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Abstract

This paper analyzes whether the superior performance of venture-backed firms is associated with the funding provided and/or to the value added by venture capitalists to their investee firms. Rooted on the agency and the resource-based view theories, both variables are analyzed according to the stage of development of the firm. The hypotheses are tested on a highly representative sample of Spanish venture-backed firms over the period 1993-2005. Our results show that funding is significant regardless of the stage of development of the investee firm at the time of the investment. The value added, however, is significant only for the subsample of firms at the expansion stage.

Keywords: Impact, managerial support, value added, venture capital
JEL Classification: G24, M13, C23

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1. Introduction

Venture capitalists (VCs) are generally seen as value-added investors who play a significant role in the development of entrepreneurial businesses (Bygrave and Timmons, 1992; Jain, 2001) and in the strategy of the firms they fund (Fried, Bruton and Hisrich, 1998). These value-added services make venture capital (VC) different from other financial services (Wright and Robbie, 1998). The literature has shown that VC has a positive impact on the performance of investee firms (Sapienza, 1992; Zahra, 1995; Florida and Kenney, 1998; Kortum and Lerner, 2000; Hellmann and Puri, 2000, 2002; Davila, Foster and Gupta, 2003; Belke, Fehn and Foster, 2006; among others), and also that this superior performance of VC-backed firms arises from both screening and monitoring (Chemmanur, Krishnan and Nandy, 2008). Although the literature suggests that the financing itself and the non-financial value-added services provided by VCs to their portfolio firms could be the reason underlying their superior performance, few papers analyze the particular influence of each of these two factors on the performance of investee firms.

The aim of this paper is to analyze the extent to which the pure financial resources and the value-added services actually spur the performance of investee firms. The separate influence of both factors has not been previously analyzed in literature (see Gompers, 1995; Lerner, 1995; Hellman and Puri, 2000, 2002; Kaplan and Stromberg, 2000; Bottazi and Da Rin, 2002; Baum and Silverman, 2004; Bertoni, Colombo and Grilli, 2007; Chemmanur, Krishnan and Nandy, 2008; among others). This paper aims to cover this gap. Also, as the relative importance of both financial and non-financial needs may vary according to the stage of development of firms, this paper analyzes the differences of early, expansion and late stage investments, and this is a second contribution of the paper, since the results obtained constitute a valuable tool aimed at developing government policies that are adequate to foster the development of each particular segment of firms. Third, the empirical analysis is based on quantitative data based on financial statements of firms, which allows the performance of VC-backed firms to be measured in an objective way. Finally, most of the research on the impact of VC has been conducted in the United States market, the evidence for the European market still being scarce. This paper aims to contribute to the literature on the impact of

European VC and analyzes a sample that is free from survivorship bias, since it relies on both successful and unsuccessful firms.

The analysis relies on a comprehensive sample of Spanish VC-backed firms during the period 1993 to 2005. As De Clercq, Sapienza and Zaheer (2008) point out, limiting the scope of analysis to one country increases the likelihood that the participants operate under similar constraints derived from the institutional and legal environment. The impact of funding and value-added services is analyzed on six different corporate variables, namely the growth of sales; gross margin; earnings before interest, taxes, depreciation and amortization (EBITDA); earnings before interest and taxes (EBIT); cash flow; and, finally, employment. Analyzing an array of performance measures provides completeness to the study of the effect of VC investing. The results show that the financial resources positively affect firm performance at all stages of development. The robustness of these results is high since all the corporate growth variables analyzed show similar behavior. However, the non-financial resources turn out to be significant only in the case of expansion stage firms.

The rest of the paper is organized as follows. Section 2 provides a theoretical base to explain the superior performance of VC-backed firms, from which the hypotheses are subsequently derived. Section 3 describes the dataset and the empirical methodology. The results of the regression analyses are presented in Section 4. Section 5 concludes the paper and discusses the results obtained.

2. Theoretical background and hypotheses

2.1. Venture capital impact from the perspective of the agency and the resource-based view theories

The theoretical base to justify why the money supplied by VCs and their value-added services should lead to VC-backed firms outperforming non-VC-backed ones is rooted in the agency and the resource-based view theories. Overall, these theories focus on the information asymmetries VCs are able to solve and on the managerial support they provide.

Regarding agency theory, the existence of information asymmetries between shareholders and managers introduces an agency problem which may affect the investment and financing decisions of firms (Jensen and Meckling, 1976). In these

cases, the need for close monitoring is high (Wright and Robbie, 1998). VCs are especially qualified to invest in this kind of companies since they are typically more actively involved through the various additional tasks they perform, among which managerial support should be highlighted (Barry, 1994). Moreover, and compared to other financial intermediaries, they provide money without requiring high collateral. The agency theory is usually established as a framework to explain the existence of VCs, showing that information asymmetries are the key to understanding the VC industry (Amit, Glosten and Muller, 1990). Furthermore, as argued by Jensen and Meckling (1976), the better an investor can solve agency problems, the more value he/she will provide for a firm. Thus, if VCs are able to solve those problems better than other financial intermediaries, this kind of financing should increase the value of firms. Also, when chances to obtain funding through other channels are restricted as a consequence of a risk profile and agency costs which are too high, VC firms may constitute the only choice among the financing instruments available to the private business sector (Scholtens, 1999).

The resource-based view of the firm (Penrose, 1959; Wernerfelt, 1984) highlights the importance of managerial resources for the growth and performance of firms. The existence of imperfect markets is understood to be a critical element in explaining how resources generate competitive advantages. Resources are only valuable if they are difficult to trade or imitate on the spot market (Barney, 1991). In this context, it is suggested that the success of a company depends on the characteristics of a firm's resource bundle, which includes human resources, such as the founding team and the management (Utterback, Meyer, Roberts and Reitberger, 1988; Shane and Stuart, 2002), technical resources encompassing product and technology (Utterback, Meyer, Roberts and Reitberger, 1988; Roberts, 1991), organizational resources (Wernerfelt, 1984), and financial resources (Hellmann and Puri, 2000). In this context, if VCs really do offer money and resources to their portfolio companies that other firms do not have access to, then VC-backed companies should perform better than similar non VC-backed firms.

2.2. Hypotheses

New ventures do not obtain funds easily, since, as Busenitz, Fiet and Moesel (2005) show, even with a superior business concept and management team, these ventures are likely to be underfunded unless they can communicate the appropriate

information to potential investors. In this context, VCs play a fundamental role, since they are financial intermediaries able to reduce problems associated with information asymmetry (Chan, 1983). Thus, if financial sources are scarce for many firms, then those offered by VCs, which are best able to deal with agency problems, would be a real value-added to the companies they finance, which could carry out value-enhancing investments. Financial resources are often identified as an important contributing factor to company success or failure (Bruno, 1992). In particular, Shane and Stuart (2002) find that firms with a higher amount of venture funding received are able to progress quickly and are more likely to go to an Initial Public Offering. Therefore, the first hypothesis to be tested is as follows:

Hypothesis 1a: *The funding provided by VCs exerts a positive impact on the growth and performance of VC-backed firms.*

VCs usually specialize by stage of development, which allows them to gain developed specialized knowledge (Gupta and Sapienza, 1992) and to control portfolio risk (Norton and Tenenbaum, 1993). The funding provided could have a different impact according to the stage of development of the firm. Sahlman (1990) points out that the existence of asymmetric information is greater in early stages because of the difficulty in assessing performance. Landstrom (1992) also shows that small firms, which are usually in early stages of development, have greater difficulty in raising capital because of higher monitoring costs, debt costs and residual loss potential. However, these firms need long term funding to carry out radical changes or significantly spur their growth (Elango, Fried, Hisrich and Polonchek, 1995). Therefore, the relative importance of the funding provided could be higher for firms at these stages. Although late stage investments are supposed to involve larger commitments than early stage firms, most of the investment in late stage firms is related to the acquisition of existing shares rather than to the injection of fresh money. Thus, regarding the stage of the firm, the first hypothesis would be reformulated as follows:

Hypothesis 1b: *The funding provided by VCs may exert a higher positive impact on the growth and performance of VC-backed firms at earlier stages.*

The second cause for superior performance is the value added services provided by VCs to their portfolio firms. The literature has shown that VC has a positive effect on investee firms in several aspects such as innovation (Hellmann

and Puri, 2000; Kortum and Lerner, 2000), professionalization (Hellmann and Puri, 2002), economic development (Florida and Kenney, 1998), employment (Belke, Fehn and Foster, 2006), performance (Sapienza, 1992; Jain, 2001) or survival rate (Timmons, 1994). Arthurs and Busenitz (2006) show that VC-backed companies also demonstrate greater dynamic capabilities as they relate to product and management development, and Busenitz, Fiet and Moesel (2004) find that there is a negative relationship between two-plus dismissals and a favorable venture exit and that procedural justice will positively affect venture exit. However, Manigart, Baeyens and Van Hyfte (2002) suggest that choosing the right VCs is more important than receiving venture funding per se.

There is a wide range of non-financial resources that VCs provide for the firms they back. Zacharakis and Meyer (2000) state that the VC firm's performance is also a function of how effective the management advice and services provided by VCs are. Large and Muegge (2008) make a nice collection of salient empirical studies that analyze the role of these non-financial value-added activities on the performance of investee firms. These authors find that there is little consensus regarding the definition and measurement of value-adding inputs. In any case, Jääskeläinen, Maula and Seppä (2006) find that in order to provide value through the different tasks performed by VCs, the attention devoted to investee firms becomes a key variable on their performance. In this sense, De Clercq and Fried (2005) state that the extent to which VCs are able to add value should be related to their experience and available time devoted to each investee company. A stream of literature has highlighted that there is a trade-off between portfolio size and extent of involvement and that larger portfolios tend to undermine the quality of advice (Kanniainen and Keuschnigg, 2003; Keuschnigg, 2004; Bernile, Cumming and Lyandres, 2007).

A measure that has been recently used in literature to analyze the time devoted to each company relates to the quotient between the number of portfolio companies and the number of venture managers overseeing them (Cumming, 2006; Balboa and Martí, 2007). Thus, the second hypothesis to be tested is the following:

Hypothesis 2a: *The higher the number of portfolio companies controlled by a single venture manager, the worse the growth and performance of those investee firms.*

This reasoning should be true for VC-backed firms at all stages of development. However, the nature of involvement (Jääskeläinen, Maula and Seppä, 2006) and the role VCs play (Bruining and Wright, 2002) is affected by the stage of development of the firm. In fact, Cumming (2006) analyzes the factors that affect portfolio size and finds that VCs that invest in a greater proportion of early stage firms have larger portfolios, which suggests scale economies in early stages. Nevertheless, Gupta and Sapienza (1992) and Norton and Tenenbaum (1993) show that VC firms that invest in early stages prefer less diversification by stage and/or industry. The higher risk of early stage ventures, derived from management, market, and technological uncertainties, could be the reasons underlying this phenomenon. In fact, early stage investors carry out a higher monitoring activity (Gorman and Sahlman, 1989; Sapienza, 1992), spend more time with portfolio companies (Gómez-Mejía, Balkin and Welbourne, 1990) and are more involved in supporting the management team of these firms (Sapienza and Timmons, 1989; Fried and Hisrich, 1991) and in negotiating employment contracts, contacting potential vendors, evaluating product and market opportunities, formulating and evaluating marketing plans and contacting potential customers (Rosenstein, Bruno, Bygrave and Taylor, 1993). Thus, according to the stage of development of the firm, the second hypothesis would be reformulated as follows:

Hypothesis 2b: *The negative impact of a higher number of portfolio companies controlled by a single venture manager should be greater at earlier stages.*

3. Data and methodology

3.1. Data and sample

The sample analyzed refers to VC investments recorded in Spain from 1993 to 2005 and carried out between 1993 and 2002, thus keeping track of their performance up to at least three years after the initial investment. The sample is based on a dataset that includes the deal by deal investment data of the whole population of VC funds operating in the Spanish market since 1985. Once double-counting of syndicated deals and investments abroad are eliminated, the total number of firms that received venture funding between 1993 and 2002 is 1,571. To define the sample properly, two sectors, namely financial and real estate, are also excluded, giving a total of 1,474 firms. As shown in Table 1, the real names of 1,235 firms were identified, of which we found accounting data for 1,099 deals. This represents 74.6 percent of the population. The number of VC investments has been

increasing over time, culminating in the year 2000, which accounted for 17.7 percent of the whole sample. As expected, a decrease in the number of investments is observed in 2001, after the bursting of the Internet bubble. However, a healthy investment activity persists after the crash of the so-called ‘New (stock) markets’.

Table 1.
Population and Sample of VC Investments in Spain

Panel A- Number of firms per year

Year	(1)	(2)	(3)	(4)	Population	(5)	Percent	(6)	Percent
1993	102	-4	106	0	106	80	75.5	62	58.5
1994	123	-4	119	-10	109	98	89.9	88	80.7
1995	111	-6	105	-6	99	89	89.9	82	82.8
1996	104	-8	96	-3	93	82	88.2	74	79.6
1997	162	-7	155	-13	142	114	80.3	106	74.6
1998	156	-6	150	-4	146	129	88.4	123	84.2
1999	185	-11	174	-10	164	146	89.0	136	82.9
2000	281	-19	262	-19	243	230	94.7	194	79.8
2001	239	-11	228	-17	211	166	78.7	135	64.0
2002	199	-23	176	-15	161	101	62.7	99	61.5
Total	**1,662**	**-99**	**1,571**	**-97**	**1,474**	**1,235**	**83.8**	**1,099**	**74.6**

Panel B- Breakdown of the sample by year and stage

	Early stage		**Expansion stage**		**Late stage**		**All stages**	
Year	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1993	29	5.78	29	6.05	4	3.39	62	5.64
1994	44	8.76	34	7.10	10	8.47	88	8.01
1995	45	8.96	29	6.05	8	6.78	82	7.46
1996	33	6.57	34	7.10	7	5.93	74	6.73
1997	42	8.37	53	11.06	11	9.32	106	9.65
1998	41	8.17	57	11.90	25	21.19	123	11.19
1999	53	10.56	66	13.78	17	14.41	136	12.37
2000	96	19.12	81	16.91	17	14.41	194	17.65
2001	65	12.95	58	12.11	12	10.17	135	12.28
2002	54	10.76	38	7.93	7	5.93	99	9.01
Total	**502**	**100.00**	**479**	**100.00**	**118**	**100.00**	**1.099**	**100.00**

New investments recorded between 1993 and 2002, with accounting data until 2005
(1) Number of initial investments reported by Spanish venture capitalists
(2) Number of investments outside Spain
(3) Total number of investments in Spain
(4) Excluded sectors: Financial services and real estate
(5) Investee firms that were identified
(6) Investee firms for which accounting data were found
Note: Number refers to the number of venture capital-backed firms

Since the influential factors in the growth of companies analyzed in this paper may have different effects on companies at various stages of their life cycle, the sample is broken down into three groups: early, expansion and late stage firms. Panel B of Table 1 records the breakdown of the sample by year and stage of

development of investee firms that includes 502 early stage firms, 479 firms funded at the expansion stage and 118 late stage deals.

3.2. Methodology

In order to analyze the performance of investee firms, six different variables are studied. These endogenous variables refer to the growth of the following variables: sales, gross margin, EBITDA, EBIT, cash flow and employment of VC-backed firms. The absolute rather than the relative growth of these variables is employed, because measuring growth in relative terms would imply a distorting effect on average values when the changes from one period to another are high enough (Baum and Silverman, 2004).

The set of independent variables includes the variables aimed at evaluating the effect of both the financial and non-financial services provided by VCs, and also two control variables. The variable introduced to quantify the impact of the funding provided is the accumulated investment carried out since the year of the initial investment. The attention allocated to VC-backed firms is measured by the ratio of the number of companies assisted by a given investment manager. The mean value of this variable for each firm is considered in the empirical analysis. The reason is that the continuous value could introduce a bias, since the number of players more than doubled in Spain in the period analyzed. As a result, this ratio is significantly lower for new entrants in their early years, until they reach the desired portfolio size, thus distorting the expected value added effect. According to the hypotheses developed, a positive value is expected for the first variable whereas a negative value is anticipated for the second. Given that the effect of funding and managerial support is not immediate, both variables are lagged one year.

Regarding the control variables employed, the first one refers to the growth of the total assets of the investee firm lagged one year, since all endogenous variables are expected to be related to the variation of the assets held by the company the previous year. As growth patterns are also likely to be affected by the current economic situation, the second control variable is the growth of the gross domestic product (GDP).

Since the data refer to time series observations on a high number of firms, the panel data methodology is 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 (Arellano and Bover, 1990). Moreover, if N is large and T small, as is the case in this study, and the sample of firms is supposed to be randomly extracted from the population, then the random effects approach is the adequate methodology (Gujarati, 2004). Nevertheless, we test the possible correlation between the exogenous variables and the individual effects to ensure that the random effects approach is well suited for estimating the proposed model (Hausman, 1978).

3.3. Descriptive statistics

The characteristics of the sample of VC-backed companies broken down by stage of development are shown in Table 2 for each year of the period under study. In constant 2001 Euros, the average volume committed for the whole period is 2.82 million, with a standard deviation of 9.48 million. With the exception of the mean amount recorded in 2002, a constant growth of the amounts committed over time is observed. Nevertheless, the high dispersion is related to the huge difference in the volume invested at different stages, being the mean values of 0.8 million, 3.38 million and 9.2 million Euros in early, expansion and late stage deals, respectively.

Table 2.
Descriptive Statistics of Investments by Year and Stage of Development of Investee Firms

	Early stage		**Expansion stage**		**Late stage**		**All stages**	
Year	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*
1993	0.37	0.59	1.05	1.38	0.41	0.28	0.69	1.08
1994	0.25	0.35	1.64	2.24	3.75	5.28	1.18	2.54
1995	0.55	1.05	2.45	3.44	0.86	1.27	1.25	2.39
1996	0.91	1.93	2.31	4.10	3.18	4.10	1.77	3.41
1997	0.38	0.54	1.91	3.62	6.58	6.49	1.79	3.77
1998	0.99	3.84	1.77	2.85	6.26	6.12	2.42	4.49
1999	1.39	4.11	3.66	7.06	9.55	13.18	3.52	7.67
2000	0.87	1.51	4.52	7.00	16.63	35.98	3.77	12.41
2001	1.35	3.59	6.36	19.34	24.29	36.80	5.54	18.09
2002	0.45	0.53	5.32	14.16	7.47	6.80	2.81	9.35
Total	0.80	2.38	3.38	9.16	9.20	20.33	2.82	9.48

Note: Mean and *SD* include the average volume committed to venture-backed firms and its standard deviation, respectively. All data refer to the year of the initial investment. Data in € year 2001 million.

Table 3 is indicative of the funding received by investee firms over time. Descriptive data are broken down by stage of development to provide an insight of the staging activity used by VCs to reduce the investment risk and to control information asymmetry problems. Staging seems to be important in early stage investments, since the growth of the mean of cumulative amounts invested record the highest values. This is in line with the theoretical base, because early stage firms are the most affected by information asymmetry. In the case of expansion and late stage firms, the staging activity shows a similar pattern, except that the growth of accumulated investment goes down sharply in late stage firms from the second year after the investment onwards.

Table 3.
Descriptive Statistics of the Evolution of Accumulated Investments from the Year of Investment until Year Three after the Investment by Stage of the Firms

	Early Stage				Expansion Stage				Late Stage			
Year of investment	**N**	**Mean Amount**	**Mean Growth (percent)**	***SD***	**N**	**Mean amount**	**Mean Growth (percent)**	***SD***	**N**	**Mean amount**	**Mean Growth (percent)**	***SD***
Year of investment	502	0.80		2.38	479	3.38		9.16	118	9.20		20.33
1 Year after	502	0.98	22.39	2.96	479	3.87	14.49	9.85	118	10.35	12.43	20.77
2 Years after	501	1.15	16.97	3.37	476	4.21	8.99	10.46	118	10.77	4.09	20.78
3 Years after	491	1.33	16.18	3.80	473	4.50	6.88	10.97	118	10.95	1.70	20.83

Note: N refers to the number of venture capital-backed firms. Mean amount and mean growth include the average cumulative volume committed to venture-backed firms and its growth, respectively. SD is the standard deviation. All data refer to the year of investment. Data in € year 2001 million.

The mean values and standard deviations of the number of companies assisted by one single investment manager for the whole sample and the subsamples by stage are shown in Table 4. The values are estimated for each firm at the time of the initial investment and in the following three years. It is important to highlight that the ratio increases over time in all cases due to the constant growth in the number of VC firms in Spain over the period analyzed. Those new firms record low ratios in their early years until they reach their optimal portfolio size. Therefore, we also estimate the average ratio over the holding period as a better measure of the overall involvement. These latter values will be used to run the regressions.

Both yearly and average means show higher values for early stage firms than for late stage firms. Early stage investee firms record a mean of 4.81 firms per VC investment manager in the third year, with 4.33 being the mean for the whole holding period. Those figures are 4.42 and 3.65, respectively, for firms at the

expansion stage. Finally, late stage firms show the lowest ratios and the lowest changes over time, with the average for the holding period being 3.15.

Table 4.
Descriptive Statistics of the Average Number of Companies per Investment Manager

	Year 0	Year 1	Year 2	Year 3	Averages
Early Stage					
Mean	3.90	4.14	4.48	4.81	4.33
Standard deviation	2.30	2.32	2.64	2.87	2.09
Number	502	502	501	491	502
Expansion					
Mean	3.55	3.81	3.98	4.42	3.65
Standard deviation	2.09	2.16	2.18	2.55	1.77
Number	479	479	476	473	479
Late stage					
Mean	3.06	3.05	3.23	3.30	3.15
Standard deviation	2.17	1.95	2.31	2.26	2.04
Number	118	118	118	118	118
All					
Mean	3.66	3.88	4.12	4.48	3.88
Standard deviation	2.21	2.24	2.45	2.71	1.98
Number	1,099	1,099	1,095	1,082	1,099

Note: Number refers to the number of venture capital-backed firms.

4. Results

The regression results for the whole sample, which are shown in Table 5, provide evidence on the significant effect of the cumulative investment on the growth of all the endogenous variables analyzed. Therefore, it is shown that the funding provided exerts a positive influence on the evolution of investee firms, confirming Hypothesis 1a. Regarding the average number of portfolio firms under the control of a given VCs, the regression results show negative coefficients, as expected in Hypothesis 2a, but they are significant at the 10 percent level in five out of six specifications. As it stands, this variable does not seem to have any effect on employment growth.

Table 5.
Generalized Least Square Regression Results on Corporate Variables of VC-backed Companies - All Stages

	Dependent variables					
Independent variables	**Gross Revenue Growth**	**Gross Margin Growth**	**EBITDA Growth**	**EBIT Growth**	**Cash Flow Growth**	**Employment Growth**
Growth in total assets$_{t-1}$	0.2542***	0.0854***	-0.0158***	-0.0027	0.0012	6.12e-07***
	(0.0122)	(0.0051)	(0.0025)	(0.0016)	(0.00275)	(1.27e-07)
GDP growth	-2.72e-05	-1.41e-05	-5.02e-06	4.37e-06	1.03e-06	-6.28e-10*
	(3.47e-05)	(1.45e-05)	(7.13e-06)	(4.51e-06)	(7.63e-06)	(3.59e-10)
Accumulated investment$_{t-1}$	0.2277***	0.1603***	0.0728***	0.0327***	0.0534***	1.12e-06**
	(0.0509)	(0.0100)	(0.0091)	(0.0059)	(0.0097)	(5.41e-07)
# of firms by investment manager$_{t-1}$	-183397*	-183276*	-80432*	-59465*	-85860*	-4.5202
	(272844)	(106705)	(48479)	(30665)	(51843)	(2.9117)
Constant	3987486**	1660694***	671433**	270429	475755	53.1443***
	(1571926)	(632729)	(297574)	(188117)	(318654)	(16.4965)
Companies	1042	1044	1042	1035	1044	1057
Observations	3089	3098	3086	3072	3096	3141

Standard errors in brackets.
***, **, and * represent statistical significance at the 1, 5 and 10 percent levels, respectively.

In order to analyze Hypothesis 1b and 2b, Table 6 shows the results for early stage firms, whereas Tables 7 and 8 present results for expansion and late stage firms, respectively. The results for the subsample of early stage firms show that the cumulative investment is positive and significant, as expected, for all endogenous variables except employment growth, with the coefficients being higher than those observed for the whole sample. Regarding the number of portfolio firms managed by a given VCs, the coefficients related to the specifications that aim to measure sales and gross margin growth have unexpected positive values, although significant at the 10 percent level. On the other hand, it is not significant in the remaining proposed specifications.

A robustness check was then performed to test the lack of significance of the latter variable in most specifications, as well as the unexpected positive value in the remaining two. As shown in Table 1, a large number of early stage firms from the sample belong to the 'bubble period' and it is known that a substantial number of them did not perform well. So their negative growth patterns could distort the analysis of VC involvement in firm performance. Therefore, new regressions were run excluding investments related to that period.[1] Regarding the variable related to accumulated investment, the coefficients become even larger, as well as their significance, with the exception of the specification related to employment growth.

[1] The results are not presented here for conciseness but are available upon request.

On the other hand, the ratio of portfolio firms to VC investment managers is not significant in any of the six specifications. As a result, it seems as if VC, at least for this group of firms in a European context, is just money and nothing else.

Table 6.
Generalized Least Square Regression Results on Corporate Variables of VC-backed Companies – Early Stage

	Dependent variables					
Independent variables	**Gross Revenue Growth**	**Gross Margin Growth**	**EBITDA Growth**	**EBIT Growth**	**Cash Flow Growth**	**Employment Growth**
Growth in total assets$_{t-1}$	0.0221***	-0.0496***	-0.1226***	-0.0619***	-0.0102*	6.11e-07***
	(0.0074)	(0.0055)	(0.0044)	(0.0023)	(0.0059)	(9.37e-08)
GDP growth	-2.46e-06	-9.90e-07	-4.77e-06	1.87e-07	-2.17e-07	-3.68e-10*
	(1.78e-05)	(1.30e-05)	(1.04e-05)	(5.53e-06)	(1.39e-05)	(2.21e-10)
Accumulated investment$_{t-1}$	0.3534***	0.4976***	0.8210***	0.3716***	0.4138***	-1.65e-07
	(0.0915)	(0.0629)	(0.0498)	(0.0293)	(0.0667)	(1.06e-06)
# of firms by investment manager$_{t-1}$	260741*	147856*	-4411	-41863	-36726	1.7442
	(137613)	(89119)	(70469)	(44723)	(94487)	(1.5062)
Constant	-429920	-544646	20363	133790	75190	6.6340
	(868074)	(593638)	(470281)	(277228)	(631399)	(10.0541)
Companies	457	458	457	459	458	457
Observations	1237	1239	1234	1244	1238	1239

Standard errors in brackets.
***, **, and * represent statistical significance at the 1, 5 and 10 percent levels, respectively.

The results for firms at the expansion stage are shown in Table 7. They indicate that the cumulative VC investment is significant in all specifications, thus proving that money also matters for expansion firms. It is important to remark, however, that the capacity of adding value, represented by the workload of VCs, also plays a significant role. The coefficient related to the number of portfolio firms per investment manager is negative in all specifications, as expected, with significant levels ranging from 1 percent (sales and gross margin growth), to 5 percent (cash flow growth) and 10 percent (EBITDA; EBIT and employment growth).

Table 7.
Generalized Least Square Regression Results on corporate variables of VC-backed companies – Expansion stage

Independent variables	Gross Revenue Growth	Gross Margin Growth	EBITDA Growth	EBIT Growth	Cash Flow Growth	Employment Growth
	Dependent variables					
Growth in total assets$_{t-1}$	0.5404***	0.1941***	0.0371***	0.0261***	0.0243***	1.40e-07
	(0.0222)	(0.0081)	(0.0023)	(0.0018)	(0.0022)	(2.33e-07)
GDP growth	-8.87e-05	-3.12e-05	-8.63e-06	-2.39e-06	-2.25e-06	-8.49e-10
	(7.09e-05)	(2.59e-05)	(7.40e-06)	(5.79e-06)	(7.11e-06)	(7.20e-10)
Accumulated investment$_{t-1}$	0.2330***	0.1536***	0.0640***	0.0330***	0.0389***	2.12e-06*
	(0.0882)	(0.0323)	(0.0092)	(0.0076)	(0.0089)	(1.10e-06)
# of firms by investment manager$_{t-1}$	-1395638***	-514937***	-94110*	-78306*	-108423**	-11.9836*
	(497739)	(181459)	(51981)	(40838)	(49811)	(6.6906)
Constant	9503898***	3557795***	678976**	321209	570896*	103.0932***
	(2904347)	(1061016)	(303819)	(238217)	(291300)	(34.503)
Companies	469	470	470	464	470	479
Observations	1474	1479	1477	1461	1478	1518

Standard errors in brackets.
***, **, and * represent statistical significance at the 1, 5 and 10 percent levels, respectively.

As regards the group of late stage investments, Table 8 shows that the variable representing the cumulative investment is positive and significant in only four of the proposed specifications, with the ones analyzing the effect of cash flow growth and gross margin growth recording the highest significance. On the other hand, in none of the specifications is the number of portfolio firms per investment manager significant.

Table 8.
Generalized Least Square Regression Results on Corporate Variables of VC-backed Companies – Late Stage

Independent variables	Gross Revenue Growth	Gross Margin Growth	EBITDA Growth	EBIT Growth	Cash Flow Growth	Employment Growth
	Dependent variables					
Growth in total assets$_{t-1}$	0.2878***	0.1328***	0.0227***	0.0050	-0.1365***	1.69e-06***
	(0.0281)	(0.0138)	(0.0068)	(0.0111)	(0.0076)	(2.80e-07)
GDP growth	1.32e-04	3.99e-05	3.51e-05*	2.23e-05	-2.24e-05	1.75e-10
	(8.09e-05)	(4.08e-05)	(1.98e-05)	(2.07e-05)	(2.20e-05)	(8.48e-10)
Accumulated investment$_{t-1}$	0.0795*	0.0839***	0.0120	0.0100	0.0806***	-1.61e-07
	(0.0465)	(0.0251)	(0.0113)	(0.0120)	(0.0126)	(5.58e-07)
# of firms by investment manager$_{t-1}$	152498	-49431	-50327	31013	-94109	-3.3511
	(529752)	(284662)	(129394)	(134245)	(144097)	(6.2673)
Constant	-4395742	-919259	-976300	-883199	1148481	5.9800
	(2992352)	(1552418)	(727268)	(757273)	(813947)	(32.8008)
Companies	114	114	113	110	114	117
Observations	374	374	371	361	374	379

Standard errors in brackets.
***, **, and * represent statistical significance at the 1, 5 and 10 percent levels, respectively.

Summarizing the results, conclusive evidence that funding matters on early and expansion stage firms is found, thus confirming Hypothesis 2a for early but also for expansion firms. The successive money injections can certainly explain the growth and better performance of those investee firms. Similarly, the coefficients of the accumulated amount invested show larger values in early stage firms than those found for the whole sample, except in the case of employment growth.

Regarding Hypothesis 2b, it is not verified for firms at earlier stages. This variable is only significant in the subsample of firms at the expansion stage, except for employment growth. There is at least one possible explanation for the lack of significance in the case of early stage firms. Since the average amount invested is small in early stage firms, the number of investee firms per VCs is large in early stage portfolios (Cumming, 2006), as shown in Table 4, thus diminishing the attention allocated to each firm. The lack of significance in the case of late stage firms could be explained, since VCs do not usually play such an active role at that stage. Since late stage deals are usually related to the acquisition of majority holdings, VCs tend to maintain or attract highly skilled and experienced professionals to perform daily operations. Even the cumulative amount invested could be discussed in late stage deals because in many of those deals there is not a substantial inflow of fresh money into the acquired firm. In any case, the results for early and late stage firms are in line with MacMillan, Kulow and Khoylian (1989) and Elango, Fried, Hisrich and Polonchek (1995) who found no relationship between stage and involvement.

5. Conclusions and discussion

Although the positive impact of VC has been widely recognized in the literature, little conclusive evidence has been provided on the causes behind the superior performance of VC-backed firms. The aim of this paper is to determine to what extent the better performance of these firms could be explained by the accumulated funding provided and the value-added services offered by VCs. The paper is rooted in the agency and the resource-based view theories.

The first contribution of this paper is that it aims to explain the superior performance of VC-backed firms relying on objective, quantitative data, and it is based on a highly representative sample of Spanish VC investments free from survivorship bias, since it includes both successful and unsuccessful firms. Second,

the analysis performed allows the effect of both finance and managerial assistance to be isolated. Moreover, the study of both effects is carried out on firms at different stages of development, which allows the testing of possible differences in the impact of VC according to the stage of development of investee firms. Finally, this paper extends the scarce existing evidence on the impact of VC in the European context.

The results show that funding matters regardless of the stage of development of the investee firm, although with a limited effect in late stage deals, as expected. Regarding the number of portfolio companies per VC manager, the results show negative coefficients in all specifications, except the one related to employment growth, for the whole sample. Nevertheless, the results are quite different by stage of development. VCs are supposed to add more value when the number of portfolio firms under their surveillance is low enough. The results show that this is the case only for firms at the expansion stage. For early and late stage firms this variable is not significant. The results on early stage could be driven by the large number of portfolio firms that VCs investing on early stage usually have (Cumming, 2006). A second explanation could be related to the VCs' inability to provide relevant value added to high technology-related businesses, at least in the European context. In the case of late stage investments, the reason could be that VCs do not usually play such an active role at this stage once they have appointed highly skilled managers to the firm.

The main limitation of this paper is that although the analysis is based on quantitative data, it only addresses the capacity of VCs to spend more or less time with each specific company. This does not imply that all fund managers will actually offer real value-added services, since they may be involved in other tasks, such as raising money for a new fund, finding new investment proposals or closing new deals. Therefore, more research should be conducted on the specific aspect of non-financial resources that foster company growth.

Future research could focus on specific characteristics of the VC-backed companies, for example their activity, or on different characteristics of the VCs involved. For example, the importance of value-added services may be different for small or large VC funds, since the abilities of fund managers might be different. This could also be the case if the reputation of the VCs is taken into account. Higher

reputation could indicate a higher ability to provide managerial support to the portfolio firms and, thus, to obtain higher growth rates.

The results found are important for entrepreneurs for at least two reasons. First, the funding provided proves to be a scarce asset that is key to sustain the firm’s growth. Second, firms seeking VC may be more interested in asking for funds from those VCs that do in fact provide value-added services, such as previous valuable experience in the same industry. The fact that the funding is also of value to companies at all stages of development may have interesting implications for investors. The capital gains obtained could then be explained by the positive effect that funds exert on investee firms. Finally, there are also implications for government authorities, since our findings provide evidence that the positive effect of VC on the economy can be explained by the money supplied and the managerial assistance provided. As a result, policymakers may find support from these results to go ahead with the introduction of changes in the legal and fiscal framework that favor VC activity, to foster economic growth. Similarly, our findings also support the need to supply public sector funding to fill the gap in early stage funding in the European Union.

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