–age relationship. Heshmati (2001), however, obtained similar results in the asset growth model when using fixed effects estimation. In line with Serrasqueiro and Nunes (2008), our results further document that leverage has a positive effect on firm growth, indicating that external finance can enhance firm growth. This implies that credit constraints may inhibit firms from growing. The debt-to-equity ratio is highly significant in all growth models. Our final control variable, industry growth, proves to be significantly positively related to firm growth, suggesting that firm growth is partly industry driven.

Since the purpose of this study is to examine the effect of formal business networking on firm growth, we are particularly interested in the sign and significance of the PLATO dummy. As networking facilitates transfer of knowledge and resources that are essential for firm growth, we expect a positive relationship between networking and SME growth. In the employment growth model, the coefficient of the PLATO dummy, albeit positive, is statistically insignificant. This implies that, contrary to our expectations, participating in PLATO does not increase employment growth. This is in line with the findings of Havnes and Senneseth (2001), who also did not find a positive relationship between networking and employment growth. The absence of a relationship between networking and 1 year ahead firm growth may be explained by the relatively fixed nature of a firm's workforce in the short run. Furthermore, SMEs often face difficulties in attracting qualified employees, which might also impede employment growth. Contrary to the employment growth model, however, the net asset growth model shows a highly significant ($p = 0.002$) positive effect of networking through PLATO on net asset growth. Net asset growth is on average 2.50 percentage points higher for SMEs participating in PLATO than for non-PLATO SMEs. Furthermore, PLATO also seems to have a highly significant ($p = 0.006$) and positive impact on growth

Table 3 Empirical results

	(1) Employment	(2) Net assets	(3) Added value
ln(employment)	−0.3780***		
	(0.0068)		
ln(employment)^2	0.0468***		
	(0.0018)		
ln(employment) * ln(age)	−0.0171***		
	(0.0023)		
ln(net assets)		−0.2820***	
		(0.0065)	
ln(net assets)^2		0.0199***	
		(0.0007)	
ln(net assets) * ln(age)		−0.0162***	
		(0.0009)	
ln(added value)			−0.6610***
			(0.0081)
ln(added value)^2			0.0352***
			(0.0009)
ln(added value) * ln(age)			0.0195***
			(0.0013)
ln(age)	−0.0182***	0.0450***	−0.0121*
	(0.0068)	(0.0046)	(0.0068)
ln(age)^2	0.0275***	0.0185***	−0.0152***
	(0.0028)	(0.0017)	(0.0023)
Leverage	0.0013***	0.0105***	0.0035***
	(0.0002)	(0.0004)	(0.0002)
Industry growth	0.7780***	0.9270***	0.6560***
	(0.2590)	(0.0584)	(0.0355)
Plato	0.0065	0.0250***	0.0307***
	(0.0100)	(0.0080)	(0.0113)
Firm-year observations	108,794	284,996	303,567
Number of SMEs	19,518	39,254	40,882
R^2	0.393	0.358	0.329

Notes: Robust standard errors (White 1980) in parentheses. All variables are winsorized at the 5th and 95th percentile

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table 4 Elasticities

		(1) Employment	(2) Net assets	(3) Added value
Size elasticity	Mean	−0.2827	−0.1277	−0.2987
	SD	0.1048	0.0519	0.1016
Age elasticity	Mean	0.0859	0.0456	0.0143
	SD	0.0444	0.0316	0.0327

SD standard deviation

in added value. The added value growth of firms taking part in PLATO is 3.07 percentage points higher, on average, than the added value growth of non-PLATO firms. Based on our results, it can be concluded that joining a business-to-business network like PLATO is beneficial for the net asset and added value growth of SMEs.

5 Conclusions

In recent decades SMEs have received considerable attention since they play a major role in the creation of social and economic wealth. In order to stimulate SME growth, it is important that governments, entrepreneurs and SME managers gain a clear insight into the

drivers and determinants of firm growth. In this study the primary focus was to examine the effect of formal business networking on SME growth. It is argued that having a broad and deep external network is an important intangible asset, as it enables firms to enhance their competitive position (Zhao and Aram 1995). Furthermore, networking facilitates the acquisition of knowledge, skills and resources essential for firm growth and survival that would otherwise be difficult to obtain. SMEs particularly benefit from networking as they often lack sufficient resources and knowledge to deal with the environment in which they operate.

The network investigated in our study is the PLATO network. PLATO is a Flemish, government-supported program aimed at intense guidance and support for small business managers. Exploring a unique, large, unbalanced panel data set, we found clear evidence that networking through PLATO positively influences net asset and added value growth. Firms participating in PLATO have a net asset growth that is, ceteris paribus, 2.50 percentage points higher than the net asset growth of non-PLATO firms. In addition, the added value growth of PLATO firms is, ceteris paribus, 3.07 percentage points higher than that of non-PLATO firms. These findings confirm the importance of networking for SME success. However, we did not find any significant effect of networking through PLATO on employment growth.

It must be noted that, similar to most other studies, our study also suffers from a number of limitations that should be taken into account when interpreting the results. First, we only examined the effect of the PLATO network on firm growth, thereby disregarding the effects of other networks such as those with employees, suppliers etc. The mix of different types of networks can, however, be important for the firm's overall performance. Furthermore, Watson (2007) argues that there is an optimal level of networking, since networking has a time and financial cost associated with it. Accordingly, firms can benefit from participating in a network like PLATO when they have not yet reached their optimal level of networking. For firms that have already reached their optimal level of networking, joining a PLATO project might be counter-productive. We could not examine these effects because it was impossible to obtain accurate information about the entire network of each of the firms in our sample. A second limitation of this paper is the use of a dummy to measure the concept of networking. The PLATO dummy only indicates whether or not a firm participated in PLATO in a certain year; it does not reflect the quality of the PLATO relationships. Fyrberg and Jüriado (2009), however, claim that the quality of a relationship plays an important role in the co-creation process associated with networking. Third, as qualitatively shown by Cliff (1998), male entrepreneurs are more likely than their female counterparts to set high maximum firm size limits and to pursue rapid growth. If a gender imbalance exists between the PLATO participants, gender differences might partly drive our results. Since we do not have exact data on the gender of the PLATO participants, further research is needed to explore this area. Finally, although we have found a positive association between formal business networking and firm growth, it is difficult to determine the direction of causality (Robson and Bennett 2000). It is possible that successful firms are more likely to participate in relevant networking activities. The question then remains whether firms are successful because of their networking activities or whether successful firms have a higher proclivity and need to network.[9]

Notwithstanding the limitations of our study, we believe that the results may be informative for both policy makers and SME managers. First, if policy makers aim to improve the net asset and/or added value growth of SMEs, then supporting networking projects like PLATO is strongly recommended. Our findings show that participating in PLATO substantially enhances SME growth measured in terms of net assets and added value. Second, it is essential that SME owners and managers are aware of the value of formal business networking. SMEs are increasingly operating in turbulent environments in which rapid access to knowledge and resources has become crucial to remain competitive. Since SMEs often do not have sufficient in-house knowledge and resources, it is important that they actively build and manage well-designed networks in order to efficiently and quickly acquire needed resources. Our results indicate that, through the alleviation of knowledge and resource

[9] However, by including firm fixed effects in our regression models we control for time-invariant, unobservable factors that may influence selection.

deficits, formal business networking can contribute to SME growth.

Research on formal business-to-business networks—in which firm managers voluntarily share knowledge—is scarce (Parker 2008). By empirically examining the relationship between this kind of networking and firm growth, we have already provided some initial evidence on this topic. However, further research is required to gain additional insights into the benefits and dynamics of formal business networks. We, therefore, propose some interesting avenues for future research. First, future studies might investigate the effect of formal business networking on other performance indicators such as firm survival and firm profitability. Second, it would be interesting to examine the network behaviour of firms participating in formal business networks in more detail. Third, networking research would benefit from the development of a measure of formal business networking that also captures the strength and quality of the relationships. Finally, future research might study whether the positive effect of formal business networking on firm growth is contingent on the gender of the participating managers.

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