Incremental Impact of Venture Capital Financing*

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Abstract

Using a unique database of 990 VC-backed Belgian firms and a complete population of SMEs in Belgium, we investigate the differences in the return generating process in the venture capital-baked firms and their peers that operate without venture capital financing. Focusing on regular financial returns, we analyze the extent to which the presence of a venture capital investor affects the sensitivity of VC-backed firm's returns to the changes in capital structure, in operating cycle, and in the industry dynamics. The differences may occur from the self-/selection of better companies into venture capital portfolios, from venture capitalists' value-adding activities, and/or from both. We examine them in the context of complex simulation procedure with allows separating selection from value-adding when other traditional approaches are difficult to implement. Our results indicate that venture capital-backed firms are able to extract more rent from the changing industry conditions, and from the optimizations in capital structure and financing choices. The presence of the venture capitalists in the equity of the firm seem to have only a marginal effect on operating cycle efficiency. Overall the results are suggestive of the value-adding being the main driver for the VC-backed firm performance.

Keywords: Venture Capital; Performance; Simulation; Value-adding; Selection.

JEL classification: L22, L25, M13, G30

1 Introduction

Venture capital and private equity (VC/PE) performance is often justified by two non-exclusive features associated with this type of financing: selection and value-adding (Macmillan et al., 1987; Gorman and Sahlman, 1989; Sahlman, 1990; Sapienza, 1992; Brander et al., 2002; Baum and Silverman, 2004). Selection means that venture capitalists (VCs), especially more experienced and reputable ones, can invest into better quality targets with higher growth prospects (Sørensen, 2007).[1] Value-adding relates to the active involvement of VCs in the ventures they fund (Sapienza et al., 1994; de Clercq and Manigart, 2007). Previous studies assert that VCs closely monitor, control, and manage their investments (Gompers, 1995; Davila and Foster, 2003; Kaplan and Schoar, 2005). To protect themselves from the management moral hazard issues, they write highly sophisticated contracts and design efficient covenants (Gompers and Lerner, 1996; Hellmann, 1998; Kaplan and Strömberg, 2004). To enhance operations of their targets, VCs make use of their large networks of potential clients and customers (Hochberg et al., 2007). Finally, they are able to assist their targets in strategic and (if needed) operational management, senior personnel recruitment, and additional financing arrangements (Gorman and Sahlman, 1989; Macmillan et al., 1989; Sapienza, 1992; Sapienza et al., 1994, 1996; Hellmann and Puri, 2002; Cumming et al., 2005; Dimov and Shepherd, 2005; de Clercq and Manigart, 2007).

Clearly, both selection and value-adding interact, which makes it difficult to separate the relative importance of each of these factors. This problem is particularly relevant for the comparison between the performance of venture capital-backed (VC-backed) firms with their non-VC-backed peers. Essentially, selection of better targets by a VC implies that her presence becomes endogenous to performance. The endogeneity occurs because

[1] Scholars also documented that prospective entrepreneurial firms may self-select themselves into a better VCs (Hsu, 2004).

firms, which end up with venture capital financing, are inherently better along a number of unobserved characteristics than firms, which operate without venture capital support (Sørensen, 2007). Accounting for this, previous studies investigated the impact of venture capital on the innovation (Kortum and Lerner, 2000), on the probability of IPO (Sørensen, 2007), on the financial returns at a fund level (Kaplan and Schoar, 2005), and on the round-to-round/pre-IPO returns at the individual investment level (Cochrane, 2005; Hand, 2007).

This paper analyzes the impact of the VC's presence on the determinants of regular financial performance at the portfolio firm level. The extant literature on the determinants of financial performance of VC-backed firms isolate three relevant elements: capital structure, operating cycle, and industry dynamics (Tyebjee and Bruno, 1984; Gorman and Sahlman, 1989; Hellmann and Puri, 2000; Baeyens and Manigart, 2003; Bottazzi et al., 2008b). Our central assumption is that the interaction between selection and value-adding explicitly magnifies the effects of these elements. The main challenge, however, is the separation of selection from value-adding. To solve this issue, previous literature extensively used instrumental variable approach (like in Kortum and Lerner (2000) and Kaplan and Schoar (2005)) or Heckman's[2] sample selection models (like in Sørensen (2007) and Cochrane (2005)). These methods, however, require either exogenous and relevant instruments or the information on investor characteristics. Unfortunately, the nature of our data do not allow the use of these approaches. Instead, we are able to match VC-backed firms with the whole population of small and medium sized firms that operate without VC financing. Consequently, we develop a framework that separates selection from value-adding and quantifies the magnitude of the impact of VC's presence on the return determinants. Our main research question is therefore formulated as follows: how does selection and value-

[2] See Heckman (1976) and Heckman (1979).

adding by a VC impact on the return generating process of underlying portfolio firms? Specifically, we investigate the extent to which the presence of a venture capital investor affects the sensitivity of VC-backed firm's returns to the changes in capital structure, in operating cycle, and in the industry dynamics.

The analysis exploits two raw datasets. The first set is a unique hand-collected sample of Belgian VC-backed companies, which received financing during 1998-2007. These data come from various secondary sources, like press-releases, funds' annual reports and web sites, and news databases. The second set is a complete population of Belgian firms over the same period. The disclosure of the standardized financial statements is mandatory for all firms operating in Belgium. Thus, the data are deemed to be reliable and homogeneous. Using the population we match VC-backed firms with their comparable peers and randomly permutate both sets.[3] We then run our models on the original and permutated samples and store results. This procedure is repeated in a simulation setting, which ultimately allows us to trace the empirical distributions of the return determinants' loadings.

Consistent with the evidence on the VC's value-adding, our findings indicate that the presence of VCs among the shareholders of an underlying portfolio firm increases the sensitivity of its regular financial returns to changes in its determinants. Moreover, these shifts are likely to be independent of selection. Specifically, returns of the VC-backed firms react much faster to the changes in capital structure, and to the changes in industry dynamics, compared to their non-VC-backed peers. The changes in the operating cycle seem to have a very close effect on the future performance of the VC-backed firms and their peers. Finally, returns of VC-backed firms seem to be nonlinear in their determinants, and these nonlinearities are exaggerated by the presence of venture capital investor. These findings suggest that VCs add the most of the value in the capital structure management and managerial

[3] The permutated samples are assumed to represent the general economic landscape in which portfolio companies operate.

advise.

The remainder of the paper is organized as follows. Section 2 discusses the theoretical reasoning of this paper. Section 3 presents the data and research design. Section 4 outlines the results. Finally, Section 5 concludes.

2 VCs' selection, value-adding, and performance

Entrepreneurial firms often face difficulties in obtaining external financing (Gompers and Lerner, 2001). They are typically characterized by high levels of information asymmetry, operate in highly uncertain environments, and have very few tangible assets. Because of this, traditional fund providers, such as banks, may be reluctant to provide financing to these businesses (Wright and Robbie, 1998; Gompers and Lerner, 2004). Frequently, though, such firms have high growth prospects and can potentially yield handsome returns to investors. As such, venture capitalists invest in these firms to benefit from this perceived growth and return potential.

VCs excel in "picking winners" and reducing information gaps around entrepreneurial firms (Baum and Silverman, 2004). Their thorough due diligence process, sophisticated contracting, and selection criteria allow entrepreneurs to receive the financing, which they could not obtain from other sources (Macmillan et al., 1985; Gorman and Sahlman, 1989; Brander et al., 2002; Kaplan and Strömberg, 2003; Baum and Silverman, 2004; Kaplan and Strömberg, 2004). It has been observed that VC-backed firms show superior performance with respect to their non-VC-backed peers (Cochrane, 2005; Kaplan and Schoar, 2005; Korteweg and Sørensen, 2010). However, this may be an artifact of venture capital investors' selection process or of a self-selection of potentially best targets into very reputable and experienced venture capital investors (Hsu, 2004; Sørensen, 2007). If this conjecture holds, it is then straightforward that venture capital financing would have the same effect on any firm, which is comparable to the eventual VC-backed one prior the investment.

Yet, a substantial literature asserts that venture capital investors are actively involved in the ventures they fund. It is this involvement, which significantly enhances the value of the venture after the initial investment (Wright and Robbie, 1998; Gompers and Lerner, 2001, 2004; Bottazzi et al., 2008b). More specifically, investors' involvement may impact on several functional mechanisms in portfolio firms.

First, it may affect the ways products are produced or sold. VCs actively participate in the board of directors of their portfolio firms (Tyebjee and Bruno, 1984; Gorman and Sahlman, 1989). They closely monitor and control their targets, which provides additional information about the development of their investments, asserts the managerial discipline, incentives realignment. Obviously, this protects investors from managerial moral hazard problems and significantly reduces wasteful expenditures (Jensen and Meckling, 1976; Gompers, 1995; Gompers and Lerner, 2001; Cumming and Johan, 2008). Their participation also implies provision of advisory services to the entrepreneurs (Cumming and Johan, 2008), including managerial, strategic, and marketing advices (Sapienza, 1992; Sapienza et al., 1994). Besides operational and strategic management, VCs may help their portfolio companies with finding appropriate professional senior executives, especially when entrepreneurs themselves lack skills in key areas of management (Hellmann and Puri, 2002; Bottazzi et al., 2008b). Last but not least, venture's development can be facilitated by the access to the VCs' developed networks of business advisors, lawyers, suppliers, potential clients, customers, and partners (Hochberg et al., 2007; Cumming and Johan, 2008). At the investee's operational level this may translate into more adequate cost structure and increased revenues from operations.

Second, it may influence the underlying portfolio firm's capital structure and financing choices at and after the initial capital injection. Prior to the investment, high uncertainty, potential for agency problems, and little tangibility of assets, which may serve as collateral, considerably limit the range of possible financing sources (Gompers and Lerner, 2001; de Bettignies and Brander, 2007; de Bettignies, 2008). In this sense, venture capital financing serves as a viable alternative to the bank capital. Depending on the instrument used by the venture capitalist to channel funds into the venture[4], post-investment capital structure of the underlying portfolio firm may experience some changes (Cumming, 2005; Hellmann, 2006). In addition, the arrival of venture capitalist also sends a strong positive signal about the quality of the venture and its future prospects to external fund providers (Megginson and Weiss, 1991; Baeyens and Manigart, 2003; Cornelli and Yosha, 2003; Gompers and Lerner, 2004; López-Gracia and Sogorb-Mira, 2009). Venture capitalist's involvement further facilitates negotiations and contracting for additional financing with third parties (Gorman and Sahlman, 1989; Baeyens and Manigart, 2003). Finally, contracts between VCs and entrepreneurs coerce additional discipline in the nature, sources, and uses of subsequent funds raised from third parties (Kaplan and Strömberg, 2003, 2004). It is therefore plausible to assume that financing decisions by entrepreneurial firms could be more optimal and tailored to the needs of the underlying firm in comparison to the firms without VC-backing.

Third, venture capitalists typically invest in innovative ventures in new and highly-dynamic industries (Kortum and Lerner, 2000; Gompers and Lerner, 2001). To provide proper guidance to such firms, venture capital managers need significant previous experience both as venture investor, as industry player, and sometimes as entrepreneur (Bottazzi et al., 2008b). Not surprisingly, many top VC managers have previous consulting and entrepreneurial experience (Knockaert et al., 2006). This experience may help VCs better

[4] The literature suggests that traditional instruments are convertible securities, like convertible preferred equity (Sahlman, 1990; Cornelli and Yosha, 2003; Kaplan and Strömberg, 2003; Hellmann, 2006). Some scholars argue, however, that this conjecture is particular to the US venture capital industry and need not hold in other countries (see for example Cumming (2005)).

understand and develop appropriate (re)actions to the changes in the underlying market/industry conditions. Scholars documented that human capital characteristics of VCs help reducing the failure rate of the portfolio firms (Dimov and Shepherd, 2005). It has also been shown that VC's involvement affects underlying portfolio firm's strategic choices in terms of product market strategies (Hellmann and Puri, 2000). It is therefore straightforward to assume that VC-backed firms will further benefit from changes in respective industry conditions in comparison to their non-VC-backed peers.

The foregoing mechanisms are directly related to the regular financial performance of the portfolio firms. The selection argument, however, implies that VC-backed firms should be indistinguishable from their non-VC-backed peers as long as their comparability is asserted. This means that changes in these factors will affect the performance of both type of entrepreneurial firms in the same way, which leads to the following hypotheses:

> H1a: Financial performance of VC-backed firms and their non-VC-backed peers will be affected in the same way by the changes in the operating cycle in these firms.
>
> H2a: Financial performance of VC-backed firms and their non-VC-backed peers will be affected in the same way by the changes in the capital structure in these firms.
>
> H3a: Financial performance of VC-backed firms and their non-VC-backed peers will be affected in the same way by the changes in the external environment around these firms.

The value-adding arguments suggest that operations of VC-backed firms are more efficient[5], and that financing and strategic decisions are more appropriate to the dynamic environment around these firms. Under such structure, we may expect VC-backed firm's performance to react faster to the changes in these factors in comparison to the non-VC-backed peers. This discussion leads to the following set of alternative hypotheses:

> H1b: Financial performance of VC-backed firms will be more sensitive to the changes in the operating cycle compared to non-VC-backed firms.

[5] Even if the efficiency is not an objective, we may expect that VC's involvement still benefit the operating process in terms of cost-reductions and value enhancements.

H2b: Financial performance of VC-backed firms will be more sensitive to the changes in the capital structure compared to non-VC-backed firms.

H3b: Financial performance of VC-backed firms will be more sensitive to the changes in the corresponding external environment compared to the non-VC-backed firms.

3 Method and data

The test of the foregoing hypotheses is directly related to the selection and value-adding arguments proposed in the literature. Separating the two is a very challenging task. Because of the selection, venture capital financing becomes endogenous to performance, which inflates the values of parameters of performance factors. Include value-adding activities into the picture, and the effect of the performance factors could be even more exaggerated. The classical solution to the endogeneity problem is the instrumental variable (IV) approach. However, Sørensen (2007) argues that IV requires appropriate (exogenous and relevant) instruments, which are not readily available for analysis in the venture capital context. Instead, he suggests to estimate a structural model, similar to the two-stage Heckman's selection models (Heckman, 1976, 1979). This approach makes use of a selection equation, which, in turn, requires observable information on the investor characteristics. In our case, the latter are not available, thus we need an alternative solution.

The procedure devised for testing the proposed conjectures is based on the simulation method. We use two types of datasets, which we call main sample (MS) and peer groups (PG). The construction of each of the samples is described below.

3.1 Sample construction

The empirical setting of this paper is the Belgian venture capital industry during the period 1998-2007. We use a list of 1,050 Belgian companies that received venture capital financing (only the first injection dates are available) during the mentioned period.[6] This list comes from various secondary sources, which include Factiva search engine, news archives, venture capital funds' annual reports, various press releases, newsletters, and announcements. In order to ensure the validity of the observation units, we manually cross-checked, whenever possible, each entry between the mentioned sources and the VentureEconomics and/or ZEPHYR databases.[7] Each entry of the raw data contain information on the date of financing round and the target company's national identification number. Using this number we are able to extract firm-specific data from the BELFIRST database. The latter include complete annual financial reports (over the specified period) as well as the industrial sector codes (NACE-BEL 2008 21 class), and the firms' creation dates.[8] Excluding unusable observations, VC-backed investments in the financial and real estate sectors, management buyout deals, and listed companies, we obtain a main sample (MS) of 990 firms that had received venture capital financing. Finally, we use the data from National Institute of Statistics on the total assets in each industry present in the sample (NACE-BEL 21 class) during the specified period.

Peer groups (PG) are constructed in several steps, following the matching procedure suggested by Megginson and Weiss (1991), Lerner (1999), and Manigart et al. (2002). First, for each VC-backed firm in the sample we record the values of total assets and total revenues in the year immediately prior to the venture capital injection.[9] Next, using NACE-BEL 2008 21 class codes (3 digits), each VC-backed firm in the MS is matched with its respective industry. Basing on the amounts of total assets and total revenues, noted earlier,

[6] It is worth noting that this list is all we have as an initial input. Unfortunately, we do not possess any information regarding the investor or the deal, e.g., the valuation, the number of subsequent financing rounds, the investor type, the syndication, etc.

[7] The coverage of Belgian venture capital deals in these databases is far from complete.

[8] All companies in Belgium, regardless their listing status or size, are obliged to file complete financial statements with the National Bank of Belgium. They are next compiled into the commercially available BELFIRST electronic database.

[9] For start-ups, we took the corresponding values in the injection year.

we identify to which empirical decile of the corresponding industry each VC-backed firm belongs. Finally, we create a PG, set, which consists of all firms from the same industry decile as the underlying portfolio firm, plus all firms from the following and preceding deciles. The reason to take three deciles is that, sometimes, industrial sectors are too small; the number of firms in the decile may bee too limited to qualify for a usable peer group.[10] Thus, for each portfolio firm in the MS there is a corresponding PG, which includes all firms from the same industrial sector with a comparable levels of total assets and total revenues prior/in the year this portfolio firm had received VC financing. These PGs are assumed to represent the sub-populations of potential targets that might have received the venture capital backing. The size of peer groups vary from 12 to 6869 firms, depending on the industry sector of the corresponding VC-backed firm.

3.2 Permutation procedure design

The procedure is designed to randomly create a control sample (CS) from the combination of the MS and the PGs. For this, we first generate a random integer R_1[11], which indicates the number of firms of the MS to be replaced by the firms coming from the PGs. Next, a pair of random integers (R_{2_i} and R_{3_i}, $i = 1, ..., R_1$) are simultaneously created R_1 times.[12] Each R_{2_i} serves as an identifier of the VC-backed firm from MS to be replaced by one of the firms from its corresponding PG. To ensure that the same MS-firm is not replaced twice, R_{2_i} are nonrecurrent for all i. Each R_{3_i} identifies a firm from the PG, corresponding to the current VC-backed firm with the identifier R_{2_i}. Note that many of the VC-backed firms in the MS may come from the same industrial sectors. This does not necessarily imply that their PGs are identical, although, it is technically possible. There may be cases when PGs

[10] If a portfolio firm belongs to the first or the last decile of its industry, only following or preceding deciles respectively are taken.

[11] All random integers here are generated assuming the uniform distributions.

[12] Note that R_{3_i} depends on the size of the PG corresponding to R_{2_i}.

are overlapping as well. Moreover, R_{3_i} itself can be recurrent. In all these cases, a same firm from the PGs may be selected multiple times to enter the CS. In such particular cases, we control for the national identification number of that firm and, if necessary, regenerate R_{3_i}. This kind of randomized permutation ultimately provides the CS. It consists of a mix of VC-backed firms and their comparable peers that could have been financed by VC, but operated without it.

3.3 Variables and simulation structure

Financial performance of the VC-backed firms and their peers is measured annually as a ratio of free cash flow over shareholders equity. To avoid the causality problems, all independent variables are one year lagged.

To test if there is an effect of the VC's presence on the operating cycle of an underlying portfolio firm, we use an annual ratio of value added over total assets. This measure takes into consideration the efficiency in the cost structure of the portfolio firm and its sales capacity. It has been shown that financial performance is directly affected by the efficiency (Bottazzi et al., 2008a). In the context of this analysis, we expect a positive relationship between this factor and financial performance.

To test if there is an effect of the VC's presence on the subsequent capital structure and financing choices of an underlying portfolio firm, we use an annual equity ratio, defined as shareholders equity over total assets. This measure takes into consideration the capital structure and size effects (Ooghe and Wymeersch, 2006). According to the capital structure and financing choice theories (Myers and Majluf, 1984; López-Gracia and Sogorb-Mira, 2009; Vanacker and Manigart, 2010) financial performance is expected to be negatively affected by the increases in equity.

To test if there is an effect of the VC's presence on the sensitivity of portfolio firm's return to the changes in external environment, we compute the industrial growth rates (annual log change of the total industrial assets). We assume that young and developing industries would have more volatile growth rates (Klepper and Graddy, 1990; Klepper, 1997; Klepper and Simons, 2005). Returns are expected to be positively affected by the changes in this variable. The sectors are aggregated using the first three digits of the NACE-BEL code. This ensures the consistency with MS-PG matching procedure, which is also based on the three digit correspondence.

Several additional controls are also included. According to Ooghe et al. (2006) and Bottazzi et al. (2008a), there are four dimensions crucial to the financial situation of the company: profitability, liquidity, financial structure, and added value. We use four supplementary measures of liquidity, one measure of financial structure, and one measure of profitability. Also, we control our model for the dividends payouts. Three explicit control variables are used to account for the firm's age (log of the age, measured in years since creation, AGE), for the number of employees (log of the number of employees in each year, $EMPL$), and for the year in which the venture capital injection takes place (dummy variable that takes the value of one from the moment of the arrival of VC onwards, $INJYEARDUM$).[13] Following tables report the definitions of the variables used in the analysis, their basic statistics and the correlation matrix.

TABLE 1 & 2 HERE

Foregoing hypotheses are tested with the help of regression methods, equivalent to the ones used in Alperovych and Hübner (2011). To account for the serial correlation[14] in

[13]Some companies in the sample show zero values of AGE and $EMPL$. AGE is 0 if a company is venture backed from inception. We force NA initial value for the AGE in such cases. $EMPL$ may take the value of 0 when company does not employ staff in the legal sense, e.g., contract workers with the status "independent". We add 1 to the $EMPL$ variable to force the existence of logs.

[14]We checked for the partial correlations with lags (Ljung-Box Q-stat) as well as for the presence of the

variables, we first set a basic autoregressive empirical model:

$$CF\_E_{i,\,t} = C_i + \delta CF\_E_{i,\,t-1} + \epsilon_{i,\,t} \tag{1}$$

where subscripts t and i denote the time and company, respectively. Second, the residuals of the Equation (1) are used as the response variable to control for the dependency between the regressors (X) we use in our principal model:

$$\epsilon_{i,\,t} = \gamma_i + \gamma X_{i,\,t-1} + u_{i,\,t} \tag{2}$$

Finally, we reconfigure the principal model using Equations (1) and (2) such that

$$CF\_E_{i,\,t+1} = \beta_i + \beta X_{i,\,t} + \beta^* u_{i,\,t} + v_{i,\,t+1} \tag{3}$$

Equation (3) posits that the future value of the cash flow over equity of a company i depends on the current values of regressors.[15]

The simulation is structured in the following way. First we estimate the parameters for the MS only. Once a CS is finalized, we estimate model on it and store the parameters. After that, the current CS is deleted, and we repeat the permutation procedure to recreate a new CS and reestimate the model. This resampling is reiterated 10000 times, which yields the empirical distributions of the sensitivities of factors discussed in the previous section. We believe that such randomized permutation procedure allows the separation of the selection effect from the value-adding effect. If we assume that VCs' presence is of no consequence, i.e. only selection matters, then there should be no significant differences between the

unit roots (Im, Pesaran and Shin W-stat, ADF Fisher CHI-square, PP Fisher Chi-square) in all series. Data and tests are available upon request.

[15]The first loading (β_i) represents the cross-section fixed effect constant, followed by the common factor betas, which are assumed to be constant over time and cross-sections. The term $u_{i,\,t}$ should be considered as an independent variable in Equation (3), since its value is determined earlier in Equations (1) and (2).

sensitivities estimated on the MS-only sample and the the average of sensitivities from the simulations. Alternatively, if VCs do bring changes and additional value to their portfolio firms, we should observe significant changes in the sensitivities.

4 Results

Two distinct specification approaches are used to test the proposed hypotheses. To begin, we benefit from the availability of the annual financial data on each portfolio firm to estimate the standard panel regressions in each iteration. The results of this approach are discussed in the first part of this section. We continue our analysis with the closer examination of the left-hand side of specification equation. The rationale and results of this analysis are presented in the second part of this section.

4.1 Panel approach

Panel regressions are estimated in three steps following the specifications of Eq. (1) - (3) with robust standard errors and cross-section fixed effects. Table 3 reports the results. First, consider the MS estimates. The sensitivities of equity ratio (E_TA), value added over assets (VA_TA), and industrial growth rate ($\Delta(LOGIND)$) are statistically significant and consistent with the sign predictions. A unit increase in the equity ratio, which is equivalent to raising the relative amounts of equity in the firm, reduces future financial performance by about 0.281 units. Second, the sensitivity of the operating cycle efficiency has a positive, as expected, and significant effect on the future performance. A unit increase of the value added over assets yields about 3.6% increase in the future free cash flow over equity of the underlying portfolio firm. Finally, positive and statistically significant effect is verified for the industrial growth rate. In this case, a unit growth in the industrial assets, the proxy for the dynamics of external environment, increases the future financial performance by about one thirds.

TABLE 3 HERE

The right-hand side of the table reports the results of the MC simulation. First, note that the simulated distributions[16] of the main variables are non-normal. Conventional Jarque-Bera tests (not reported in the table) reject the null hypothesis of normality in all cases. All distributions appear to be non-centered, skewed and leptokurtic (see Figure 1). Next, consider the main point of the simulations, namely, the substantial differences between the averages of the simulated distributions and the MS estimates. Figure 1 provides a clear visual representation. Table 4 reports the formal tests of the differences between the simulated means and the MS estimates.

FIGURE 1 & TABLE 4 HERE

The MS estimate of the operating cycle (VA_TA) variable is more pronounced (0.036 vs. 0.029) and statistically different from the simulated mean, leading to the support of H1b (and the rejection of H1a). The size of the implied difference indicates that the VC's presence in the equity of the entrepreneurial firm translates in about 24.14% improvements in the efficiency of the operating cycle. This is quite remarkable, especially considering that our matching procedure aims at ensuring that non-VC-backed firms are as comparable to the VC-backed ones as possible. Although the efficiency of the operating cycle might not be the objective in early-stage ventures, the VC value-adding efforts in monitoring, control, and managerial advice may still result in optimizations in the operating cycle.

[16]For convenience, we use terms "simulated mean", "simulated average", "mean of the simulated distribution" and "average of the simulated distribution" interchangeably.

The MS estimate of the capital structure (EA_TA) variable shows some unexpected results. First, it appears to be greater than the simulated mean (-0.281 vs. -0.300). Second, the implied difference of about 6.3% is significant (see Table 4). This structure suggests that future increases in the financial performance due to reductions in equity are more pronounced when VC is not present in the firm. In other words, non-VC-backed firms benefit more from the increases in debt levels compared to their VC-backed peers. This suggests the rejection of H2a. Concerning the H2b, however, some clarification might be necessary. Specifically, VC-backed firms may be more levered than their non-VC-backed peers. In a study of the dynamic financing strategies of the Belgian VC-backed firms, Baeyens and Manigart (2003) indicate that VC-backed firms have significantly greater debt levels in comparison to their non-VC-backed peers. According to the traditional capital structure theory, the debt has the marginally decreasing effect (Myers and Majluf, 1984; Frank and Goyal, 2007). Consequently, a unit increase of debt in the non-VC-backed firm may result in a more substantial increases in the future financial performance, compared to the VC-backed firms. This seems to be more consistent with the simulation results. Moreover, this suggests some nonlinear effects of the capital structure variable, which are tested in the following section. We will come back to the H2b after these analyses.

Finally, the MS estimate of the industrial growth rate ($\Delta(LOGIND)$) variable is, as expected, much greater (0.322 vs. 0.171) and statistically significant from the simulated mean, supporting the H3b. The implied difference is as high as 88.33%, suggesting that VC-backed firms react much faster to the changes in the underlying industry conditions. If we regard the implied difference as the effect of VC's presence, hence, of the value-adding and monitoring activities, this suggests the substantial benefits of the venture capital financing.

On balance the results seem to be in line with our discussion on the incremental impact of VC financing due to value-adding. An alternative explanation, namely, the selection hypothesis suggests that VCs just select better companies (Baum and Silverman, 2004; Sørensen, 2007). If that is the case, then the seemingly superior performance of the VC-backed firms should be replicated by their comparable non-VC-backed peers. Therefore, the sensitivities of returns to the changes of the corresponding determinants should be indistinguishable for both VC-backed firms and their peers. Following our results, we posit that selection is highly unlikely to be a main factor for the VC performance.

4.2 Quantile approach

Our previous discussion of the H2b pointed out on the possible nonlinear relationship between the factors affecting financial performance and the performance itself. Why should we expect such a relationship? According to a recent and growing stream of literature, the growth of small firms is nonlinear in its determinants (Landajo et al., 2008). For example, Jovanovic (1982) suggests firm's growth diminishes with its age, while other studies show that a firm's growth diminishes with size (Serrasqueiro et al., 2009). Bottazzi et al. (2008a) argue that growth influences financial performance, and we have already discussed that VC-backed firms are characterized by high growth opportunities. Therefore, we might detect a nonlinearity in the firm-specific factors of financial performance as well.

In a more general way, VC-backed firm may be viewed as a portfolio of growth options (Trigeorgis, 1999). Some of these options are straightforward. Others are activated only upon realization some prerequisites - options themselves. For example, impressive returns on investment in a biotech firm could be triggered if this firm successfully passes all necessary clinical trials. In addition to the main objective of research, the R&D process may yield some spillover results as well. In this context, the role of VCs is twofold. First they are able to detect these options (selection) and stipulate/accelerate their execution (value-adding). Thus, because of these option-like characteristics we may observe a nonlinearity of the financial performance in its determinants in general. And in the VC-backed firm case, because of selection and value-adding, we may expect this nonlinearity be further exaggerated.

To detect and test this conjecture we use quantile regression models, coined by Koenker and Basset (1978). These models were designed to detect nonlinearities without truncating the samples. Instead of estimating the conditional mean function (as in least squares), quantile regression models estimate the conditional quantile function.[17] The models are always estimated for the pre-specified quantile of the performance distribution. Hence, if we are interested in the effect of VA_TA, E_TA, and $\Delta(LOGIND)$ in the most performing firms, we specify and estimate the parameters for the 0.9^{th} quantile over the complete sample, and not over the firms in this quantile only. The interpretation of the estimated parameters is straightforward.[18] The use of quantile regression in a simulation setting allows the isolation of the VC's presence effect with respect to the empirical quantiles of the financial performance distribution.

Table 5 reports the results of the simulation with the quantile regression approach. As in the preceding section, we reproduce the MS estimates of the model specification performed on the VC-backed firms only. For succinctness, we report the results for the main variables only.[19] Standard parametric ($t-test$) and non-parametric (Mann-Whitney-Wilcoxon signed-rank tests) were applied to all variables. The resulting simulated means are significantly different from the original estimates in all cases.

TABLE 5 & FIGURES 2, 3, and 4 HERE

Panel A and Figure 2 show the results for the equity ratio. The means of the simu-

[17]For example a median regression is a particular case of quantile regression when the dependent variable is conditional median.

[18]For more details, see preceding chapter and Koenker and Basset (1978) & Koenker and Hallock (2001).

[19]The estimates of the simulated distributions for control variables are available upon request.

lated parameter distributions vary from 0.004 ($\tau = 0.1$) to about -0.404 ($\tau = 0.9$). The distributions themselves are skewed and leptokurtic. In line with our previous discussion of H2b, the simulated means exceed MS estimates in all cases. The penalizing effect of under-leverage increases over the quantile of performance, i.e. the difference between the MS estimate and simulated mean is growing. The effect of the capital structure on the future performance can be considered as linear in the corresponding quantiles. For the example, the results for the last quantile ($\tau = 0.9$) suggest that future returns of the most performing VC-backed firms are much more sensitive to the changes in the firm's capital structure than the returns of comparable firms, again in line with H2b. Specifically, for the VC-backed firm from the top quantile of the financial performance distribution, a unit increase of equity reduces future returns by -0.498 units. We observe the same patterns in the simulated means, however the magnitude is not as pronounced as in the VC-backed firm case.

Panel B and Figure 3 show the results for the value added over assets variable. MS estimates and simulated means of the quantile process follow a somewhat growing pattern. For both MS estimates and the simulated means, the effect of the operating cycle efficiency is negative in the lowest quantiles, and positive in the highest quantiles of the distribution. Simulated means switch sign around the median of the distribution, whereas MS estimates do so after the fourth quantile ($\tau = 0.4$). The differences between the simulated means and MS estimates are partially in line with the H1b. This is because the positive impact of the VC's presence is strongly observable in the middle of the distribution, in the fifth-to-seventh quantiles. To give an example, MS estimations show that the coefficient of the value added over assets variable is negative (-0.027) and lower than the simulated mean (-0.018) for the least performing firms (bottom quantile, $\tau = 0.1$). Simulated means show that in the top quantiles of the distribution a unit increase of the value added over assets ratio yields about 2.4% increase in the future financial performance. In the case of VC-backed firm, this increase is about 2.0%. The MS estimate however, is always greater than the simulated mean between the third and seventh quantile. The difference between the simulated means and MS estimates seem to converge towards the top quantile of the performance distribution. On balance, this structure suggests several considerations. First, because of the very narrow difference between the simulated means and MS estimates in the top quantile, VC's presence in the equity of the underlying portfolio firm does not seem to affect operating cycle efficiency much. This may happen because VC-backed firms and their peers are very close in terms of optimization of their operating cycles. Second, VC's presence does make portfolio firm react faster to the changes in operating cycle, if the firm is in the middle of the performance distribution. Third, the bottom quantiles suggest that VC's presence slightly reduces the sensitivity of financial performance to the changes in the operating cycle. The last two parts may be related to the findings on the VC's involvement. Specifically, the literature suggests that VCs spend more effort on the ventures, which are already performing well (Sapienza, 1992; Sapienza et al., 1994, 1996), forcing the greater negative effect of the VC's presence in the bottom quantiles. Finally, the negative values of the sensitivities in these quantiles are probably related to the fact that, at this cash-burn stage of firm's development, reaching the optimum in the production efficiency is not beneficial. In any case, it appears that value-creation in the VC-backed firms is not rooted in the optimization of the operating cycle.

Panel C and Figure 4 report the results for the industry growth rate variable. It follows, that in the lowest quantiles ($\tau \in [0.1; 0.4]$) the average impact of the industry related variable is negative, and that it switches its sign in the following quantiles. Original MS estimates are negative and lower than the simulated means in the first quantile, but turn positive and greater then simulated means in all subsequent quantiles. VC-backed firms seem to react much faster to the changes in the industrial dynamics in comparison to the simulated means. The impact of the industrial growth rate on future performance of the most performing VC-backed firms ($\tau = 0.9$) is the highest in comparison to their non-VC-backed peers (0.552 vs. 0.360). This difference seems to be greater in the outer quantiles ($\tau \in [0.1; 0.3]$ and $\tau \in [0.7; 0.9]$), and moderate in the middle quantiles. This suggests that the magnification effect of the presence of the VC is more pronounced in the low performing and high performing firms. This structure is in line with H3b, and implies that VC-backed firms are able to extract considerable value from the dynamics of external environment.

On balance, we observe that VC presence in the company amplifies the portfolio firm's reaction to the changes in the capital structure and in the industry dynamics. To a lesser extent the same conclusion can be applied to the operating cycle efficiency variable.

5 Concluding remarks

This paper explores the incremental impact of the venture capital financing in the simulation setting. Specifically, we examine whether the regular financial returns of VC-backed firms are due to self-selection (Sørensen, 2007) or value-adding. We draw our assumptions following the insights of venture capital literature on the three determinants of financial performance: operating cycle efficiency, capital structure/financing choices, and dynamics of the industry. Consequently, we build our main assumption that the presence of the venture capitalist in the equity of the firm exaggerates the impact of these factors. Using the complex sample construction procedure, three-step regression method and two different estimation approaches, we are able to quantify the magnitude of these shifts. The central findings can be summarized as follows.

First, the traditional regression approach points out that venture capital-backed firms are able to extract more rent from the changing industry conditions, and to an extent from the operating cycle optimization. The sensitivity of the financial returns of VC-backed firms to the changes in these factors is always greater than it is in comparable firms. It seems that because of the generally higher leverage levels in the VC-backed firms, the sensitivity of the regular financial returns to the changes in capital structure seem to be lower in VC-backed firms, than in their comparable peers. However, this evidence is directly related to the nonlinear relationship between the financial return and its determinants. In this context, our second finding suggests that capital structure, or financing choices, and industry dynamics are the main sources of return generation in VC-backed firms. In both cases, such firms react faster and stronger to the changes in these factors in comparison to the sensitivities of their non-VC-backed peers. This is especially relevant to the most performing firms, as the sensitivity of their returns seem to be the highest. Underperforming firms still benefit from VC's presence, however, the effect decays with performance. Concerning the operating cycle efficiency, we find the weak evidence that returns of average performing VC-backed firms react slightly faster to the changes in operating cycle, whereas the difference is almost negligible in the most performing firms (both VC-backed and non-VC-backed ones).

One of the implications of this study is that we are able to measure and test the impact of the VC presence on the determinants of firm's regular performance at a company level. Moreover, our findings indirectly support the value-adding hypothesis of venture performance, consistent with the traditional literature (Wright and Robbie, 1998; Brander et al., 2002; Wood and Wright, 2009). The simulation procedure allows us to overcome to an extent the selection bias issues (Manigart et al., 2002; Bottazzi et al., 2008b), when the instrumental variable and/or structural models are difficult to implement. Finally, our results point out the possibility that value-adding by venture capital investor is mainly concentrated in the capital structure decisions and the decisions linked with strategic management advise.

Some future developments in this direction are possible. For example, due to the nature of our data, we are unable to control directly for the VC's type, experience, reputation, and level of involvement. Consequently, it is impossible to test whether a particular investor, a more experienced, or reputable one, is associated with specific areas of firm performance. For example, captive venture capitalists related to banks and other financial institutions may put more emphasis on the financing choices and capital structure optimization in the portfolio firms. Alternatively, investors experienced in a particular industry may better affect the way portfolio firms integrate in their respective industries. This, in turn, could explain why, in some cases, the presence of VC is beneficial, and in others is only marginal. Our analysis assumed constant effects of the return determinants over time, hence the differences in sensitivities of VC-backed firms and their peers are set to be stable. It is however plausible to assume that comparable firms may show some convergence to the VC-backed firms in a longer time horizon. The analysis of this structure, however, would require much larger sample that we currently have.

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Appendix: tables and figures

Table 1: Summary of the variables

Variable	*Description*	*Definition*
CF_E *(1)*	Return measure, dependent variable	Free cash flow (after taxes) / Book value of equity
E_TA *(2)*	Company maturity measure, independent variable	Book value of equity / Book value of total assets
$LOGIND$ *(3)*	Industry maturity measure, independent variable	Natural log of industrial assets' value
VA_TA *(4)*	Product maturity measure, independent variable	Value added / Book value of total assets
$PAYOUT$ *(5)*	Payout over retention, control variable	Dividends distributed / Retained earnings
LIQ *(6)*	Debt servicing ratio, here liquidity ratio, control variable	Debt charges (interest payments) / EBIT
$LOG(AGE)$ *(7)*	Age of the portfolio company, control variable	Natural log of the age of the portfolio firm
$LOG(EMPL)$ *(8)*	Number of employees, control variable	Natural log of the number of number of employees in full time equivalent
$INJYEARDUM$ *(9)*	Dummy for injection year, control variable	1 since injection year onwards, 0 otherwise
$ACID$ *(10)*	Strict liquidity ratio, here acid test, control variable	(Accounts receivable + treasury placements + cash) / Short term debt
$CURRENT\_RATIO$ *(11)*	Current ratio, control variable	(Current assets - long term current liabilities) / Short term debt
FCF_TF *(12)*	Free cash flow over tier funds, control variable	Free cash flow after tax / (Deferred taxes and provisions + Total Debt)
NET_RENT_CA *(13)*	Current assets operating profitability, control variable	Operating income / Current assets
$TRESO\_RATIO$ *(14)*	Treasury ratio, control variable	(Treasury placements + cash - short-term financial debt) / (Current assets - long-term accounts receivables)

The ratios are computed following Ooghe and Wymeersch (2006) discussion.

Table 2: Sample descriptive statistics and correlation matrix

Panel A: Variables descriptive statistics

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*
Mean	0.07	0.32	7.98	0.76	2.07	0.12	1.89	1.96	0.64	2.13	2.20	0.00	-0.15	0.05
Median	0.09	0.27	8.09	0.28	0.00	0.00	1.95	1.95	1.00	0.88	1.12	0.07	0.02	0.06
Maximum	9.10	1.00	11.70	9.91	1531.00	141.00	4.71	7.43	1.00	86.14	86.14	9.18	9.92	1.00
Minimum	-9.88	-0.99	2.08	0.00	-16.95	-97.50	0.00	0.00	0.00	0.00	0.00	-9.79	-9.56	-9.87
Std. Dev.	0.73	0.33	2.45	1.31	34.42	2.84	0.98	1.62	0.48	5.88	5.50	1.01	1.00	0.72
No. of observations	6682	6682	9900	6186	6030	6630	7450	6692	9900	6647	6660	6657	6651	6680

Panel B: Variables correlation matrix

Correlation	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*
CF_E (1)	1.00													
E_TA (2)	0.04	1.00												
LOGIND (3)	-0.05	0.02	1.00											
VA_TA (4)	0.10	0.10	0.00	1.00										
PAYOUT (5)	0.05	-0.00	-0.00	0.02	1.00									
LIQ (6)	0.02	0.00	0.02	-0.01	-0.00	1.00								
LOG(AGE) (7)	0.17	-0.04	-0.06	-0.11	0.03	0.03	1.00							
LOG(EMPL) (8)	0.15	-0.03	-0.10	-0.02	0.04	0.03	0.45	1.00						
INJYEARDUM (9)	-0.07	0.09	-0.02	0.01	-0.01	0.02	-0.05	0.01	1.00					
ACID (10)	-0.01	0.37	0.01	0.03	-0.01	-0.01	-0.13	-0.14	0.05	1.00				
CURRENT_RATIO (11)	0.00	0.36	0.01	0.01	-0.01	-0.01	-0.11	-0.13	0.05	0.93	1.00			
FCF_TF (12)	0.37	-0.01	-0.02	0.17	0.03	0.01	0.20	0.06	-0.05	-0.05	-0.04	1.00		
NET_RENT_CA (13)	0.36	0.04	-0.01	0.17	0.05	0.01	0.19	0.08	-0.07	-0.07	-0.05	0.47	1.00	
TRESO_RATIO (14)	0.01	0.28	-0.01	0.05	0.02	-0.03	-0.19	-0.09	0.06	0.25	0.23	-0.07	-0.07	1.00

Table 3: Panel regressions - simulation summary

Dependent variable: future free cash flow over equity, $CF\_E_{i,\,t+1}$								
Coefficient	MS estimate	Mean	Median	SD	min	max	Skewness	Kurtosis
β_i	-0.061	-0.024	-0.032	0.086	-0.428	0.346	0.290	3.584
Main variables:								
$E\_TA_{i,\,t}$	-0.281**	-0.300	-0.295	0.078	-0.639	0.033	-0.216	3.528
$VA\_TA_{i,\,t}$	0.036**	0.029	0.030	0.016	-0.040	0.095	-0.145	3.638
$\Delta(LOGIND_{i,\,t})$	0.322**	0.171	0.189	0.156	-0.731	0.877	-0.575	3.866
Control variables:								
$PAYOUT_{i,\,t}$	0.001***	0.001	0.001	0.000	-0.004	0.007	3.381	31.776
$LIQ_{i,\,t}$	-0.003*	-0.002	-0.002	0.003	-0.022	0.008	-0.727	5.963
$LOG(AGE_{i,\,t})$	0.135***	0.118	0.122	0.040	-0.040	0.291	-0.249	3.497
$LOG(EMPL_{i,\,t})$	-0.038*	-0.034	-0.035	0.023	-0.152	0.075	-0.033	3.880
$INJYEARDUM_{i,\,t}$	0.040*	0.045	0.044	0.033	-0.108	0.228	0.222	4.397
$ACID_{i,\,t}$	0.012**	0.002	0.001	0.006	-0.063	0.068	1.462	11.976
$CURRENT\_RATIO_{i,\,t}$	-0.016**	-0.004	-0.002	0.007	-0.066	0.067	-1.116	8.924
$FCF\_TF_{i,\,t}$	0.045*	0.033	0.034	0.018	-0.044	0.131	0.038	3.728
$NET\_RENT\_CA_{i,\,t}$	-0.003	0.002	0.000	0.024	-0.098	0.189	0.551	5.313
$TRESO\_RATIO_{i,\,t}$	-0.004	-0.008	-0.006	0.024	-0.189	0.098	-0.657	5.485

The table summarizes the results of 10000 iterations of the panel regression model with robust standard errors (White estimates). β_i stands for the constant term. $E\_TA_{i,\,t}$ is the equity ratio, measured by the value of equity in the total book value of the assets of company i in year t. $VA\_TA_{i,\,t}$ is the value added in the total book value of the assets of company i in year t. $\Delta(LOGIND_{i,\,t})$ represents the growth rate of the corresponding industrial assets for company i in year t. The detailed description of the variables is available in the previous chapter; definitions are summarized in Table 1. The column "MS estimate" shows the parameter estimates for the sample of VC-backed firms only (MS). Mean, median, SD, min, and max refer to the empirical distributions corresponding to each parameter. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively (two-tailed).

Table 4: Panel regressions - formal tests

Variable	MS estimate, ($\hat{\beta}_k$)	Mean	Δ%	$H_0:\ \hat{\beta}_k - Mean = 0$ $t - test$	MW-test	$Pr(\beta_k < \hat{\beta}_k)$
$E\_TA_{i,\,t}$	-0.281**	-0.300	6.33	***	***	0.586
$VA\_TA_{i,\,t}$	0.036**	0.029	24.14	***	***	0.670
$\Delta(LOGIND_{i,\,t})$	0.322**	0.171	88.33	***	***	0.852

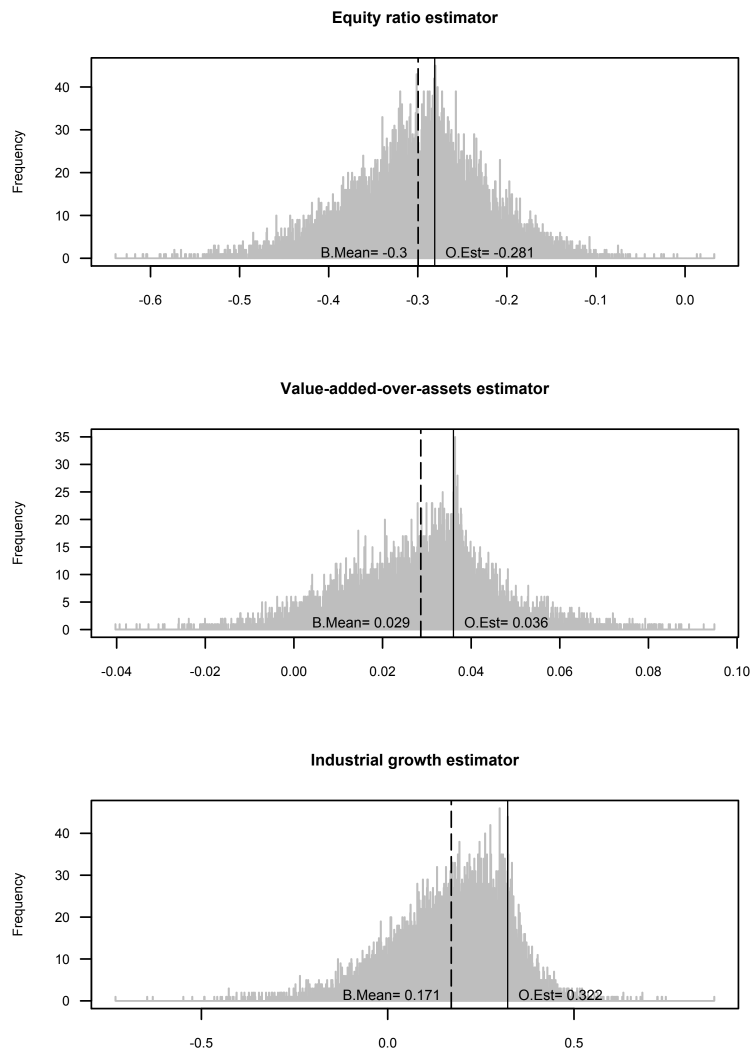
The table summarizes the results of two formal tests of the difference between the means of simulated distributions and the MS estimates. The formal tests are the standard $t - test$ and the non-parametric Mann-Whitney-Wilcoxon signed-rank test. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively. Δ% is always computed with respect to the MS estimate. Last column reports the proportion (empirical probability) of the simulated parameters bellow the original estimate.

Table 5: Quantile regressions - simulation summary

Dependent variable: future cash flow over equity, $CF\_E_{i,\ t+1}$									
τ	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Panel A: E_TA_τ									
MS estimate (1)	-0.038	-0.065***	-0.09***	-0.086***	-0.104***	-0.137***	-0.173***	-0.256***	-0.498***
Mean (2)	0.004	-0.028	-0.046	-0.060	-0.074	-0.097	-0.127	-0.192	-0.404
$\Delta_{(1)}^{(2)}$ †	0.042	0.037	0.044	0.026	0.030	0.040	0.046	0.064	0.094
Median	0.004	-0.027	-0.044	-0.060	-0.074	-0.098	-0.127	-0.193	-0.405
SD	0.032	0.022	0.023	0.019	0.020	0.024	0.029	0.039	0.072
min	-0.111	-0.090	-0.106	-0.104	-0.125	-0.154	-0.197	-0.304	-0.588
max	0.149	0.045	0.025	0.017	0.006	-0.007	-0.025	-0.069	-0.156
Panel B: VA_TA_τ									
MS estimate (3)	-0.027*	-0.013**	-0.008**	-0.002	0.001	0.002	0.006	0.011*	0.020*
Mean (4)	-0.018	-0.011	-0.008	-0.004	-0.002	0.001	0.006	0.012	0.024
$\Delta_{(3)}^{(4)}$ †	0.042	0.037	0.044	0.026	0.030	0.040	0.046	0.064	0.094
Median	-0.018	-0.011	-0.008	-0.004	-0.002	0.001	0.006	0.012	0.021
SD	0.009	0.005	0.003	0.003	0.003	0.004	0.005	0.008	0.015
min	-0.080	-0.037	-0.023	-0.017	-0.017	-0.015	-0.014	-0.016	-0.023
max	0.015	0.005	0.003	0.008	0.012	0.020	0.029	0.067	0.180
Panel C: $\Delta(LOGIND)_\tau$									
MS estimate (5)	-0.200	0.002	0.024	-0.007	0.037	0.055	0.141**	0.286**	0.552***
Mean (6)	-0.109	-0.042	-0.021	-0.011	0.028	0.033	0.089	0.142	0.360
$\Delta_{(5)}^{(6)}$ †	0.091	-0.044	-0.045	-0.004	-0.009	-0.022	-0.052	-0.144	-0.192
Median	-0.122	-0.035	-0.020	-0.011	0.032	0.038	0.097	0.147	0.401
SD	0.122	0.058	0.045	0.038	0.043	0.049	0.067	0.111	0.204
min	-0.490	-0.285	-0.223	-0.176	-0.173	-0.208	-0.208	-0.349	-0.712
max	0.425	0.211	0.171	0.154	0.186	0.256	0.359	0.523	0.895

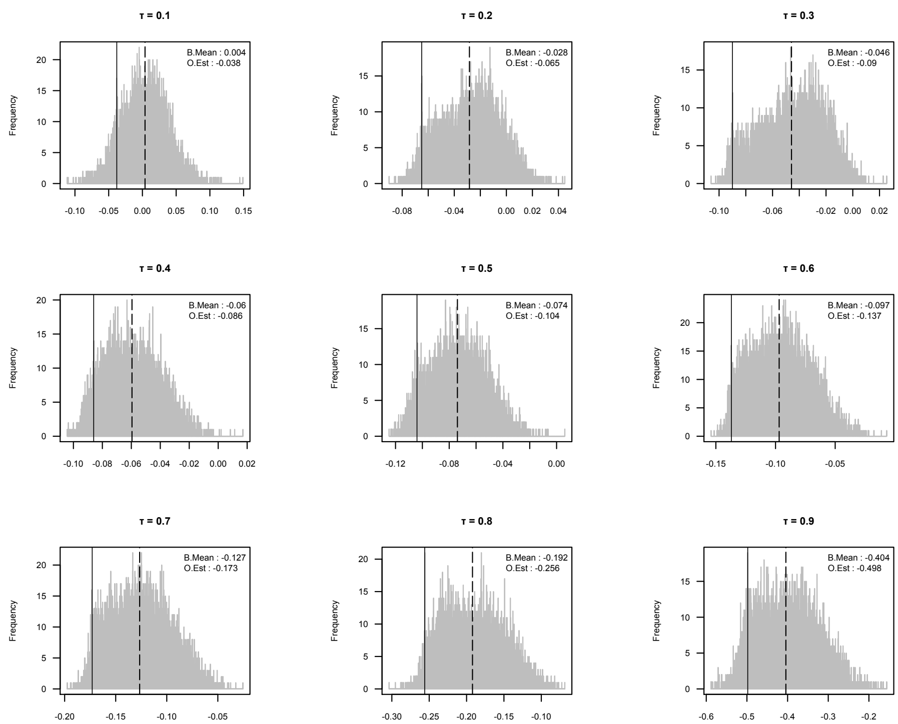
The table summarizes the results of 10000 iterations of the quantile regression model with bootstrapped standard errors. All quantile specifications include all control variables. For details and definitions, see Table 1. The line "MS estimate" shows the parameter estimates for the sample of VC-backed firms only (MS). Mean, median, SD, min, and max refer to the empirical distributions corresponding to each parameter in each quantile (τ). ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively (two-tailed). † indicate 1% significance of the corresponding difference in the parametric ($t-test$) and non-parametric (Mann-Whitney-Wilcoxon signed-rank test) testing procedures.

Figure 1: Panel regression approach - simulated distributions of the loadings of return determinants



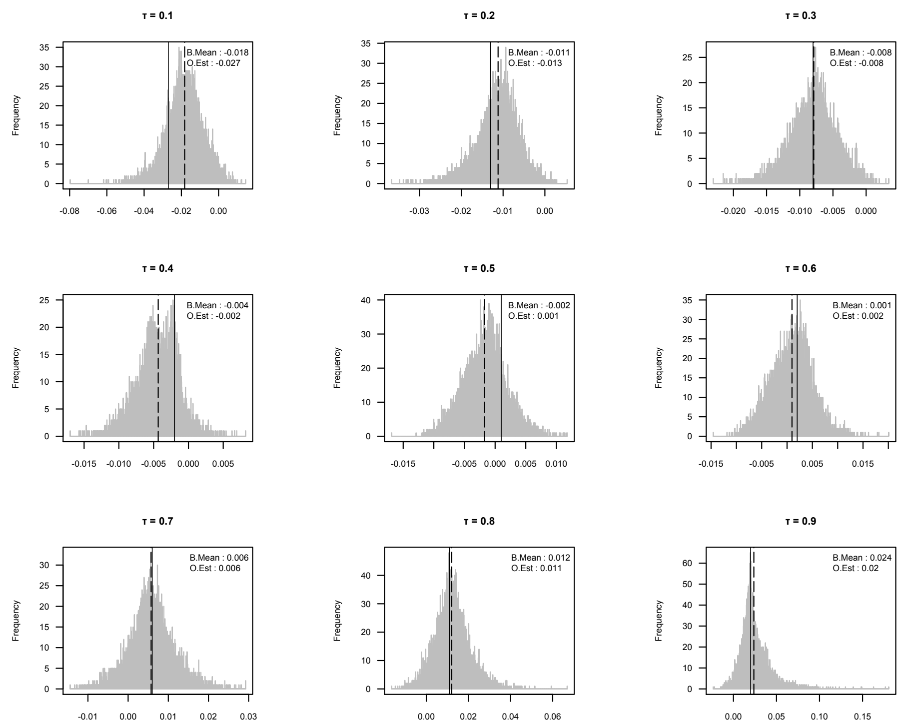
Note: The figure reports the simulated distributions of the estimators of the loadings of return determinants. Dashed lines correspond to the simulated means of the distributions. Solid lines mark the MS original estimates for the VC-backed sample only.

Figure 2: Quantile regression approach - simulated distributions of the loadings of the Equity ratio (E_TA)



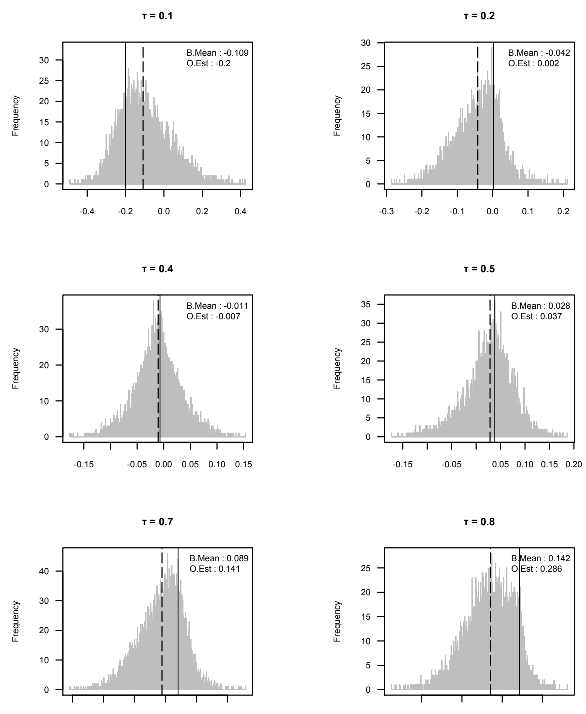
Note: The figure reports the simulated distributions of the estimators of the Equity Ratio (E_TA) in the quantile regression setting. Dashed lines correspond to the simulated means of the distributions. Solid lines mark the MS estimates of for the VC-backed sample only.

Figure 3: Quantile regression approach - simulated distributions of the loadings of the Value-added-over-assets ratio (VA_TA)



Note: The figure reports the simulated distributions of the estimators of the Value-added-over-assets ratio (VA_TA) in the quantile regression setting. Dashed lines correspond to the simulated means of the distributions. Solid lines mark the MS estimates of for the VC-backed sample only.

Figure 4: Quantile regression approach - simulated distributions of the loadings of the Industrial growth rate ($\Delta(LOGIND)$)



Note: The figure reports the simulated distributions of the estimators of the Industrial growth rate ($\Delta(LOGIND)$) in the quantile regression setting. Dashed lines correspond to the simulated means of the distributions. Solid lines mark the MS estimates of for the VC-backed sample only.