

# The role of banks and venture capital for firm performance

(Extended Abstract)

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**Abstract:** The relevance of bank lending relationships and of venture capital (VC) financing for firms has been well-established in the literature. However, the question whether these two funding sources have a positive or negative common effect on growth and investment of firms (i.e. whether they work as complements or substitutes) remains largely unanswered, especially at the micro level. This paper fills the gap in the literature by combining firm-level information on growth and investment outcomes of Belgian firms with bank loan-level data and VC deal-level data for the period 2002m1-2012m3. Preliminary results suggest that new bank debt and venture capital have complementary positive effects on growth and investment of firms. This result holds especially for the pre-Lehman collapse period, but partially also for the (post-)crisis period. Using information on the actual funding providers, we find that small banks do not have a comparative advantage over large banks in promoting growth and investment of firms, and do not have an interactive effect with venture capital. On the other hand, funding provided by bank-affiliated venture capital investors yields positive effects on firm performance, both individually and when combined with new bank debt.

**Keywords:** Banking; Venture capital; Growth; Investment

**JEL Classification:** G21, G24, G32

## INTRODUCTION

As has been widely accepted in the literature, financial development and the related availability of funding sources are an important driver of economic growth (e.g. King and Levine, 1993; Rajan and Zingales, 1998). In that respect, banks might be considered as the most relevant financial intermediaries for firms. In the case of firms facing financial constraints, small banks may possess comparative advantages over more hierarchically complex banks in alleviating such constraints (Stein, 2002; Liberti and Mian, 2009; Berger, Bouwman and Kim, 2015). However, banks are generally also considered to be less willing to provide funding to small and young or high-tech firms, due to a high degree of uncertainty and a lack of hard information related to such firms (Carpenter and Petersen, 2002; Beck, Demirgüç-Kunt and Maksimovic, 2005; Colombo and Grilli, 2007).

On the other hand, the venture capital industry is especially oriented towards alleviating informational asymmetries related to young and small firms (Hall and Lerner (2010)). It is therefore of no surprise that venture capital support enables such firms to grow faster and become more efficient (see e.g. Engel and Keilbach, 2007; Paglia and Harjoto, 2014 and references therein). Several theoretical contributions to this strand of the literature have discussed the appropriateness of bank funding and venture capital for different types of firms beyond their size and age, and have argued that venture capital is more suitable for firms with less collateral (Ueda, 2004), lower productivity (de Bettignies and Brander, 2007) or lower profitability (Winton and Yerramilli, 2008).

Only a few recent empirical studies, however, consider the two sources of funding together, rather than separately. Barry and Mihov (2015) rely on a sample of around 6000 IPO firms to find that, although the firms obtaining the two types of funding are different, there exists a degree of complementarity between the financing sources: long-run underperformance among firms with high debt is lower for firms backed by venture capital than for those without it. From their analysis at the level of US states, Cole, Cumming and Li (2016) find that venture capital has a more stimulating effect on entrepreneurship than bank debt in promoting entry of new firms and employment. From the perspective of the funding providers, Hellmann, Lindsey and Puri (2008) consider banks that are also engaged in providing venture capital, and find that such banks are more likely to lend to a firm with which they had a prior VC relationship.

The aim of this paper is to provide a comprehensive view on the relevance of banks and venture capital for firms' growth and investment prospects in the following ways: (1) performing the analysis at the firm-time level, which allows to analyse the funding dynamics of firms; (2) explicitly accounting for all possible funding combinations (i.e. having only VC; having only new debt; having both; having neither) in order to identify positive or negative effects of simultaneously using both bank debt and VC; (3) adding characteristics of funding providers to deepen existing insights on the role of small banks and bank-affiliated VC providers. To the knowledge of the author, this is the first paper that tackles the issue of complementarity/substitutability of the two sources of funding at a highly disaggregated level.

## **DATA AND METHODOLOGY**

This paper combines information from four various data sources, for the period 2002m1-2012m3:

- (1) annual balance sheets and income statements of Belgian firms reporting to the Central Balance Sheet Office of the National Bank of Belgium; we consider only the non-financial firms;

- (2) monthly firm-bank data on authorized credit from the Central Corporate Credit Register of the National Bank of Belgium with the reporting threshold of 25,000 EUR; we keep information on cash credit provided by credit institutions registered in Belgium and focus on the main lender of each firm during a given year;
- (3) monthly banks' balance sheets and income statements from the National Bank of Belgium; these are used to identify whether the main lender of a firm can be classified as a small bank or a large bank according to whether they were below or above the median of total assets during a given year;
- (4) data on venture capital deals and VC providers from the Thomson One database; we focus on investments made in Belgium and consider whether the VC provider is bank-affiliated.

In the first, relatively more descriptive part of the empirical analysis we divide firms into four mutually exclusive groups according to the funding status of the firm: (1) funded only by venture capital; (2) funded only by debt; (3) funded by both venture capital and debt; (4) funded by neither of the two, and look at their characteristics in the initial year of the particular funding status. In this way we can identify whether such groups of firms are substantially different from each other, thus potentially verifying previous results in e.g. Barry and Mihov (2015). We then proceed by analysing the funding dynamics of firms, i.e. to what extent is their funding status changed in the last year they are observed in the dataset compared to the first year of observation. Such a transition matrix can be compared to the analysis by Degryse, Lu and Ongena (2016) on the interaction between formal and informal financing.

The main part of the empirical analysis looks at two indicators of firm performance, and how those are affected by the availability of bank debt or venture capital: (1) growth potential, measured as the annual growth rate of total assets, and (2) investment opportunities, proxied with the annual growth rate of fixed assets.

The equation of interest for firm  $i$  in year  $t$  is:

$$\Delta Y_{i,t} = \alpha \cdot B_{i,t} + \beta \cdot V_{i,t} + \gamma \cdot BV_{i,t} + X_{i,t-1} + Year_t + u_i + \varepsilon_{i,t} \quad (1)$$

where  $B_{i,t}$  equals one if the firm received a new bank loan from its main lender during year  $t$  and is zero otherwise,  $V_{i,t}$  equals one if the firm received its first venture capital investment during year  $t$  or afterwards and is zero otherwise, and  $BV_{i,t}$  equals one if the firm received both new debt (from its main lender) and venture capital during year  $t$  and is zero otherwise.  $X_{i,t-1}$  represents firm characteristics at the end of year  $t - 1$  (logarithm of age and its squared term, logarithm of total assets as a measure of size, ROA as a measure of profitability, and ratios of net trade credit, cash and capital in total assets to account for other possible sources of funding). The specification also includes time fixed effects, while firm fixed effects are used to control for unobserved firm heterogeneity and to separate the selection from the treatment effect of a particular funding source.

In order to address any further possible endogeneity or reverse causality concerns when estimating Equation (1), proper instruments should be found for the probability of having new debt or venture capital, preferably such instruments that can be attributed to supply of debt or venture capital. A recent study by Degryse et al. (2016) estimates a monthly series of bank loan supply shocks, which are a perfect candidate for a possible debt instrument. The authors identify loan supply shocks using industry-location-size-time fixed effects as a demand control instead of the traditional firm-time fixed effects; this methodology allows them to capture firms that borrow from just one bank, since such firms also comprise the majority of borrowing firms. Their approach of grouping firms into industry-location-size (*ILS*) clusters is applied in this paper with the following motivation: while bank supply shocks cannot be directly linked to firms without any debt, they can be linked to *ILS* clusters where at least one firm, but not necessarily all of them, borrows from one or more banks. Additionally, Degryse et al. (2016) find that the changes in interbank liabilities can explain a substantial fraction of the observed variation of their *ILS*-based loan supply shock measures, hence these changes are another candidate for a debt instrument. The procedure of instrumenting debt and VC availability is thus implemented by first replacing the firm-level probabilities with *ILS*-level probabilities of having debt or venture capital, or both:

$$\Delta Y_{i,t} = \alpha \cdot B_{ILS(i \in ILS),t} + \beta \cdot V_{ILS(i \in ILS),t} + \gamma \cdot BV_{ILS(i \in ILS),t} + X_{i,t-1} + Year_t + u_i + \varepsilon_{i,t} \quad (2)$$

The set of instruments for bank debt thus incorporates two dummy indicators equal to one if the bank supply shock was extremely positive (i.e. in the top quartile) or if the growth rate of interbank liabilities was positive during a given year. For the case of venture capital, similarly to Bertoni, Colombo and Grilli (2011), we use the number of VC investors active in a given *ILS* cluster, but in squared and cubed terms to give a higher weight on the differences between the *ILS* clusters. Following the approach used also in Barry and Mihov (2015), the interaction of instruments for bank debt (interbank liabilities growth) and VC is a proper instrument for the interaction between bank debt and venture capital. The procedure is performed using IV and 3SLS; we also use the test of overidentifying restrictions to assess the appropriateness of the instruments used.

In the extended analysis, we split the sample into periods before and since 2009 (to assess the effect of the financial crisis), and interact the availability of debt or VC with the characteristic of the funding provider: (1) whether the main lender was a small bank; (2) whether any of the VC providers in a particular VC deal was bank-affiliated. The instrumenting procedure was also applied to these exercises.

## PRELIMINARY RESULTS

From the first part of the empirical analysis it can be concluded that the set of firms using either only venture capital or only debt are significantly different from each other: while VC-funded firms are on average younger

and have more intangible assets on their balance sheets, debt-funded firms are more mature firms with less intangible fixed assets and more assets pledged thus far as collateral. This corroborates the intuition argued by Barry and Mihov (2015) that tangibility is more of a concern for banks than for VC providers. Not surprisingly, firms using both types of funding are the oldest and the biggest among the firms in the sample. Additionally, the transition matrix suggests that firms largely maintain the same funding structure that they start with. Among firms that add an additional source of funding, it is more likely that VC-funded firms will add debt than it is for debt-funded firms to add venture capital. Taken together, the results confirm previous findings from the literature arguing for the appropriateness of venture capital for the more informationally opaque firms.

The results of the main part of the analysis suggest that both debt and venture capital have individual positive effects on growth and investment of firms (i.e.  $\alpha > 0$ ;  $\beta > 0$ ) that are both statistically and economically significant. Additionally, a combination of the two sources of funding is also strongly positively related with growth and investment of firms (i.e.  $\alpha + \beta + \gamma > 0$ ), suggesting that the effects of these two sources of funding on firm performance are complementary. Such an effect can also be found when splitting the sample into periods before and since 2009 to account for the possible differential effect of the financial crisis, although the results appear more robust for the pre-crisis period. For the case of small banks, the associated estimated coefficient  $\hat{\alpha}$  on their individual effect is smaller than the estimated coefficient  $\hat{\alpha}$  from the main specification (which should represent the average effect for small and large banks), suggesting that the positive effects induced by borrowing from small banks are smaller to those stemming from large banks. Additionally, there is no evidence of a common effect of lending from small banks and having venture capital, whether in the direction of complementarity or substitutability. Finally, the complementary effect of bank debt and venture capital is also found when the focus is placed on bank-affiliated VC-providers, albeit at this stage of the analysis such VC providers in Belgium are still not directly linked with the related Belgian banks; this issue remains on the agenda for future research.

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