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INVESTMENT-CASH FLOW SENSITIVITY IN SMALL AND MEDIUM-SIZED ENTERPRISES AT THE EXPANSION STAGE

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ABSTRACT

Most of the controversy about the investment-cash flow sensitivity as a measure of financial constraints concentrates on listed firms. We assume that unlisted growing Small and Medium-Sized Enterprises (SMEs) were subject to financial constraints before a Venture Capital (VC) investment. We analyse the investment-cash flow sensitivity in unlisted Spanish SMEs with and without VC involvement. We find a positive relationship between investment and cash flow in all unlisted firms, which is larger in the subsample of VC-backed firms. Our findings provide an additional justification for the role of VC as a source to fill the financing gap and support the investment-cash flow sensitivity as a measure of the presence of financial constraints.

Key Words: Investment, Cash flow, SMEs, Financial constraints, Venture Capital

1. INTRODUCTION

Given that access to external funding of a firm depends upon a greater or lesser presence of the problems stemming from asymmetrical information, it is to be expected that mature firms with a long financial history and a significant amount of fixed assets are not financially constrained. The characteristics of this group of firms, as far as size and the availability of information are concerned, make it easier for them to access funds provided by capital markets. Small and Medium-Sized Enterprises (SMEs, hereafter), on the contrary, suffer constraints when attempting to obtain financial resources to fund growth because public information concerning their history and financial track record is lacking, as are assets to put on the table as collateral.

With no access to the stock market, SMEs attempt to obtain funding from debt markets to finance growth opportunities. Nevertheless, debt markets provide resources at a high cost (Berger and Udell, 1998; Titman and Wessels, 1988; Wald, 1999), demand a fair amount of assets as collateral, and require complex contracts (Berger and Udell, 1998; Carpenter and Petersen, 2002a) which in some cases are difficult, or even impossible, for SMEs to take on.

As a consequence, constraints in obtaining financial resources force SMEs to fund their expansion through funds coming from people surrounding the entrepreneurs, such as family and friends (Ang, 1991), and internally generated resources (Paul et al., 2007). Nonetheless, the latter may not be sufficient, thus highlighting their problems in financing growth opportunities.

As regards those limitations faced by SMEs, venture capitalists may play a critical role in funding their expansion. Their financial limitations are lessened not just by the resources directly supplied by the venture capitalist. The presence of these specialised investors also adds value to the firm, which may materialise in different ways (Sahlman, 1990; Hellmann and Puri, 2002; Chemmanur et al., 2011; among others), and is positively assessed by

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entrepreneurs (Hsu, 2004). For the purposes of this work, a key contribution of venture capitalists is the increased credibility of SMEs in their relation with third parties, such as potential shareholders, creditors, customers and suppliers, making it easier for them to negotiate financial terms and conditions.

In this context, the period prior to the venture capitalist's joining the firm is characterised by investment decisions being conditioned to the available resources, basically represented by internally generated funds. The relationship between investment and cash flow, as a proxy for internally generated funds, is interpreted by Fazzari et al. (1988) and later studies as evidence of the presence of financial constraints. However, Kaplan and Zingales (1997) raised the discussion about investment sensitivity to cash flow being a signal of financial constraints in firms which, due to their characteristics, have easy access to external finance. The controversial aspect of these contributions focuses on the discussion regarding the pre-classification of firms as financially constrained or not, when all firms considered in both articles were listed.

This pre-classification issue is addressed in this article by selecting a sample of unlisted SMEs at the expansion stage that were subject to a Venture Capital (VC, hereafter) deal and a one-by-one matched sample of similar non-VC-backed firms. We aim to measure the sensitivity between investment and cash flow in those firms prior to the entry of the venture capitalist. In this way, the aim is also to compare whether what was suggested by Fazzari et al. (1988) is true or not; or whether, on the contrary, the relationship they establish is not important in explaining the existence of financial constraints.

We conduct our analysis on a representative sample of unlisted Spanish SMEs belonging to the manufacturing sector. Firms that received VC between 1995 and 2007 are analysed, tracing them back to at least three years before the entry of the investor.

The results confirm that the existence of financial constraints in firms from the sample is linked with the investment-cash flow sensitivity. In the same direction, an increase in long term debt has a positive effect on investment. This circumstance, also detected in firms without VC involvement, albeit with lower coefficients, stresses the justification for searching for other external sources of funds, such as VC, to continue taking advantage of growth opportunities.

The main contribution of this study to the literature is the empirical demonstration of the financial constraints suffered by SMEs as a determining factor in the quest for an alternative source of external funding, such as VC. Secondly, from a sample of firms which are presumably subject to financial constraints, new evidence is provided on the sensitivity of investment to changes in cash flow, as hypothesised by Fazzari et al. (1988). Similarly, it must be stressed that it is the first work about this issue carried out in firms before receiving VC, and we are aware that only Manigart et al. (2003), Bertoni et al. (2010), Guariglia (2008), and Engel and Stiebale (2009) have ventured forth into this analysis for unlisted firms, albeit with a different approach.

The rest of the paper is organised as follows. Section 2 focuses on the problems on the financing of SMEs and on the debate about the interpretation of the correlation between investment and cash flow and presents our hypotheses. Section 3 includes the description of the sampling process and the methodology used, whilst the results are presented in the fourth section. Finally, the main findings are highlighted and discussed in the fifth section.

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2. LITERATURE REVIEW AND RESEARCH HYPOTHESES

2.1 FINANCIAL CONSTRAINTS FACED BY SMALL AND MEDIUM-SIZED ENTERPRISES

The problems stemming from information asymmetries, described by Jensen and Meckling (1976), Myers and Majluf (1984) and Stiglitz and Weiss (1981), among others, imply that interest groups in the firm do not have the same access to information. The lack of sufficient information to assess the quality of different investment projects in the firm as well as the quality of management in making investment decisions determines the level of risk that creditors and/or equity investors face. The level of risk is then reflected by a high cost of capital, plus the requirement of additional collateral and/or the limitation of the amounts supplied.

According to Myers (1984) and Myers and Majluf (1984), when additional financing is required there is a hierarchy in the use of funds, which is based on information asymmetry. Whenever possible, funding a firm should be covered by internally generated funds, which are not affected by adverse selection problems. If these were not enough, debt would be the next option, with stock issues something to be avoided, since the risk associated with the latter is greater than that of debt. Therefore, firms with high levels of internally generated funds will not have such a strong need to seek external finance. This occurs in the presence of considerable financial slack (Myers and Majluf, 1984). The availability of cash and/or liquid assets enables the firm to take advantage of growth opportunities with no need to access external funds.

In the particular case of SMEs, problems stemming from information asymmetries are acute (Ang, 1991; Carpenter and Petersen, 2002a). Beyond the shareholders' motivation of avoiding ownership becoming diluted and their desire to keep control of the business, the growth and survival of SMEs are affected by various issues. Among others we could highlight the following (Ang, 1991; Chittenden et al., 1996; Berger and Udell, 1998): hidden information, the lack or low level of collateral and the lack of any history or financial track record to characterise them. The evaluation of the quality of assets and investment opportunities by suppliers of external funds may be difficult (Fazzari et al., 1988), so obtaining resources to finance SME growth is limited to certain funding sources. From the entrepreneur's point of view, if stock issues are compared with debt, the original stockholders will tend to prefer the latter, since they are against dilution of ownership and loss of management control (Holmes and Kent, 1991; Chittenden et al., 1996; López-Gracia and Aybar-Arias, 2000). Additionally, the stock market does not constitute an alternative for SME financing, since it is relatively expensive and, even, out of reach for smaller firms (Ang, 1991 and 1992; Kadapakkam et al., 1998).

On the other hand, information asymmetry problems in the SMEs' access to bank loans (Gregory et al., 2005) and the lack of collateral (Chittenden et al., 1996) result in high costs (Berger and Udell, 1998; Titman and Wessels, 1988; Wald, 1999) and complex contracts (Berger and Udell, 1998). The firm could then be forced to turn down an investment project because the expected return is wiped out by a high cost of capital. The latter could make firm growth dependent on the internally generated funds available.

Since long term debt is, generally, out of reach for SMEs, short term debt becomes the only feasible alternative (Chittenden et al., 1996). Regarding commercial credit, SMEs must find a proper matching between the maturity of the cash conversion period and the maturity of accounts payable. On the other hand, short term bank loans could also be accessed by SMEs, albeit at a high cost. Additionally, SMEs' future viability would be conditioned by the bank's willingness to renew short term credit lines over time. As a result, funding growth basically with

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short term debt increases the likelihood of the firm suffering most from any external shock in the economy or in the financial system.

In spite of the ideas of Myers and Majluf (1984), Hogan and Hutson (2005) and Paul et al. (2007) find evidence of SMEs' main source of external financing being stock issues rather than debt when equity capital is supplied by specialised investors such as venture capitalists. Unlike other financial intermediaries, venture capitalists can alleviate the problems of information asymmetries and provide funds that the SMEs cannot obtain from other sources (Gompers and Lerner, 2001). At the same time they add value to the firms they are investing in (Sahlman, 1990; Gompers and Lerner, 1998; Jain, 2001; Hellmann and Puri, 2002; Chemmanur et al., 2011; among others). The likelihood of losing independence and control of the firm is offset by the benefits provided by external funding (Paul et al., 2007). Opportunities for growth are favoured not only by the arrival of financial resources, since choosing a good investor adds value to the firm (Hsu, 2004). Additionally, this source of finance would not require collateral.

2.2 THE SENSITIVITY OF INVESTMENT TO CASH FLOW AS A MEASURE OF FINANCIAL CONSTRAINTS

When the access to external funds to attain further firm growth is difficult then the firm's future development is limited to internally generated funds. In this line, Fazzari et al. (1988) argue that a positive relationship between investment and internally generated funds signals the existence of financial constraints. They analyse the relationship on a sample of US listed firms, which are classified as financially constrained or not on the basis of the dividend-payout ratio. Their work is based on a model relating investment to available cash flow, with Tobin's q being a proxy of the firm's growth opportunities. Their results show that investment in firms with low dividends shows greater sensitivity to available cash flow.

To test the existence of investment-cash flow sensitivity as evidence of financial constraints, a number of subsequent empirical studies follow the work by Fazzari et al. (1988). Because the level of financial constraints is not observable, these studies categorised firms according to characteristics such as dividend payout (Moyen, 2004), size or age (Vogt, 1994; Gilchrist and Himmelberg, 1995), availability of debt rating (Whited, 1992), ownership structure (Pawlina and Renneboog, 2005), affiliation with industrial groups (Hoshi et al., 1991), cross-country comparison (Kadapakkam et al., 1998; Bond et al., 2003), and other firm characteristics.

Higher investment-cash flow sensitivity is also observed in firms that are new or small (Shin and Kim, 2002; Carpenter and Petersen, 2002a; Carpenter and Guariglia, 2008; Hovakimian and Hovakimian, 2009); independent firms, as opposed to firms affiliated with industrial groups (Hoshi et al., 1991; Shin and Park, 1999); firms with high growth rates and low dividend pay-out ratios (Alti, 2003); firms with high debt ratio or a high interest coverage ratio, or without rated ratio (Whited, 1992); firms with low probability of informed trading (Ascioglu et al., 2008); and firms in high-tech sectors (Carpenter and Petersen, 2002b).[1]

Contrary to the findings of Fazzari et al. (1988), and subsequent studies, Kaplan and Zingales (1997) consider that sensitivity of investment to cash flow should not be taken as evidence of financial constraints, and a firm's dividend policy is a choice variable since firms could choose to pay low dividends or to pay out more. From a subset of firms in the sample used by Fazzari et al. (1988), Kaplan and Zingales (1997) pre-classify firms as financially constrained or not using both quantitative and qualitative information and then test the sensitivity between investment and cash flow. They find that investments in firms with lower financial constraints

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[1] For a comprehensive survey, see Hubbard (1998).

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exhibit more sensitivity to changes in cash flow. They argue that investment dependency on cash flow might not increase monotonically with the level of cash flow, making an aggregate sensitivity difficult to interpret. Kaplan and Zingales (2000) argue that investment-cash flow sensitivity could (at least partially) be caused by excessive conservatism on the part of managers.[2] The contributions of Devereux and Schiantarelli (1990), Kadapakkam et al. (1998), Cleary (1999 and 2006), Almeida and Campello (2007), and Hovakimian (2009) support the findings of Kaplan and Zingales (1997).

In spite of the controversy regarding the validity of the approach by Fazzari et al. (1988), it is still accepted in the literature as a valid way of analysing financial constraints (Pawlina and Renneboog, 2005).

Given the information asymmetries that external investors face when deciding about the funding of SMEs, we anticipate a positive and significant relationship between investment and internally generated cash flows in those firms. Accordingly, our first hypothesis would stand as:

> *Hypothesis 1: SMEs exhibit a positive relationship between cash flow and investment.*

Since VC firms are able to reduce the information asymmetries in SMEs, we anticipate that those suffering most from the inability to obtain external funding would then approach VC. In this line, we also anticipate that the investment-cash flow sensitivity should be greater in firms that later receive VC in the period prior to the entry of the venture capitalist. Therefore, our second hypothesis would be as follows.

> *Hypothesis 2: SMEs that later receive VC show a greater investment dependency on cash flow than similar firms that do not profit from that source of external equity.*

The empirical evidence on investment-cash flow sensitivity in VC-backed firms is limited. Manigart et al. (2003) study the investment dependency on cash flow in unlisted Belgian VC-backed firms and a matched sample of non-VC-backed firms. They do not find a significant reduction in the investment-cash flow sensitivity in the group of VC-backed firms. Their results could be affected, however, by the lack of distinction of firms across stages of development. Another factor influencing the results could be the concentration of post-investment observations in a period after the economic downturn of the early nineties, when banks were more reluctant to grant credit to SMEs. Bertoni et al. (2010) analyse the investment-cash flow sensitivity in unlisted Italian new-technology-based firms. They find that both VC and non-VC-backed technology-based firms exhibit a positive relationship between investment and cash flow, which is reduced in the former due to VC involvement. More recently, Engel and Stiebale (2009) also find that VC contributes to the reduction in investment sensitivity to cash flow in a sample of UK and French firms at the expansion stage.

Nevertheless, to the best of our knowledge, our work is the first to test whether the dependency of investment to cash flow before the VC investment event is greater in firms that later receive VC than in similar growing firms that do not have access to that source of funding.

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[2] Fazzari et al. (1997) argue that the approach of Kaplan and Zingales (1997) is inconsistent because the small sample is not heterogeneous enough to support meaningful conclusions, and, furthermore, firms are classified as financially constrained or not using a fairly subjective set of criteria.

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3. DATA AND METHODOLOGY

3.1 THE SAMPLING PROCESS

The presence of investment-cash flow sensitivity in SMEs that were later financed by venture capitalists is tested on a sample of Spanish manufacturing SMEs[3] at the expansion stage. The period of analysis includes VC investments performed between 1995 and 2007.

In accordance with the data obtained from the Spanish Private Equity and Venture Capital Association (ASCRI), 2,651 VC investments were recorded in Spain in that period, including all stages but excluding the financial and real estate sectors. Finding information on these was possible in the case of 2,230 firms on the AMADEUS Database, which records information on 1,202,363 Spanish firms. 757 of them were at the expansion stage[4] at the time of the initial VC investment.

In order to have sufficient information about the pre-investment period, 413 firms which did not have at least three years of accounting data before the initial VC investment were dropped from the sample. We also restrict sectoral heterogeneity by focusing on the manufacturing sector. The previous process reduced the sample to a total of 168 firms, accounting for 22 per cent of the population, even though some of them have missing data about some variables.

To test the investment-cash flow sensitivity as a common characteristic of SMEs, 168 firms with no VC funding and comparable one-by-one with the previously identified firms were selected. Comparable firms were randomly chosen from the AMADEUS Database, matching the sector, by means of the NACE Rev2 code (4-digit code), the number of employees, the revenues, the asset volumes, and the age, whenever possible, in the year before the initial VC investment performed, as well as its location in a geographical area with a similar level of development, whenever possible.

3.2 METHODOLOGY

According to Fazzari et al. (1988) the presence and importance of financial constraints in the firms analysed depends on the relationship between investment, as the dependent variable, and internally generated resources and growth opportunities, as independent variables. Investment refers to the formation or net increase of capital. Changes in fixed assets are interpreted as a reflection of conscious decision-making by the managers (Kadapakkam et al., 1998).

Regarding the independent variables, the capacity to generate resources internally is proxied by cash flow. Given the limited access to external finance, the firm's capability of taking advantage of growth opportunities might be heavily dependent on cash flow.

Originally, Fazzari et al. (1988) used the Market-to-Book ratio as a proxy of growth opportunities, because their sample records data from listed firms. This ratio has the advantage of incorporating market judgment regarding the future profit-generating capability of the firm (Kadapakkam et al., 1998; Andrés-Alonso et al., 2000), which could then reduce the difficulties found in accessing additional finance. On the contrary, if growth opportunities

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[3] SMEs are defined according to the European Union criteria. A SME provides work for fewer than 250 employees and has an annual turnover not exceeding 50 million Euros or total assets not exceeding 43 million Euros.
[4] Firms at the expansion stage are defined by EVCA (2007) as operating firms that require financing for growth, and which may or may not be breaking even or trading profitably. According to NVCA (2009), they are characterised as firms that have a complete management team and exhibit a substantial increase in revenues.

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are not very promising, access to external funding is limited. Vogt (1994) finds evidence that the latter happens in firms with low Tobin q ratios.

We do not have any listed firms in our sample for which we could obtain a market value. Therefore, regarding the numerator, we could estimate market values by applying average EBITDA multiples selected from Merger and Acquisitions (M&A). The multiples obtained would then be used to estimate the market values of the firms in the sample, all of them unlisted and with no observable market value. As a result, it would be possible to have a market value estimate for each firm analysed that changes over time. Nevertheless, since this reference is based on the firm's EBITDA, the result would be highly correlated with a key independent variable: cash flow. As a result, we use the EBITDA multiple alone as a measure of the aggregate shifts in economic prospects.

We also add a dummy variable to the original approach by Fazzari et al. (1988), which takes the value 1 when the firm is subject to a VC investment later. Additionally, we include the interaction between this latter variable and cash flow to test whether firms that later receive VC exhibit a different investment-cash flow sensitivity when compared with the non-VC ones. Likewise, other variables are added to control for size, age and the geographical location of the firm. The model, which would also incorporate time dummies, would be represented as follows:

$$I_{it} = \beta_0 + \beta_1 CF_{it} + \beta_2 EBITDA_{it} + \beta_3 Size_{it} + \beta_4 Age_i + \beta_5 R_i + \beta_6 VC_i + \beta7 VCi{*}CF_{it} + \varepsilon_{it} \tag{1}$$

where i is the firm's indicator and t is a time indicator, which is set to 0 in the year of the initial VC investment for both the firm that later receives VC and the one-by-one matched control group firm. The investment variable (I_{it}) is given by the ratio of the difference between the book value of the net fixed assets of the firm in year t and t-1 plus the depreciation expenditure of the year t (Morgado and Pindado, 2003; Pawlina and Renneboog, 2005; Bertoni et al., 2008), divided by the beginning-of-period-t total assets of the firm i. Cash flow (CF_{it}) is measured by the ratio of the firm's net earnings in year t plus the depreciation (Carpenter and Petersen, 2002a; Shin and Kim, 2002) divided by the beginning-of-period-t total assets of the firm i.

Regarding EBITDA multiples, the source of information is the Mergermarket Database, from which 2,887 complete M&A in non-financial Spanish firms for the period 1992-2007 are taken. From this sample, a random selection is made of at least one deal per sector and year. In parallel, the accounting information is extracted for each of the selected acquired firms to calculate the EBITDA multiple of the transaction. The source of accounting information is the AMADEUS Database. This operation is repeated for all the Mergermarket Database subsectors, and an average of the EBITDA multiples for each of the years being studied is calculated.

We also control for size, age, and location of the firm. $Size_{it}$ is measured by the natural logarithm of the total number of employees of the firm in the period t and Age_{it} is measured by the age of the firm at the period t. The variable R_i is a dummy taking value 1 if the firm is located in a region of Spain with per capita income below 75 per cent of the European Union average (Objective 1 region), or zero otherwise. VC_i takes value 1 if the firm receives VC funding in the following years, or 0 otherwise.

The previous model can be completed to control for the effect of leverage on investment. As Lang et al. (1996) argue, a relation should exist because high leveraged firms might not be able to take advantage of growth opportunities. Thus, Hovakimian (2009) follows this

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approach and, as well as Lang et al. (1996), measures leverage using the total debt ratio. Following Hovakimian (2009), there may be diverse effects from the interaction of leverage with available cash flows. Low debt levels may be interpreted as a signal of financial constraints and, at the same time, as evidence of limited access to funds provided by borrowers. However, high levels of debt reduce future available cash flow for investment.

Nevertheless, we find that SMEs mostly rely on short term debt rather than on long term debt. Furthermore, most of the short term debt is represented by commercial debt, namely accounts payable. Since our purpose is to measure long term investment sensitivity to cash flow, the controlling role of debt should be played by long term debt. In this case, the model to be estimated is the following:

$$I_{it} = \beta_0 + \beta_1 CF_{it} + \beta_2 EBITDA_{it} + \beta_3 LTD_{it} + \beta_4 Size_{it} + \beta_5 Age_i + \beta_6 R_i + \beta_7 VC_i + \beta_8 VC_i{*}CF_{it} + \varepsilon_{it} \tag{2}$$

where LTD_{it} is the ratio between long term debt and beginning-of-period-t total assets of the firm i. This model would also include time dummies, which would help us to control for the limited availability of debt and the changing interest rates available over time.

The use of the estimated EBITDA multiples found in M&A, however, might not properly represent market value multiples in our sample, which only includes unlisted firms. A further extension is applied in the two models outlined above introducing intangible assets as an alternative approach to control for growth opportunities. Fama and French (2002) argue that Research and Development (R&D) expenditures generate future investments, thus the latter signal the growth potential of firms (Manigart et al., 2003). Therefore, following Michaelas et al. (1999) and Manigart et al. (2003), we use the volume of intangible assets as a proxy of growth opportunities.[5] Intangible assets ($Intang_{it}$) are defined by the ratio between net intangible assets of the firm i in year t and the beginning-of-period-t total assets of the firm i. Table 1 summarises the definition of the variables to be used.

TABLE 1.
DEFINITION OF THE VARIABLES

VARIABLE	DESCRIPTION
I_{it}	Increase in book value of net fixed asset plus depreciation divided by beginning-of-period total assets.
CF_{it}	Net earnings plus depreciation divided by beginning-of-period total assets.
$EBITDA_t$	Average EBITDA multiple for the period.
$Intang_{it}$	Intangible fixed assets normalised by beginning-of-period total assets.
LTD_{it}	Total long term debt divided by the beginning-of-period total assets.
$Size_{it}$	Natural logarithm of total the number of employees of the firm i in the period t.
Age_i	Age of the firm i at the period t.
VC_i	Dummy variable that takes value 1 if the firm was subject to a VC investment in the following years.
R_i	Dummy variable that takes value 1 if the firm is located in a region classified as Objective 1.

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[5] Titman and Wessels (1988) introduce the percentage of change in total assets as an alternative measure of growth opportunities. Nevertheless, this measure could be more representative of past growth (Balboa et al., 2009).

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Since our data refer to time series observations on a number of unlisted firms, the panel data methodology will be employed to estimate the models. Regarding the estimation method, some papers have discussed whether the individual effects should be treated as fixed or random variables. However, this is not an important distinction because we can always treat the individual effects as random variables without loss of generality (Mundlak, 1978; Arellano and Bover, 1990). Furthermore, one of the variables of interest in this analysis is the dummy that represents whether the firm later receives VC. If a fixed effect approach is employed, all variables with constant values over time are dropped from the analysis. From a different perspective, since the model is tested on a representative sample of unlisted firms, with and without VC involvement, the results would not change if a given individual were randomly replaced by another.

3.3 DESCRIPTIVE STATISTICS

Table 2 shows the descriptive statistics for the whole sample, for the subsample of firms that later receive VC backing and for the subsample of firms which do not have any VC involvement. All ratios are winsorised at the 2 per cent threshold. All accounting information is shown in constant 2005 Euro using the Harmonised Consumer Price Index as deflator. Accounting information includes data from 1991 to 2007.

On average, the investment ratio of firms that were subject to VC backing later is relatively high compared to that for firms without VC involvement (0.1348 against 0.1006). Even though both groups include growth firms, the greater investment ratio found in firms that later receive VC might be a sign of the faster expansion process of this latter group, which triggers the need to obtain external funds. Conversely, the cash flow ratio for non-VC-backed firms (0.1024) is, on average, greater than that of firms which become VC-backed later (0.0930), with the difference being significant at the 10 per cent level.

Regarding the proxies to control for growth opportunities, the market value reference estimated is not significantly different between firms that later receive VC and the control group. Nevertheless, the average of intangible assets stands at 0.0664 in the former, which is significantly greater than the 0.0449 found in the latter.

As regards debt, we also find significant differences between both groups, which may also be interpreted as a signal of the greater need to access external equity to fund further growth. Firms that later receive VC are more levered than those belonging to the control group, with total debt ratio representing 0.8531 of total assets. The reference in the control group is estimated at 0.7246 of total assets. Regarding long term debt, firms that were later subject to a VC investment exhibit a higher ratio than control group firms, with their values being 0.1723 and 0.1290 of total assets, respectively.

Interestingly, both groups of firms show high levels of short term debt, with the group of firms which are not subject to a VC investment later showing a greater share of short term rather than long term debt. When we compare short and long term debt in both groups, we find that, on average, short term debt represents 80.32 per cent of total debt in firms that later receive VC, whereas it accounts for 84.14 per cent in the group without VC-backing. Pairwise correlations among all variables are reported in Table 3.

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TABLE 2.
DESCRIPTIVE STATISTICS OF THE VARIABLES FOR THE SAMPLE OF MANUFACTURING UNLISTED SPANISH SMES (PRE-INVESTMENT PERIOD)

VARIABLES	OBSERVATIONS	FIRMS	MEAN	STD. DEVIATION
Investment				
All firms	2,046	336	0.1181	0.1967
VC-backed firms	1,048	168	0.1348	0.2110
Non-VC-backed firms	998	168	0.1006	0.1789
Difference	2,046	336	0.0343***	0.0086
Cash flow				
All firms	2,046	336	0.0976	0.0861
VC-backed firms	1,048	168	0.0930	0.0836
Non-VC-backed firms	998	168	0.1024	0.0884
Difference	2,046	336	-0.0094*	0.0038
EBITDA multiple				
All firms	2,342	336	6.0302	1.7304
VC-backed firms	1,195	168	6.0159	1.7182
Non-VC-backed firms	1,147	168	6.0451	1.7436
Difference	2,342	336	-0.0292	0.0716
Intangible assets				
All firms	2,046	336	0.0559	0.0886
VC-backed firms	1,048	168	0.0664	0.0959
Non-VC-backed firms	998	168	0.0449	0.0788
Difference	2,046	336	0.0215***	0.0039
Debt				
All firms	2,046	336	0.7904	0.3564
VC-backed firms	1,048	168	0.8531	0.3600
Non-VC-backed firms	998	168	0.7246	0.3405
Difference	2,046	336	0.1286***	0.0155
Short term debt				
All firms	2,046	336	0.6331	0.2935
VC-backed firms	1,048	168	0.6732	0.3021
Non-VC-backed firms	998	168	0.5909	0.2781
Difference	2,046	336	0.0824***	0.0128
Long term debt				
All firms	2,046	336	0.1512	0.1601
VC-backed firms	1,048	168	0.1723	0.1606
Non-VC-backed firms	998	168	0.1290	0.1566
Difference	2,046	336	0.0433***	0.0070

The table reports descriptive statistics on winsorised (2% each tail) values of the variables. Except Market value and EBITDA multiple, all variables are normalised by using beginning-of-period-*t* stock of total assets. We test the null hypothesis that means are equal between VC-backed and Non-VC-backed groups assuming unequal variance. ***, ** and * indicate, respectively, significance levels <1%, <5% and <10%.

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TABLE 3. CORRELATION MATRIX

	CASH FLOW	EBITDA MULTIPLE	INTANGIBLE ASSETS	LONG TERM DEBT
CASH FLOW	1.0000			
EBITDA MULTIPLE	-0.0168 0.4488	1.0000		
INTANGIBLE ASSETS	0.2753* 0.0000	0.0214 0.3339	1.0000	
LONG TERM DEBT	0.0959* 0.0000	0.0311 0.1597	0.2646* 0.0000	1.0000

The table reports pairwise correlations among all independent variables. The variables are: (1) *Cash flow:* net earnings plus depreciation divided by beginning-of-period total assets; (2) *EBITDA multiple*: average EBITDA multiple for the period; (3) *Intangible assets:* intangible fixed assets normalised by beginning-of-period total assets; (4) *LTD*: total long term debt divided by the beginning-of-period total assets. * indicates significance levels of <10%.

4. RESULTS

Table 4 shows the results obtained from the estimation of the models specified for the whole sample. As expected, all the models provide evidence of a positive, significant relationship between available cash flow and investment, thus verifying our Hypothesis 1. According to Fazzari et al. (1988), this circumstance would be signalling the presence of financial constraints in firms in the sample. But our main purpose is to check whether the sensitivity between investment and cash flow is significant in the supposedly more constrained firms, namely the group that receives VC backing later. The interaction variable between cash flow and the VC dummy is positive and significant in all models, thus showing a higher sensitivity of investment to cash flow in firms that are later the subject of a VC investment.

Regarding our proxies measuring growth opportunities, the EBITDA multiple is not significant in any of the models, either with or without debt. This finding might be caused by the inability of the measure to capture the market value of these unlisted firms. Nevertheless, when growth opportunities are proxied by intangible assets, the coefficient of this variable is positive and significant. Since our sample firms are not traded on the stock market, this latter measure could be more representative of their growth opportunities.

When long term debt is brought into the estimation process, we find evidence of its positive effect on investment. Given the limited access to debt and the low level of available cash flow, this result may explain why entrepreneurs access VC investors as an alternative source for financing the expansion process. The results obtained are robust after controlling for size, age and time dummies, as well as dummies relative to the location of the firm.

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TABLE 4.
REGRESSION RESULTS OF THE INVESTMENT-CASH FLOW SENSITIVITY
FOR THE FULL SAMPLE OF UNLISTED SPANISH SMES (PRE-INVESTMENT PERIOD)

INDEPENDENT VARIABLES	DEPENDENT VARIABLE: INVESTMENT			
	WITHOUT THE EFFECT OF LONG TERM DEBT		WITH THE EFFECT OF LONG TERM DEBT	
CF_{it}	0.5099*** (0.1087)	0.4788*** (0.1086)	0.4691*** (0.0979)	0.4615*** (0.0990)
$EBITDA_{it}$	0.0069 (0.0077)		0.0049 (0.0068)	
$Intang_{it}$		0.4733*** (0.0820)		0.1414* (0.0849)
LTD_{it}			0.6167*** (0.0479)	0.5951*** (0.0524)
$Size_{it}$	0.0234*** (0.0074)	-0.0204*** (0.0069)	-0.0201*** (0.0067)	-0.0194*** (0.0066)
Age_i	-0.0018*** (0.0004)	-0.0015*** (0.0004)	-0.0008* (0.0004)	-0.0007* (0.0004)
R_i	0.0006 (0.0140)	0.0125 (0.0134)	-0.0073 (0.0125)	-0.0035 (0.0121)
VC_i	0.0188 (0.0171)	0.0065 (0.0162)	-0.0054 (0.0169)	-0.0083 (0.0165)
VC_i*CF_{it}	0.2329** (0.1198)	0.2311** (0.1156)	0.2209* (0.1215)	0.2206* (0.1209)
Time dummies	Yes	Yes	Yes	Yes
Intercept	0.1438*** (0.0548)	0.1458*** (0.0320)	0.0537 (0.0475)	0.0756** (0.0301)
Nº observations	2,028	2,029	2,028	2,029
Nº groups	335	335	335	335

The table reports Generalised Least Squares, random effects, estimation of the model. The dependent variable is the ratio between investments (i.e. increase in net fixed assets of the firm i in year t plus depreciation in year t) and beginning-of-period total assets of the firm. The independent variables are: (1) CF_{it}: net earnings plus depreciation divided by beginning-of-period total assets; (2) $EBITDA_{it}$: average EBITDA multiple for the period; (3) $Intang_{it}$: intangible fixed assets normalised by beginning-of-period total assets; (4) LTD_{it}: total long term debt divided by the beginning-of-period total assets; (5) $Size_{it}$: natural logarithm of total the number of employees of the firm i in the period t; (6) Age_i: age of the firm i at the period t; (7) R_i: dummy variable indicating firms located in Objective 1 region; (8) VC_i: dummy variable indicating firms in the VC-backed group (i.e. 0 for firms in the control group). All ratios are winsorised at the 2% threshold. Robust standard errors are reported in parenthesis. ***, ** and * indicate, respectively, significance levels of <1%, <5% and <10%.

The positive coefficient found for the interaction variable between cash flow and the VC dummy in Table 4 anticipates significant differences in the investment-cash flow relationship between the groups of firms with and without VC involvement, which are shown in Tables 5 and 6, respectively. For the subsample of firms that later receive VC funding, the results of which are shown in Table 5, the existence of financial constraints is confirmed by the presence of a positive and significant cash flow coefficient. Furthermore, its value is greater

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than the one registered for the sample of SMEs as a whole and for the firms without VC involvement. This finding is robust in the two models considered, which also include time and location dummies. These results provide evidence of the difficulties involved in obtaining additional funds, either because they are not available or because the cost is high.

TABLE 5.
REGRESSION RESULTS OF THE INVESTMENT-CASH FLOW SENSITIVITY FOR THE SUBSAMPLE OF UNLISTED SPANISH SMEs THAT WERE SUBJECT TO A VC INVESTMENT LATER (PRE-INVESTMENT PERIOD)

INDEPENDENT VARIABLES	DEPENDENT VARIABLE: INVESTMENT			
	WITHOUT THE EFFECT OF LONG TERM DEBT		WITH THE EFFECT OF LONG TERM DEBT	
CF_{it}	0.7252*** (0.1365)	0.6891*** (0.1290)	0.6810*** (0.1290)	0.6670*** (0.1268)
$EBITDA_{it}$	0.0122 (0.0117)		0.0076 (0.0106)	
$Intang_{it}$		0.6142*** (0.1059)		0.3380*** (0.1062)
LTD_{it}			0.6437*** (0.0649)	0.5866*** (0.0692)
$Size_{it}$	-0.0343*** (0.0104)	-0.0284*** (0.0096)	-0.0226** (0.0102)	-0.0205** (0.0097)
Age_i	-0.0021*** (0.0006)	-0.0016*** (0.0005)	-0.0015*** (0.0006)	-0.0013** (0.0005)
R_i	-0.0220 (0.0194)	0.0015 (0.0176)	-0.0267 (0.0177)	-0.0150 (0.0163)
Time dummies	Yes	Yes	Yes	Yes
Intercept	0.1947** (0.0857)	0.1922*** (0.0461)	0.0690 (0.0743)	0.0869* (0.0461)
Nº observations	1,034	1,034	1,034	1,034
Nº groups	167	167	167	167

The table reports Generalised Least Squares, random effects, estimation of the model. The dependent variable is the ratio between investments (i.e. increase in net fixed assets of the firm i in year t plus depreciation in year t) and beginning-of-period total assets of the firm. The independent variables are: (1) CF_{it}: net earnings plus depreciation divided by beginning-of-period total assets; (2) $EBITDA_{it}$: average EBITDA multiple for the period; (3) $Intang_{it}$: intangible fixed assets normalised by beginning-of-period total assets; (4) LTD_{it}: total long term debt divided by the beginning-of-period total assets; (5) $Size_{it}$: natural logarithm of total the number of employees of the firm i in the period t; (6) Age_i: age of the firm i at the period t; (7) R_i: dummy variable indicating firms located in Objective 1 region; (8) VC_i: dummy variable indicating firms in the VC-backed group (i.e. 0 for firms in the control group). All ratios are winsorised at the 2% threshold. Robust standard errors are reported in parenthesis. ***, ** and * indicate, respectively, significance levels of <1%, <5% and <10%.

In the same vein, long term debt exhibits a positive coefficient in both groups of firms. Nevertheless, the coefficients found in firms that later receive VC are much greater than those of the firms without VC involvement. This finding supports the idea of firms accessing VC funding to go ahead with their expansion projects when they exhaust their debt capacity. Conversely, lower cash flow and long term debt coefficients are consistent with a gentle growth rate in firms that are not subject to VC investments in the near future.

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REGRESSION RESULTS OF THE INVESTMENT-CASH FLOW SENSITIVITY FOR THE SUBSAMPLE OF UNLISTED SPANISH SMES WITHOUT FUTURE VC INVOLVEMENT (PRE-INVESTMENT PERIOD)

	DEPENDENT VARIABLE: INVESTMENT			
INDEPENDENT VARIABLES	WITHOUT THE EFFECT OF LONG TERM DEBT		WITH THE EFFECT OF LONG TERM DEBT	
CF_{it}	0.6097*** (0.1229)	0.5942*** (0.1243)	0.5532*** (0.1054)	0.5688*** (0.1050)
$EBITDA_{it}$	0.0005 (0.0100)		0.0020 (0.0088)	
$Intang_{it}$		0.1805* (0.1060)		-0.2204* (0.1157)
LTD_{it}			0.5645*** (0.0709)	0.5982*** (0.0769)
$Size_{it}$	-0.0119 (0.0089)	-0.0114 (0.0088)	-0.0169** (0.0084)	-0.0178** (0.0085)
Age_i	-0.0018*** (0.0006)	-0.0017*** (0.0006)	-0.0001 (0.0006)	-0.0002 (0.0006)
R_i	0.0264 (0.0177)	0.0292* (0.0177)	0.0128 (0.0159)	0.0085 (0.0160)
Time dummies	Yes	Yes	Yes	Yes
Intercept	0.1097** (0.0612)	0.1004*** (0.0402)	0.0284 (0.0556)	0.0508 (0.0364)
Nº observations	994	995	994	995
Nº groups	168	168	168	168

The table reports Generalised Least Squares, random effects, estimation of the model. The dependent variable is the ratio between investments (i.e. increase in net fixed assets of the firm i in year t plus depreciation in year t) and beginning-of-period total assets of the firm. The independent variables are: (1) CF_{it}: net earnings plus depreciation divided by beginning-of-period total assets; (2) $EBITDA_{it}$: average EBITDA multiple for the period; (3) $Intang_{it}$: intangible fixed assets normalised by beginning-of-period total assets; (4) LTD_{it}: total long term debt divided by the beginning-of-period total assets; (5) $Size_{it}$: natural logarithm of total the number of employees of the firm i in the period t; (6) Age_i: age of the firm i at the period t; (7) R_i: dummy variable indicating firms located in Objective 1 region; (8) VC_i: dummy variable indicating firms in the VC-backed group (i.e. 0 for firms in the control group). All ratios are winsorised at the 2% threshold. Robust standard errors are reported in parenthesis. ***, ** and * indicate, respectively, significance levels of <1%, <5% and <10%.

As further robustness checks we run all regressions again replacing long term debt with the ratio of total debt and cash flow at the beginning of the period. We assume that firms with a higher debt-to-cash-flow ratio should be able to invest more. We also use the ratios between long term and short term debt[6] for the same purpose. The results are reported in Tables 7, 8 and 9, which show the regressions carried out on all sample firms, on firms that later receive VC funding and on firms which are not subject to VC investments, respectively. Regarding the full sample, Table 7 highlights the fact that the coefficients of cash flow are slightly greater than those recorded in Table 4, and all are highly significant. Similarly, the rest of the variables show similar results and significance levels as well, with the interaction variable

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[6] It would be better to use only financial short term debt but the number of missing values of the variable accounts payable and other commercial debt did not allow us to use it in the regressions due to the significant reduction in the number of observations. This limitation, however, would not affect the results based on the ratio long term debt/cash flow, which is also provided.

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between cash flow and the VC dummy being positive and significant. Furthermore, the coefficients of cash flow are even greater in all models in the subsample of firms that were later subject to a VC investment (see Table 8) than those of the subsample of firms that did not have access to VC funding (see Table 9).

TABLE 7.
ROBUSTNESS CHECK CONSIDERING EFFECT OF THE RATIO DEBT-CASH FLOW ON THE INVESTMENT-CASH FLOW SENSITIVITY FOR THE FULL SAMPLE OF UNLISTED SPANISH SMES (PRE-INVESTMENT PERIOD)

	DEPENDENT VARIABLE: INVESTMENT					
INDEPENDENT VARIABLES	**WITH THE EFFECT OF TOTAL DEBT/CF**		**WITH THE EFFECT OF SHORT TERM DEBT/CF**		**WITH THE EFFECT OF LONG TERM DEBT/CF**	
CF_{it}	0.5353*** (0.1108)	0.5045*** (0.1105)	0.5225*** (0.1104)	0.4937*** (0.1101)	0.5633*** (0.1093)	0.5304*** (0.1095)
$EBITDA_{it}$	0.0077 (0.0077)		0.0072 (0.0077)		0.0088 (0.0076)	
$Intang_{it}$		0.4741*** (0.0818)		0.4779*** (0.0818)		0.4330*** (0.0828)
$Debt\_CF_{it}$	0.0011*** (0.0004)	0.0011*** (0.0004)				
STD_CF_{it}			0.0007 (0.0005)	0.0008 (0.0005)		
LTD_CF_{it}					0.0099*** (0.0019)	0.0090*** (0.0019)
$Size_{it}$	-0.0222*** (0.0075)	-0.0192*** (0.0070)	-0.0227*** (0.0075)	-0.0196*** (0.0070)	-0.0224*** (0.0073)	-0.0199*** (0.0069)
Age_i	-0.0018*** (0.0004)	-0.0015*** (0.0004)	-0.0018*** (0.0004)	-0.0015*** (0.0004)	-0.0015*** (0.0004)	-0.0012*** (0.0004)
R_i	-0.0014 (0.0140)	0.0105 (0.0134)	-0.0006 (0.0140)	0.0112 (0.0134)	-0.0004 (0.0139)	0.0109 (0.0134)
VC_i	0.0172 (0.0175)	0.0049 (0.0166)	0.0183 (0.0174)	0.0057 (0.0165)	0.0120 (0.0176)	0.0013 (0.0168)
VC_i*CF_{it}	0.2289** (0.1215)	0.2261** (0.1174)	0.2312* (0.1207)	0.2278** (0.1167)	0.2303* (0.1218)	0.2280** (0.1176)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	0.1227*** (0.0566)	0.1289*** (0.0336)	0.1335*** (0.0560)	0.1354*** (0.0335)	0.1038* (0.0555)	0.1238*** (0.0322)
N^o observations	2,028	2,029	2,028	2,029	2,028	2,029
N^o groups	335	335	335	335	335	335

The table reports Generalised Least Squares, random effects, estimation of the model. The dependent variable is the ratio between investments (i.e. increase in net fixed assets of the firm i in year t plus depreciation in year t) and beginning-of-period total assets of the firm. The independent variables are: (1) CF_{it}: net earnings plus depreciation divided by beginning-of-period total assets; (2) $EBITDA_{it}$: average EBITDA multiple for the period; (3) $Intang_{it}$: intangible fixed assets normalised by beginning-of-period total assets; (4) $Debt\_CF_{it}$: total debt divided by firm's cash flow; (5) STD_CF_{it}: total short term debt divided by firm's cash flow; (6) LTD_CF_{it}: total long term debt divided by firm's cash flow; (7) $Size_{it}$: natural logarithm of total the number of employees of the firm i in the period t; (8) Age_i: age of the firm i at the period t; (9) R_i: dummy variable indicating firms located in Objective 1 region; (10) VC_i: dummy variable indicating firms in the VC-backed group (i.e. 0 for firms in the control group). All ratios are winsorised at the 2% threshold. Robust standard errors are reported in parenthesis. ***, ** and * indicate, respectively, significance levels of <1%, <5% and <10%.

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TABLE 8.

ROBUSTNESS CHECK CONSIDERING EFFECT OF THE RATIO DEBT-CASH FLOW ON THE INVESTMENT-CASH FLOW SENSITIVITY FOR THE SUBSAMPLE OF UNLISTED SPANISH SMES THAT WERE SUBJECT TO A VC INVESTMENT LATER (PRE-INVESTMENT PERIOD)

INDEPENDENT VARIABLES	DEPENDENT VARIABLE: INVESTMENT					
	WITH THE EFFECT OF TOTAL DEBT/CF		WITH THE EFFECT OF SHORT TERM DEBT/CF		WITH THE EFFECT OF LONG TERM DEBT/CF	
CF_{it}	0.7562*** (0.1439)	0.7219*** (0.1365)	0.7385*** (0.1418)	0.7071*** (0.1345)	0.8029*** (0.1425)	0.7619*** (0.1356)
$EBITDA_{it}$	0.0133 (0.0119)		0.0126 (0.0118)		0.0155 (0.0119)	
$Intang_{it}$		0.6157*** (0.1058)		0.6190*** (0.1056)		0.5801*** (0.1074)
$Debt\_CF_{it}$	0.0011* (0.0006)	0.0011** (0.0006)				
STD_CF_{it}			0.0006 (0.0007)	0.0008 (0.0006)		
LTD_CF_{it}					0.0111*** (0.0027)	0.0098*** (0.0027)
$Size_{it}$	-0.0328*** (0.0107)	-0.0270*** (0.0098)	-0.0337*** (0.0106)	-0.0276*** (0.0098)	-0.0310*** (0.0105)	-0.0259*** (0.0097)
Age_i	-0.0020*** (0.0006)	-0.0015*** (0.0005)	-0.0021*** (0.0006)	-0.0016*** (0.0005)	-0.0018*** (0.0006)	-0.0014*** (0.0005)
R_i	-0.0247 (0.0194)	-0.0042 (0.0176)	-0.0233 (0.0193)	-0.0031 (0.0175)	-0.0254 (0.0193)	-0.0057 (0.01769)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	0.1672* (0.0908)	0.1711*** (0.0500)	0.1835*** (0.0890)	0.1801*** (0.0496)	0.1314 (0.0893)	0.1587*** (0.0477)
Nº observations	1,034	1,034	1,034	1,034	1,034	1,034
Nº groups	167	167	167	167	167	167

The table reports Generalised Least Squares, random effects, estimation of the model. The dependent variable is the ratio between investments (i.e. increase in net fixed assets of the firm i in year t plus depreciation in year t) and beginning-of-period total assets of the firm. The independent variables are: (1) CF_{it}: net earnings plus depreciation divided by beginning-of-period total assets; (2) $EBITDA_{it}$: average EBITDA multiple for the period; (3) $Intang_{it}$: intangible fixed assets normalised by beginning-of-period total assets; (4) $Debt\_CF_{it}$: total debt divided by firm's cash flow; (5) STD_CF_{it}: total short term debt divided by firm's cash flow; (6) LTD_CF_{it}: total long term debt divided by firm's cash flow; (7) $Size_{it}$: natural logarithm of total the number of employees of the firm i in the period t; (8) Age_i: age of the firm i at the period t; (9) R_i: dummy variable indicating firms located in Objective 1 region. All ratios are winsorised at the 2% threshold. Robust standard errors are reported in parenthesis. ***, ** and * indicate, respectively, significance levels of <1%, <5% and <10%.

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TABLE 9.
ROBUSTNESS CHECK CONSIDERING EFFECT OF THE RATIO DEBT-CASH FLOW ON THE INVESTMENT-CASH FLOW SENSITIVITY FOR THE SUBSAMPLE OF UNLISTED SPANISH SMES WITHOUT FUTURE VC INVOLVEMENT (PRE-INVESTMENT PERIOD)

INDEPENDENT VARIABLES	DEPENDENT VARIABLE: INVESTMENT					
	WITH THE EFFECT OF TOTAL DEBT/CF		WITH THE EFFECT OF SHORT TERM DEBT/CF		WITH THE EFFECT OF LONG TERM DEBT/CF	
CF_{it}	0.6292***	0.6138***	0.6229***	0.6075***	0.6424***	0.6302***
	(0.1254)	(0.1268)	(0.1252)	(0.1265)	(0.1231)	(0.1254)
$EBITDA_{it}$	0.0009		0.0007		0.0015	
	(0.0097)		(0.0098)		(0.0097)	
$Intang_{it}$		0.1778*		0.1845*		0.1277
		(0.1037)		(0.1051)		(0.1031)
$Debt\_CF_{it}$	0.0012*	0.0014***				
	(0.0006)	(0.0006)				
STD_CF_{it}			0.0009	0.0009		
			(0.0008)	(0.0008)		
LTD_CF_{it}					0.0087***	0.0084***
					(0.0026)	(0.0026)
$Size_{it}$	-0.0110	-0.0106	-0.0110	-0.0106	-0.0130	-0.0127
	(0.0090)	(0.0088)	(0.0090)	(0.0089)	(0.0089)	(0.0088)
Age_i	-0.0018***	-0.0017***	-0.0019***	-0.0017***	-0.0014***	-0.0013***
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
R_i	0.0248	0.0276	0.0252	0.0281	0.0265	0.0285
	(0.1778)	(0.0178)	(0.0178)	(0.0316)	(0.0176)	(0.0176)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	0.0909	0.0845***	0.0972	0.0888***	0.0826	0.0838***
	(0.0612)	(0.0415)	(0.0613)	(0.0417)	(0.0608)	(0.0400)
Nº observations	994	995	994	995	994	995
Nº groups	168	168	168	168	168	168

The table reports Generalised Least Squares, random effects, estimation of the model. The dependent variable is the ratio between investments (i.e. increase in net fixed assets of the firm i in year t plus depreciation in year t) and beginning-of-period total assets of the firm. The independent variables are: (1) CF_{it}: net earnings plus depreciation divided by beginning-of-period total assets; (2) $EBITDA_{it}$: average EBITDA multiple for the period; (3) $Intang_{it}$: intangible fixed assets normalised by beginning-of-period total assets; (4) $Debt\_CF_{it}$: total debt divided by firm's cash flow; (5) STD_CF_{it}: total short term debt divided by firm's cash flow; (6) LTD_CF_{it}: total long term debt divided by firm's cash flow; (7) $Size_{it}$: natural logarithm of total the number of employees of the firm i in the period t; (8) Age_i: age of the firm i at the period t; (9) R_i: dummy variable indicating firms located in Objective 1 region. All ratios are winsorised at the 2% threshold. Robust standard errors are reported in parenthesis. ***, ** and * indicate, respectively, significance levels of <1%, <5% and <10%.

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5. CONCLUSIONS AND DISCUSSION

The controversy about the link between financial constraints and investment-cash flow sensitivity has basically relied on listed firms that were subject to some qualitative or quantitative pre-classification procedures. While Fazzari et al. (1988) maintain that the relationship between investment and cash flow explains financial constraints, Kaplan and Zingales (1997) affirm that the former relationship does not necessarily explain that a firm is financially constrained. Since all sample firms were listed, with potential access to long term external funding, the pre-classification was a requisite so as to define which of them were supposedly financially constrained.

Our approach is to focus on unlisted SMEs, which do not have access to capital markets, to be better able to test the investment-cash flow sensitivity as a signal of the presence of financial constraints. Even if we assume that most SMEs are potentially financially constrained, due to the limited access, if any, to long term external sources of finance, we also need some sort of pre-classification. One source of external funds available in developed countries is VC, which aims to invest in growing SMEs on a temporary basis. When approaching a venture capitalist, SMEs aim to raise funds as well as to benefit from the value added that the former may provide. Therefore, one of the key reasons for SMEs' accessing VC is the lack of internally generated funds to finance their growth. As a result, we adopt a pre-classification procedure of SMEs by selecting a group of firms that were later subject to a VC investment.

We conduct our analyses on a representative sample of 168 Spanish manufacturing SMEs at the expansion stage that received a VC investment over the period 1995-2007. We compare the results with a one-by-one matched sample of similar SMEs with no VC involvement, which was randomly selected from the AMADEUS Database. We find evidence of a positive and significant relationship between investment and cash flow when all firms, both VC and non-VC-backed, are included in the analysis. We also find that the investment dependency on internally generated funds in the firms that later received VC is greater than that found in control group firms.

Our results also show a positive coefficient of the long term debt, which provides evidence of the positive effect of debt on future investment. Nevertheless, the use of debt might not be a viable financial resource for SMEs, which are the most affected by information asymmetry problems. This fact may be interpreted as one of the reasons that entrepreneurs have to approach VC investors.

Regarding growth opportunities, we are required to find a suitable proxy replacing the Tobin's Q. We first define an EBITDA multiple, which is neither significant for the whole sample nor for the subsamples of firms with and without VC involvement. This can be motivated by the estimation procedure applied, since no observable market value is available on all sample firms. Nevertheless, the variable measuring growth opportunities through intangible assets, as applied by Michaelas et al. (1999) and Manigart et al. (2003), is significant for the whole sample and also for the two subsamples considered individually, with the coefficients being greater in the group of firms that later receive VC.

The contributions of this paper are three. First, we provide an empirical financial justification to explain VC intervention, since SMEs with high investment-cash flow sensitivity may solve their financial constraints by accessing an external source of funds. Second, we provide new evidence to the controversy about the sensitivity between investment and cash flow. To identify the presence of financial constraints we rely on VC involvement as a pre-classification procedure of more financially constrained firms. Finally, we test our hypotheses

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on unlisted European SMEs that were later financed by a venture capitalist. With the exception of Manigart et al. (2003), Bertoni et al. (2010), Guariglia (2008), and Engel and Stiebale (2009), the previous literature focuses on listed firms. Furthermore, none of these papers addresses the analysis of the dependency between investment and cash flow prior of the VC investment event.

Regarding the limitations, since we focus on unlisted firms, we do not have access to market values to represent growth opportunities through the Market-to-Book ratio. We had to estimate market values by computing EBITDA multiples in acquisitions disclosed in the media over the whole period. Those multiples were then used to estimate the evolution of market values of unlisted firms over time. A second limitation is related to the methodology, since we base our estimation on static random effects models, due to the lack of sufficient observations per firm in our sample.

The implications of the work are various. For policymakers and practitioners, the investment sensitivity to changes in cash flow could be viewed as a tool for identifying financial constraints in SMEs. Additionally, our findings could be interpreted as a way to justify the role of venture capitalists in covering the financing gap of SMEs in their growth process.

For future research, new proxies for growth opportunities should be tested in order to better explain the evolution of investments in unlisted firms. Similarly, when more observations are available, it would be interesting to check the robustness of our findings using dynamic models. In addition, future research should analyse to what extent VC investors are able to alleviate the investment-cash flow sensitivity after the initial VC round. Finally, it should also be interesting to test whether our findings, which are related to Spanish SMEs, could also be similar to those found in other developed countries.

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