Investment-cash flow sensitivity in family-controlled firms and the impact of venture capital funding

Annalisa Croce[a], José Martí[b], Olaf M. Rottke [c]

[a]Politecnico di Milano, via Lambruschini 4/b, 20156, Milano, Italy. E-mail: annalisa.croce@polimi.it.

[b]Universidad Complutense de Madrid, 28223 Pozuelo de Alarcón, Madrid, Spain. E-mail: jmartipe@ccee.ucm.es. Phone: +34 913942310. Fax: +34 913942531. Corresponding author.

[c] Zeppelin University, Am Seemooser Horn 20, Friedrichshafen | Lake of Constance, 80045, Germany. E-mail: olaf.rottke@zu.de.

Abstract

In this paper we analyze investment sensitivity to cash flows in family-controlled businesses (FCBs) before and after the initial VC investment. We argue that highly constrained ones will be more inclined to change the preservation of the socioemotional wealth as the highest order reference point and, hence, accept the entry of external shareholders such as Venture Capital (VC) institutions. We find that financial constraints are significantly higher in first generation VC-backed FCBs than in similar untreated firms. We also find that VC involvement alleviates but does not fully eliminate the investment-cash flow sensitivity in investee first generation FCBs.

Keywords*:* financial constraints, socioemotional wealth, venture capital, family firms, generations

JEL Classification: G24, C23

EFMA codes: 810, 110, 140

Investment-cash flow sensitivity in family-controlled firms and the impact of venture capital funding

Abstract

In this paper we analyze investment sensitivity to cash flows in family-controlled businesses (FCBs) before and after the initial VC investment. We argue that highly constrained ones will be more inclined to change the preservation of the socioemotional wealth as the highest order reference point and, hence, accept the entry of external shareholders such as Venture Capital (VC) institutions. We find that financial constraints are significantly higher in first generation VC-backed FCBs than in similar untreated firms. We also find that VC involvement alleviates but does not fully eliminate the investment-cash flow sensitivity in investee first generation FCBs.

Keywords*:* financial constraints, socioemotional wealth, venture capital, family firms, generations

JEL Classification: G24, C23

EFMA codes: 810, 110, 140

1. Introduction

Information asymmetry makes it difficult for external investors to assess the quality of investment projects or the reliability of the managers in a firm. The higher the information asymmetry the higher the risk associated to the firm and, thus, the higher the cost of external sources of funds. Information asymmetry is lower in listed firms because they are obliged to provide detailed audited accounting information regularly and to report immediately any relevant information to the market. This is not the case in privately held companies, which are more affected by the higher level of risk perceived by stakeholders that conditions the choice of financing between internally generated cash flows and outside sources of funds (Carpenter & Petersen, 2002).

The problems derived from information asymmetries that influence the choice between internal and external capital exist in both family and non-family firms. However, we choose in this work to focus on family controlled businesses (hereinafter, FCBs): Anderson and Reeb (2003) and Faccio and Lang (2002) provide evidence on the importance of FCBs among listed firms. Their relative importance is significantly higher among unlisted firms. In the most developed countries, Gersick, Davis, Hampton & Lansberg (1997) estimate that FCBs account for over two thirds of all companies and about half of a country's GDP.

The issue of financial constraints is particularly relevant in FCBs as they strongly adhere to the pecking order theory to finance their investments. First, FCBs prefer internal financing with patient capital and lower cost of capital (McConaughy, 1999; Zellweger, 2007). Second, even though FCBs, particularly founder-controlled firms, could benefit from external financing due to their lower agency costs, the limited use by FCBs of external finance could be explained, as highlighted in the literature (e.g. Gómez-Mejía, Haynes, Núñez-Nickel, Jacobson, & Moyano-Fuentes, 2007; Gómez-Mejía, Makri, & Kintana., 2010; Gómez-Mejía, Hoskisson, Makri, Sirmon, & Campbell, 2011) by the desire to preserve the *socioemotional wealth* (hereinafter, SEW).

SEW could be defined as a behavior of family principles that 'weigh perceived threats to their endowment according to a subjective valuation of what is important to their welfare, what is already accrued, and what can be counted on' (Gómez-Mejía, Cruz et al., 2011, p. 665). Zellweger, Kellermanns, Chrisman, and Chua (2012) point out that FCBs make strategic choices that do not derive from an economic reference point or a risk-averse financial logic: as a consequence, FCBs may discard strategic investments with positive net present value if external sources of funds are required to finance them.

Nevertheless, Berrone, Cruz and Gómez-Mejía (2012) also affirm that although SEW preservation is the "higher order" reference point, when poor performance could lead to severe financial hardship to the family's standard of living, the family is forced to reconsider SEW as the primary reference point. This could lead to the acceptance of external stakeholders, such as Venture Capital (hereinafter, VC) investors.

In this context, the aim of the paper is two-fold. First, we pretend to analyze the investment sensitivity to internally generated cash flows as a driver of VC involvement in FCBs: in particular, we argue that VC will invest in FCBs when they are severely affected by information asymmetries and, as a consequence, their investments are highly driven by the availability of internal capital. Second, we pretend to ascertain to what extent VC involvement contributes to reduce the dependency between investments and internal cash flow generation. We distinguish between firms in which the founding firm is running the business (first generation FCBs) and firms in descendant generations (following generations FCBs) assuming that there are subject to a different degree of information asymmetries.

We focus our analyses on a representative sample of medium sized Spanish privately held FCBs by comparing the investment cash-flow sensitivity of VC-backed FCBs (that received the initial VC investment between 1995 and 2006) with that of a group of non VC-backed FCBs. Our comparison is based on both the pre-investment period (i.e. before the receiving of VC) and

post-investment period (i.e. by tracking the evolution after the entry of VC).

Our paper contributes to the family business literature in several ways. First, we contribute to provide evidence on the dilemma between preserving SEW or the achievement of financial goals, highlighted by Berrone et al. (2012) as one topic in the agenda for future research in family firm literature. Second, we use a new dependent variable (i.e. the investment-cash flow sensitivity) in family-business research to measure the outcomes of decisions and actions, as suggested by Sharma, Chrisman and Chua (1997). Moreover, we provide evidence of VC involvement in FCBs, which has been scarcely addressed in the family business literature.

The rest of the paper is structured as follows. The second section develops the relationship between investments and internally generated cash flows as a driver of the acceptance of external investors. In the third section we explain why the entrance of a VC firm should lead to a reduction in the dependency between investments and internal cash flows. In the fourth section we describe the data and the methodology. The results are presented and discussed in the fifth section. In the final section we conclude and highlight the contributions and agenda for future research.

2. The investment cash flow sensitivity

2.1.Previous literature on the investment cash-flow sensitivity

In perfect capital markets investment decisions are independent from financing decisions (Modigliani & Miller, 1958) and, hence, the availability of internally generated funds would not affect the investment pattern of firms (Jorgenson, 1963; Hall & Jorgenson, 1967). In real markets, however, there are frictions such as transaction costs, agency costs (Jensen & Meckling, 1976, Fama & Jensen, 1983a) and asymmetric information (Myers & Majluf, 1984) that make it difficult for firms to access external sources of funds. Myers & Majluf (1984) highlight that firms follow a hierarchy in the access to different sources of funds (i.e. pecking order), preferring

internal to external funding, and debt to equity, when external financing is necessary.

In this work we refer to the approach proposed by Fazzari, Hubbard and Pettersen (1988). They argue that the marginal opportunity cost of internal capital is constant, whereas the debt supply curve is upward-sloping. In addition, the greater capital market imperfections the steeper the slope will become. In this context, it would be expected that investments in financially constrained firms would be more sensitive to internal cash flows. Fazzari et al. (1988) assume that firms with low dividend payouts are more financially constrained and find evidence on their higher investment-cash flow sensitivity.[1]

It is important to observe that the approach of Fazzari et al. (1988) has been largely criticized. Kaplan and Zingales (1997, 2000) demonstrate that the profit-maximizing investment choices of firms do not imply a monotonic relationship between financial constraints and the sensitivity of investments to cash flows. They empirically test it on a subsample of the same sample used by Fazzari et al. (1988).[2] Hubbard (1998) highlights that positive investment-cash flow sensitivity may simply derive from the lack of proper control for unobserved investment opportunities. In addition, the opportunistic behavior by managers who misuse the firm's free cash flows could cause overinvestment (Jensen, 1986) and lead to a positive relationship between investments and cash flows in the absence of financial constraints. Therefore, even though overinvestment and underinvestment problems have a different theoretical basis, they generate similar empirical effects. Vogt (1994) provides evidence that overinvestment is more common in larger firms whereas underinvestment dominates in smaller firms. Privately-held FCBs, particularly small and young firms, are most affected by information asymmetry. They are not used to periodic reporting and, hence, are less visible to external stakeholders than listed

[1] Hubbard (1998) surveys other works that provide additional evidence by classifying constrained and unconstrained firms according to different proxies of information costs (e.g. membership in business groups, firm's age, size and ownership structure).

[2] Kadapakkam, Kumar, & Riddick(1998), Cleary (1999, 2006) and Almeida and Campello (2007), among others, support the findings of Kaplan and Zingales (1997).

firms. Nevertheless, as ownership and control are not generally separated, agency problems related to ownership tend to be negligible.

We control for the criticisms on Fazzari et al. (1988)'s theory in our work. First, we estimate an Euler equation, according to the model of Bond and Meghir (1994), in order to control for firms' investment opportunities. Moreover, Jensen's (1986) free cash flow argument does not hold for privately held FCBs in our sample: as ownership and control are generally not separated, agency problems tend to be negligible and free cash flow abuses on the part of owner-managers are not expected. Hence, in what follows we will interpret positive investment-cash flow sensitivity as a sign of binding financial constraints that condition the firm's investment activity of FCBs.

2.2.Investment cash flow sensitivity in FCBs

FCBs strongly adhere to the pecking order theory (e.g., see Coleman & Carsky, 1999, Poutziouris, 2001, López-Gracia & Sánchez-Andújar, 2007) to finance their investments.

On the one hand, FCBs prefer internal financing with patient capital and lower cost of capital (McConaughy, 1999; Zellweger, 2007). The willingness to pass the business to subsequent generations creates a special incentive to manage financial capital efficiently (McConaughy & Phillips, 1999). Consequently, this demands a 'generational investment strategy that creates desirable patient capital' (Sirmon & Hitt, 2003, p. 343). Patient capital differs from the typical financial capital in the length of the time frame of investments. Capital is committed over long periods of time without the threat of liquidation (Dobrzynski, 1993; Ward & Aronoff, 1991). Capital is typically committed by family members or others revealing the same endowment to the firm as the family itself.

On the other hand, family involvement is usually associated with lower agency problems due to the connection between ownership and management (Jensen & Meckling, 1976; Fama &

Jensen, 1983b; Chrisman, Chua, & Litz, 2004), especially when the founding generation is running the business. However, even though FCBs, particularly founder-controlled firms, could benefit from external financing due to their lower agency costs (Randøy & Goel, 2003; Anderson, Mansi, & Reeb, 2003), evidence shows that, in general, those firms tend to be less indebted (Gallo, 1995; Gallo & Vilaseca, 1996; López-Gracia & Sánchez-Andújar, 2007) than non-FCBs. Moreover, on the equity side, FCBs are underrepresented in the portfolios of VC investors (Martí, Menéndez-Requejo, S., & Rottke, 2013).

The limited use of external finance could be explained, as highlighted in the literature (e.g. Gómez-Mejía et al., 2007; Gómez-Mejía et al., 2010; Gómez-Mejía, Hoskisson et al., 2011) by the preservation of the SEW as key noneconomic reference point for FCB's decision making. In fact, Zellweger et al. (2012) point out that FCBs make strategic choices that do not derive from an economic reference point or a risk-averse financial logic: FCBs may discard strategic investments with positive net present value if external sources of funds are required to finance them. In the same vein, Gómez-Mejía et al. (2007) affirm that FCBs prefer to give up to their growth opportunities if the required funding endangers a loss in their SEW. Similarly, Poutziouris (2000) finds that the majority of UK FCBs have a propensity to retain family control across generations.

We argue that the inability or reluctance of FCBs to access external sources of funds is reflected by the dependency of investment on internally generated cash flows. Hence, our first hypothesis is:

Hypothesis 1: FCBs show a positive and significant dependency of investments on internally generated cash flows.

But some FCBs may fail to generate a sustainable volume of internal funds, due to an insufficient free operating cash flow, to be able to continuously invest and overcome periods of poor performance (Sirmon & Hitt, 2003). Only very large FCBs (e.g., Ford or Wal-Mart) with

access to traditional capital markets are no longer dependent on the family's commitment in hard times. In this regard, Berrone et al. (2012, p. 261) affirm that 'although SEW preservation is the "higher order" reference point for the family principal, poor performance acts as an informational clue that alters the family owners' loss framing'. Berrone et al. (2012) point out that in extreme situations, (i.e. when anticipated poor performance could lead to severe financial hardship to the family's standard of living), the family is forced to reconsider SEW as the primary reference point, and this could lead to the acceptance of external sources of funds. In the same vein, Poutziouris (2000) finds that around 21.4% of UK FCBs are interested in increasing the size of the business and are willing to raise external capital to finance their expansion and diversification.

In this work, we focus on a particular type of external finance: Venture Capital (VC). VC represents a pool of capital provided by informed investors and managed by professionals to be invested in businesses with high growth potential and high risk (Sahlman, 1990), but also in established companies with stable and predictable cash flows (Amess & Wright, 2012). VC institutions are considered as specialized investors able to face information asymmetries better than investment bankers and uninformed investors (Admati & Pfleiderer, 1994).

Following our reasoning, despite their natural reluctance to access external financing sources, some FCBs may approach VC institutions due to their inability to finance their investments, including those required for the survival of the company, with internally generated cash flows.

Our second hypothesis follows from this discussion:

Hypothesis 2: FCBs that are funded by VC institutions show higher dependency of investments on internally generated cash flows than other similar FCBs prior to the VC investment.

Moreover, the degree of family identification, influence and personal investment in the firm changes as the company evolves across generations (Gersick et al., 1997; Schulze, Lubatkin

& Dino, 2003). We argue that is especially in first generation FCBs that the reluctance to accept external investors is particularly high (Gómez-Mejía et al., 2007). If we add that founder-controlled firms grow faster and invest more in capital assets and research and development than descendant-controlled firms (McConaughy & Phillips, 1999), then the higher investment-cash flow sensitivity expected in FCBs funded by VC investors would be even in first generation FCBs.

Accordingly, our third hypothesis is:

Hypothesis 3: First generation FCBs that are funded by VC institutions show higher dependency of investments on internally generated cash flows than other similar first generation FCBs prior to the VC investment.

Regarding FCBs in second or subsequent generations, there are reasons in favor (e.g. higher agency costs due to ownership dispersion) or against (easier access to external funds from traditional sources) higher investment-cash flow sensitivity in FCBs approaching VC. Therefore, in our results we will provide some exploratory evidence.

3. The effect of VC on the investment-cash flow sensitivity of FCBs

When evaluating the impact of the entry of a VC investor, the first effect to be considered is the additional funds provided by VC firms, which enlarge the firm's equity base and helps finance the acquisition of assets to take advantage of growth opportunities.[3]

However, the final effect is not only related to the direct injection of funds. VC investors can alleviate the problems derived from information asymmetries. They sign detailed contracts with managers and monitor their progress closely (Admati & Pfleiderer, 1994). In addition, they provide managerial resources (Sørensen, 2007), such as assistance in designing the strategic plan or in management recruitment, and provide access to their network of contacts (Gorman &

[3] There is one exception in the case of VC investments in which the investor provides an exit to existing shareholders (e.g., in replacement or buyout deals).

Sahlman, 1989; Sahlman, 1990; Sapienza et al., 1996). Moreover, the value added by VC investors is positively perceived by other stakeholders. Megginson and Weiss (1991) report a 'certification effect' on investors whereas Sahlman (1990) and Tykvová (2006) remark an easier access to investment bankers. Therefore, in addition to the equity funding supplied, VC presence also allows investee firms to raise additional funds from banks and other external investors. Hence, VC involvement is expected to cause a significant reduction in the dependency of investments on internally generated cash flows. We argue that this effect should hold also when VC invest in FCBs. Accordingly, our fourth hypothesis is:

Hypothesis 4: VC investors reduce the dependency of investments on internally generated cash flows in FCBs.

In the VC literature, Engel and Stiebale (2009), Bertoni, Colombo and Croce (2010) and Bertoni, Ferrer and Marti (2013) provide evidence on the significant reduction in the investment sensitivity to cash flows after the initial VC investment in investee firms experiencing a rapid growth process (i.e. high technology startups and firms at the expansion stage). Since FBCs in the first generation grow faster (McConaughy & Phillips, 1999), we argue that VC involvement could be insufficient to remove investment cash flow sensitivity completely in those firms. This reasoning drives us to the following hypothesis:

Hypothesis 5: VC investors reduce, but do not completely remove, the dependency of investments on internally generated cash flows in first generation FCBs.

But Manigart, Baeyens and Verschueren (2003) do not find a significant reduction in a more generalist sample including firms at different stages of development whereas Bertoni et al. (2013) find that there is an increase in the investment-cash flow sensitivity in firms that were subject to a VC-sponsored buyout deal. Since descendant generation family-controlled businesses tend to be larger and more profitable than first generation ones (McConaughy &

Phillips, 1999) and were basically equity financed, VC investors will tend to increase their debt exposure. This strategy will be surely applied the case of majority acquisitions (i.e. leveraged buyouts). As a result, the final outcome in second or following generations is uncertain, because the investment cash flow sensitivity could either decrease in growing firms or increase in mature firms subject to a buyout. Therefore, we provide exploratory evidence on the impact of VC involvement in those FCBs in second or subsequent generations.

4. Empirical strategy

4.1. Sample description

Our empirical analyses are based on the Spanish market because there are many FCBs, nearly all of them privately-held. In addition, there is a detailed catalogue of VC deals available: www.webcapitalriesgo.com collects all individual investments carried out since 1991 on behalf of the Spanish Venture Capital Association (ASCRI) to prepare the annual reports. Since all Spanish companies are obliged to report their accounts to the Official Trade Register since 1991, there is also accounting information available on most privately-held firms. Therefore, the scope of this study focuses on VC investments carried out between 1995 and 2006 to be able to have pre and post-investment observations on all investee firms. The source of accounting information is the AMADEUS Database.

According to Martí, Salas and Alférez (2011), 1,815 VC investments were recorded in Spain between 1995 and 2005, including all stages but excluding financial and real estate sectors, as well as investments carried out abroad by Spanish VC institutions. ASCRI/webcapitalriesgo records include 375 additional investments committed in 2006 with the same characteristics (i.e. domestic non-financial or real estate), totaling a population of 2,190 companies. We were able to identify 1,833 of them in the Official Trade Registers, but full accounting data was only available in AMADEUS on 1,660 companies.

Based on the information collected from the AMADEUS database, the firms' websites, the official corporate news releases (BORME) and press clippings, we define FCBs as those whose ultimate largest shareholder was a family, or individuals closely linked to a family group, at the time of the initial VC investment. This definition is in accordance with the official family business definition given by GEEF (European Group of Owner Managed and Family Enterprises) and FBN (Family Business Network) in 2008 and also adopted by the IEF (Family Business Institute in Spain). Based on this definition we found evidence that 346 investees were FCBs.

In order to define a control group of non VC-backed FCBs, we collected the list of members for regional associations of Spanish FCBs and downloaded their accounting data from the AMADEUS database. Then we performed a propensity score matching process to select a group of similar firms with the same characteristics and probability of obtaining VC funding. We obtain a total control group of 380 FCBs.

Since we base our analyses on the Euler equation, estimated with GMM (Blundell & Bond, 2000), we need at least three consecutive observations to define instruments properly. In addition, as we want to analyze the investment-cash flow sensitivity of VC-backed FCBs in both the pre and post-investment periods, we only include VC-backed firms for which we have accounting data across the investment year. As a result, our sample size shrinks to 469 FCBs, 151 of which are VC-backed and 318 are control group (CG) FCBs.

In addition, we also consider the generation in which the FCB obtained VC. Out of 151 VC-backed firms, we identified 76 firms that received VC when the founder generation was running the business and 75 that were funded when descendant generations were managing the company. Regarding CG firms, we use as classification reference the year of the initial investment of the respective matched VC-backed pairs, classifying 165 in first generation and 153 in descendant generations.

Table 1 reports the distribution of VC-backed and CG sample FCBs by generation, activity sector and foundation year.

[Insert Table 1 about here]

4.2.Models and estimation methodology

There are different econometric models that pretend to analyze the investment-cash flow sensitivity (e.g. see Hubbard, 1998; Bond & Van Reenen, 2007). As mentioned in Section 2.1, current cash flows measures the availability of internal capital but may also be related to firms' investment opportunities. In the latter case, one cannot interpret the correlation between investments and cash flows as signal of financial constraints. Thus, the model should include some variable to control for firms' unobserved investment opportunities. For this purpose, we estimate an Euler equation, according to the model of Bond and Meghir (1994), and we insert the dummy variable d_VC_i, which indicates a family firm i that received VC during its life. Conversely, d_CG_i, identifies a CG family firm i. Therefore, the econometric specification (Model 1a) we use is as follows:

$$\frac{I_{i,t}}{K_{i,t-1}} = \alpha + \gamma_1\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right) + \gamma_2\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right)^2 + \gamma_3\left(\frac{S_{i,t}}{K_{i,t-1}}\right) + \gamma_4\left(\frac{D_{i,t}}{K_{i,t-1}}\right)^2 + \gamma_5 d\_CG_i\left(\frac{CF_{i,t}}{K_{i,t-1}}\right) \quad (1a)$$
$$+ \gamma_6 d\_VC_i\left(\frac{CF_{i,t}}{K_{i,t-1}}\right) + \varepsilon_{i,t},$$

where $I_{i,t}$ is the level of investments in tangible and intangible assets of firm *i* in period *t*,[4] $K_{i,t}$ is the end-of-period- *t* book value of firm *i*'s total assets, $CF_{i,t}$ is firm *i*'s cash flow in period *t* after taxes but before dividends,[5] $S_{i,t}$ is firm *i*'s sales during period *t* and $D_{i,t}$ is firm *i*'s end-of-

[4] We measure investments by the increase in the book value of tangible and intangible assets net of depreciation.

[5] Other authors have used ex-dividend cash flows (e.g. Manigart et al., 2003). We opted for cash flows before dividends because our sample is composed of unlisted firms. Managers of listed firms are more constrained than those of privately held firms to avoid a reduction in the amount of dividends paid to shareholders, as this reduction may be perceived as a negative signal by investors. Conversely, in privately held firms, dividends have no signaling role and all cash flows can be reinvested if some profitable investment opportunity arises.

period- *t* total debt. All the models also include year, regional and sectoral dummies. ε_{it} is an i.i.d. error term. Table 2 provides a detailed description of the variables considered in this work.

[Insert Table 2 about here]

In particular, in order to analyze differences in investment-cash flow sensitivity among VC-backed and CG FCBs before the entry of VC, we estimate Model 1a by excluding the observations of VC-backed firms related to the post-investment period.

If there are capital market imperfections and the external capital supply curve of FCBs is upward-sloping, we expect γ_5 and γ_6 to be positive, indicating financial constraints, respectively, for CG and VC-backed FCBs. Our first hypothesis anticipates a positive slope for both groups. In addition, according to our hypothesis 2, we expect VC-backed firms to be more financially constrained than CG FCBs in the pre-investment period (i.e. $\gamma_6 > \gamma_5$).

In order to test our research hypothesis 3, we modify Model 1a as follows:

$$\frac{I_{i,t}}{K_{i,t-1}} = \alpha + \gamma_1\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right) + \gamma_2\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right)^2 + \gamma_3\left(\frac{S_{i,t}}{K_{i,t-1}}\right) + \gamma_4\left(\frac{D_{i,t}}{K_{i,t-1}}\right)^2 + \sum_{g=G1,FG} \gamma_5^g d\_CG_i^g\left(\frac{CF_{i,t}}{K_{i,t-1}}\right) \quad (1b)$$
$$+ \sum_{g=G1,FG} \gamma_6^g d\_VC_i^g\left(\frac{CF_{i,t}}{K_{i,t-1}}\right) + \varepsilon_{i.t},$$

where the dummy variable $d\_VC_i^g$ indicates a FCB *i* in generation *g* that received VC during its life, while $d\_CG_i^g$ identifies a CG FCBs *i* in generation *g*, with *g* equal to G1 for first generation and equal to FG for descendant generation FCBs. According to our research hypothesis 3, we expect first generation VC-backed FCBs to be more financially constrained than CG FCBs in the pre-investment period (i.e. $\gamma_6^{G1} > \gamma_5^{G1}$).

In order to ascertain the impact of VC on the investment cash flow sensitivity of FCBs we then resort to the following model (Model 2a).

$$\frac{I_{i,t}}{K_{i,t-1}} = \alpha + \gamma_1\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right) + \gamma_2\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right)^2 + \gamma_3\left(\frac{S_{i,t}}{K_{i,t-1}}\right) + \gamma_4\left(\frac{D_{i,t}}{K_{i,t-1}}\right)^2 + \gamma_5 d\_CG_i\left(\frac{CF_{i,t}}{K_{i,t-1}}\right) \quad (2a)$$
$$+ \gamma_6 d\_VC_i\left(\frac{CF_{i,t}}{K_{i,t-1}}\right) + \gamma_7 d\_VC\_post_{i,t-1} + \gamma_8 d\_VC\_post_{i,t-1}\left(\frac{CF_{i,t}}{K_{i,t-1}}\right) + \varepsilon_{i,t},$$

where $d\_VC\_post_{i,t-1}$ switches from 0 to 1 in the year that follows the one in which the focal firm obtains the VC and equals 1 up to the end of the observation period. For CG firms this variable always takes value 0.

The coefficient γ_7 captures the increase in the average investment rate of a VC-backed family firm in the years following the initial investment. The coefficient γ_8 measures the effect of VC on the investment–cash flow sensitivity. More specifically, the effect of VC on financial constraints can be gauged through a simple linear test on the parameters of the models. Indeed, after receiving VC financing, internal cash flow in these firms should no longer have any effect on the investment rate (i.e., the coefficient of $CF_{i,t}/K_{i,t-1}$ should not be positive and significant). Following this line of reasoning, we performed the following Wald tests of the null hypothesis that a change in cash flow does not affect the investment rate: $\gamma_5 = 0$ for firms that did not obtain any VC and $\gamma_6 + \gamma_8 = 0$ for firms that obtained VC. In order to compare the investment cash flow sensitivity of VC-backed firms and CG FCBs in the post-investment period we resort to the following Wald test $\gamma_6 + \gamma_8 - \gamma_5 = 0$. Finally, the effect of VC on the investment level can be evaluated in a similar way by performing Wald tests of the following null hypothesis $\gamma_7 = 0$.

Similarly to what we do for Model 1, also for Model 2 we estimate a second model (Model 2b) in order to analyze the alleged differences in the impact of VC among generations of FCBs. We thus resort to the following model:

$$\frac{I_{i,t}}{K_{i,t-1}} = \alpha + \gamma_1\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right) + \gamma_2\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right)^2 + \gamma_3\left(\frac{S_{i,t}}{K_{i,t-1}}\right) + \gamma_4\left(\frac{D_{i,t}}{K_{i,t-1}}\right)^2 + \sum_{g=G1,FG}\gamma_5^g d\_CG_i^g\left(\frac{CF_{i,t}}{K_{i,t-1}}\right) \quad (2b)$$
$$+ \sum_{g=G1,FG}\gamma_6^g d\_VC_i^g\left(\frac{CF_{i,t}}{K_{i,t-1}}\right) + \sum_{g=G1,FG}\gamma_7^g d\_VC\_post_{i,t-1}^g + \sum_{g=G1,FG}\gamma_8^g d\_VC\_post_{i,t-1}^g\left(\frac{CF_{i,t}}{K_{i,t-1}}\right) + \varepsilon_{i,t},$$

The linear combinations we resort to test to our research hypotheses are similar to those discussed for Model 2a. In particular, according to our research hypothesis 4, we are interested in estimating whether VC is able to reduce investment cash-flow sensitivity in first generation FCBs.

All of the variables used in the model are normalized by the beginning-of-period-t stock of fixed and intangible assets. As firms in our sample are relatively young and small, this value is sometimes close to zero, producing extremely skewed and leptokurtic distributions of the variables. The presence of these outliers could severely bias our results. To avoid this problem, we winsorized all variables (e.g., Dixon, 1960) with a 1% cut-off for each tail. In other words, for each variable we calculated the values corresponding to the 1st and 99th percentiles of its distribution and assigned these values to all observations falling beyond them. This approach is useful because it reduces the impact of outliers and allows the use of a larger number of observations than would be possible if outliers were deleted. Furthermore, it has already been used in the investment literature (e.g., Baker & Stein, 2003), notably to assess investment–cash flow sensitivity (e.g., Cleary, 1999, 2006; Bertoni et al., 2010).[6]

We estimate all our models for the total sample of VC-backed and CG FCBs. Moreover, as robustness check for Model 1b and Model 2b, we also estimate Model 1a and Model 2a separately for first generation and descendant generation FCBs.

The main objective of the econometric analysis it to assess the "treatment" effect of VC on investment-cash flow sensitivity and evaluate if this effect depends on FCB generations. In order

[6] Estimates using these different cut-offs (i.e., 2% and 5%) are very close to those described in the next sections. They are available from the authors upon request.

to deal with the potentially endogenous nature of the VC variable (i.e., d_VC_i) we resort to a two-step system generalized method of moments estimation (GMM-SYS, Arellano & Bover, 1995; Blundell & Bond, 1998) with finite-sample correction (Windmeijer, 2005). In addition to lagged levels of the series as instruments for first differences equations, the GMM-SYS estimator employs additional moment conditions using first differences as instruments for variables in levels. We consider covariates in the original Euler equation and all VC variables to be endogenous; therefore, instruments start from t-2. In order to alleviate finite sample bias and measurement errors problems we limit the instrument set with moment conditions in the interval between t-2 and t-3 (see Bond, 2002).

Results of the Hansen statistic reported in Section 5 reassure us about the validity of the moment conditions used in all the estimations. Moreover, to evaluate the relevance of all our econometric models, we implemented the Arellano and Bond test for first- and second-order serial autocorrelation of residuals [AR(1), AR(2)]. If ε_{it} is not serially correlated, the difference of residuals should be characterized by a negative first-order serial correlation and the absence of a second-order serial correlation. Our results confirm this (see again Section 5).

4.3.Descriptive statistics

In Table 3, we report some descriptive statistics about regression variables, growth (in terms of total assets and sales), growth opportunities (in terms of ratio between intangible assets and fixed assets) and age for VC-backed and CG FCBs. Panel A refers to all FCBs while Panel B and Panel C refer to first generation and descendant generation FCBs, respectively.

[Insert Table 3 about here]

We show summary statistics, such as mean, median and number of observations for CG firms and VC-backed in both pre and post investment periods. Moreover, for every variable, we perform t-tests on the difference-in-mean between the group of CG and VC-backed FCBs.

5. Results

The results on the dependency of investments on cash flows in VC-backed FCBs prior to the initial VC investment and in similar FCBs that did not receive VC are reported in Table 4. This table includes analyses on all sample firms (first and second columns) and separate estimations for founder and descendant generation FCBs (third and fourth columns, respectively). In Panel A we show the estimated coefficients whereas in Panel B we apply Wald tests to explore significant differences between pairs of coefficients.

When we ignore the generation in which the family was involved at the time of the initial VC investment (i.e. first column), we find highly significant positive investment-cash flow sensitivity in both VC and non VC-backed FCBs, with the respective coefficients being 1.1203 and 0.3641. In the second column the estimations include all sample firms but separating first and descendant generation FCBs. In this case the coefficients are greater than one in FCBs that were later subject to a VC investment, with the significance level being 1% in first generation FCBs and 5% in firms in following generations. Regarding CG firms, the coefficients are 0.2154 in the first generation and 0.4544 in descendant generations, with the respective significance levels being 10% and 5%. This view is completed with separate estimations for first (third column) and descendant generation (fourth column) FCBs. The results on the first generation are similar to those of previous columns. Nevertheless, regarding descendant generations the coefficient measuring the dependency of cash flows on investments is not significant in CG firms. Therefore, regarding our first hypothesis, we find firm evidence on the sensitivity of investments to cash flows in FCBs that were later subject to a VC investment and in first generation CG FCBs, but only partial evidence for descendant generation CG firms.

Even though in Panel A the coefficients reported for VC-backed firms are higher than those of CG firms, we need to confirm that they are significantly different by applying a Wald test. The results are shown in Panel B. In the first column we find that the investment-cash flow

sensitivity is significantly higher in FCBs that received VC later than in CG FCBs when we do not separate FCBs by generation, thus confirming our hypothesis 2. When similar tests are run distinguishing between founder and descendant generation FCBs we find firm evidence that in the former the sensitivity was significantly higher in firms that were later subject to a VC investment. Therefore, we also find support for our hypothesis 3.

Regarding the different sensitivity in VC and CG FCBs in second or subsequent generations, we provide only exploratory evidence because there could be FCBs approaching VC institutions for different reasons (e.g. finance growth or as an exit way for some/all family shareholders). When the estimation is run on all FCBs (i.e. Model 1b, in the second column) the difference is not significant whereas it is significant when the estimation is carried out separately for descendant generation FCBs. We argue that the heterogeneity in this group would require a larger sample to be able to separate growing firms seeking financing from consolidated firms in which some or all shareholders are seeking liquidity.

The results of the impact of VC involvement on the investment-cash flow sensitivity are shown in Table 5. There are also four columns replicating the structure of Table 4. Panel A shows the coefficient that measures the cash flow sensitivity interacting with dummies that represent VC involvement, generation and, also, observations related to the post-investment period. In the first column we report the results of the whole sample of VC and CG FCBs. We observe that the sensitivity of investments to cash flows in VC-backed FCBs is 0.9328 for the whole observation period (i.e. pre and post investment period), significant at the 1% level, whereas it is negative, but insignificant, when only the post-investment period is considered. If we look at Panel B the Wald test in the first row provides evidence that there is still a significant sensitivity in VC-backed FCBs, albeit with a lower coefficient. In addition, Wald tests in the second and third rows show that the sensitivity in VC-backed FCBs was significantly higher than in CG firms and this difference fades away after the VC entry. Therefore, when all FCBs are

considered, despite the lower investment-cash flow sensitivity, the dependency is not fully eliminated in VC-backed FCBs but those firms are no longer more financially constrained than other non VC-backed FCBs. This provides only partial confirmation to our fourth hypothesis.

Regarding the impact on first generation FCBs, we find the results in columns 2 and 3. In Panel A the coefficient measuring sensitivity for the whole observation period is also around one and the interaction with the dummy including only the post-investment period shows negative coefficients. In this case, this reduction is significant at the 10% level only when the model is estimated only for first generation FCBs. Panel B shows similar results to those found for the whole sample (i.e. the coefficient is still positive and significant but no longer different from that found in other FCBs). Hence, even though investment-cash flow sensitivity is not fully eliminated VC-backed FCBs, we find a significant reduction (albeit with low significance) that is in accordance with our fifth hypothesis.

Finally, we provide exploratory evidence on descendant generation family firms. When the whole period is considered neither VC-backed nor CG FCBs show a significant sensitivity. This also happens when only the post-investment period is considered for the former. In addition, Wald tests do not show significant differences between the two groups neither before nor after the VC investment.

6. Conclusions and discussion

The family business literature remarks that the preservation of SEW in FCBs leads to a limited use of external financing sources and strategic choices not always deriving from an economic point of reference. Nevertheless, when poor performance could lead to severe financial hardship for the family's standard of living, family shareholders are forced to reconsider SEW as the main reference point (Berrone et al., 2012).

Based on the investment sensitivity to internally generated resources as a reference of financial constraints in unlisted FCBs that could lead to this financial hardship, we argue that

highly constrained FCBs will be more inclined to accept the entry of external shareholders such as VC institutions. In addition, we aim to check to what extent VC involvement does affect the existing dependency of investments on internally generated cash flows. The scope of analysis is a sample of unlisted Spanish VC-backed FCBs that were subject to a VC investment between 1995 and 2006. We analyze the investment sensitivity to cash flows before and after the initial VC investment.

We find evidence on the significant sensitivity of investments to cash flows in all FCBs that were later subject to a VC investment before the initial VC investment. This dependency is also significant in first generation CG FCBs, but not in descendant generation CG FCBs. In addition, financial constraints are significantly higher in first generation VC-backed FCBs than in similar CG firms. Despite their natural reluctance to accept external shareholders we argue that those FCBs accept the entry of a VC firm to carry out investments that are necessary for survival, except for a group of FCBs that are willing to access external sources to grow faster (Poutziouris, 2000). In descendant generation VC-backed firms the results are not conclusive because it is more likely that some of them may approach VC firms to find an exit for some/all shareholders rather than to finance growth.

Regarding the effect of VC involvement on financial constraints we find that, despite the lower investment-cash flow sensitivity, the dependency is not fully eliminated in VC-backed FCBs, but those firms are no longer more financially constrained than other non VC-backed FCBs. This finding holds for the whole sample and for the subsample of first generation FCBs. We argue that the sensitivity is not eliminated because the presence of VC investors will positively affect a growth-seeking attitude in the firm and investments will increase more than what family shareholders initially planned.

As first contribution of our paper, we provide evidence on the dilemma between the preservation of the SEW or the achievement of financial goals in FCBs. Secondly, we provide

evidence on the role VC investors play in alleviating financial constraints in first generation FCBs, thus contributing to taking advantage of their growth opportunities. We also contribute to overcoming the limited attention of VC activity in family business literature.

The main constraint of our work is related to the limited sample of VC-backed FCBs, which does not allow us to explore research questions related to financial constraints due to the heterogeneity found in FCBs (i.e. generations, size, motivations, industries and so on) and in VC approaches (i.e. startup, expansion, replacement capital, buyouts). For future research, it would be interesting to analyze financial constraints controlling for generation and type of funding. More specifically, what was the stake acquired by the VC firm? Majority or minority? Was there a capital increase in the investee firm and/or did some shareholders sold their stake?

Acknowledgements

We wish to thank Dr. Stephan A. Jansen, President of Zeppelin University and Professor of Strategic Organization and Financing, as well as Alexandra von Rohr, Ole Gruenberg and Alard von Rohr for their valuable feedback.

References

Admati, A.R., & Pfleiderer, P. (1994). Robust Financial Contracting and the Role of Venture Capitalists, Journal of Finance, 49(2): 371–402.

Almeida, H., & Campello, M. (2007). Financial constraints, asset tangibility, and corporate investment, Review of Financial Studies, 20(5): 1429–1460.

Amess, K., & Wright, M. (2012). Leveraged buyouts, private equity and jobs, Small Business Economics, 38(4): 419–430.

Anderson, R.C., & Reeb, D.M. (2003). Founding-Family Ownership and Firm Performance: Evidence from the S&P 500, Journal of Finance, 58(3): 1301–1328.

Anderson, R.C., Mansi, S.A., & Reeb, D.M. (2003). Founding family ownership and the agency cost of debt, Journal of Financial Economics, 68(2): 263–285.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variables estimation of error-components models. Journal of Econometrics , 68 (1): 29-51.

Baker, M., & Stein, J. C. (2003). When does the market matter? Stock prices and the investment of equity-dependent firms. The Quarterly Journal of Economics , 118 (3): 969–1005.

Berrone, P., Cruz, C.C., & Gómez-Mejía, L.R. (2012). Socioemotional Wealth in Family Firms: Theoretical Dimensions, Assessment Approaches, and Agenda for Future Research, Family Business Review, 25(3): 258–279.

Bertoni, F., Colombo, M. G., & Croce, A. (2010). The effect of venture capital financing on the sensitivity to cash flow of _firm's investments. European Financial Management, 16 (4), 528_551.

Bertoni, F., Ferrer, M.-A., & Martí, J. (2013). The different role played by venture capital and private equity investors on the investment activity of their portfolio firms, Small Business Economics, (in press).

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. Journal of econometrics, 87(1): 115-143.

Blundell, R., & Bond, S. (2000). GMM Estimation with persistent panel data: an application to production functions. Econometric Reviews, 19(3), 321–340.

Bond, S. (2002). Dynamic panel data models: a guide to micro data methods and practice. Portuguese Economic Journal , 1(2): 141-62.

Bond, S. R., & Meghir, C. (1994). Dynamic investment models and the firm's financial policy. Review of Economic Studies, 61: 197–222.

Bond, S., & Van Reenen, J. (2007). Micro-econometric models of investment and employment. In: J. Heckman E.E. Leamer (eds) Handbook of Econometrics (Volume 6A Chapter 65 pp. 4417-4498). Amsterdam: Elsevier.

Carpenter, R.E., & Petersen, B.C. (2002). Is the Growth of Small firms constrained by internal Finance?, Review of Economics & Statistics, 84(2): 298–309.

Chrisman, J.J., Chua, J.H., & Litz, R.A. (2004). Comparing the Agency Costs of Family and Non-Family Firms: Conceptual Issues and Exploratory Evidence, Entrepreneurship: Theory & Practice, 28(4): 335–354.

Cleary, S. (1999). The relationship between firm investments and financial status. The Journal of Finance, 54(2): 673–692.

Cleary, S. (2006). International corporate investment and the relationships between financial constraint measures. Journal of Banking & Finance, 30(5): 1559–1580.

Coleman, S., & Carsky, M. (1999). Sources of capital for small family-owned business: evidence from the national survey of small business finances. Family Business Review, 12(1), 73-86.

Dixon, W. (1960). Simplified estimation from censored normal samples. Annals of Mathematical Statistics, 31: 385_391.

Dobrzynski, J.H. (1993). Relationship Investing Business, Business Week, 3309: 68–75.

Engel, D. & Stiebale, J. (2009). Private Equity, investment and financial constraints—firm-level evidence for France and the United Kingdom. http://ssrn.com/abstract 1568 =1438037. January 5, 2013.

Faccio, M., & Lang, L.H.P. (2002). The ultimate ownership of Western European corporations, Journal of Financial Economics, 65(3): 365–395.

Fama, E.F., & Jensen, M.C. (1983a). AGENCY PROBLEMS AND RESIDUAL CLAIMS, Journal of Law & Economics, 26(2): 327–350.

Fama, E.F., & Jensen, M.C. (1983b). SEPARATION OF OWNERSHIP AND CONTROL, Journal of Law & Economics, 26(2): 301–326.

Fazzari, S.M., Hubbard, R.G., & Petersen, B.C. (1988). Financing constraints and corporate investment., Brooking Papers on Economic Activity, (1): 141–206.

Gallo, M.A. (1995). The Role of Family Business and Its Distinctive Characteristic Behavior in Industrial Activity, Family Business Review, 8(2): 83–97.

Gallo, M.A., & Vilaseca, A. (1996). Finance in Family Business, Family Business Review, 9(4): 387–401.

Gersick, K. E., Davis, J., Hampton, M., & Lansberg, I. (1996). Generation to generation: Life cycles of the family business. Boston: Harvard Business School Press.

Gómez-Mejía, L.R., Makri, M., & Kintana, M.L. (2010). Diversification Decisions in Family-Controlled Firms, Journal of Management Studies, 47(2): 223–252.

Gómez-Mejía, L.R., Cruz, C.C., Berrone, P., & Castro, J. de (2011). The Bind that Ties: Socioemotional Wealth Preservation in Family Firms, Academy of Management Annals, 5: 653–707.

Gómez-Mejía, L. R.; Hoskisson R. E.; Makri M., & Sirmon D. G. (2011). Innovation and the preservation of socioemotional wealth in family controlled high technology firms: Unpublished manuscript, Texas A&M University, College Station.

Gómez-Mejía, L.R., Haynes, K.T., Núñez-Nickel, M., Jacobson, K.J.L., & Moyano-Fuentes, J. (2007). Socioemotional Wealth and Business Risks in Family-controlled Firms: Evidence from Spanish Olive Oil Mills, Administrative Science Quarterly, 52(1): 106–137.

Gorman, M., & Sahlman, W.A. (1989). What do venture capitalist do?. Journal of Business Venturing, 4: 231-248.

Hall, R.E., & Jorgenson D.W. (1967). Tax Policy and Investment Behavior. American Economic Review, 57(3): 391-414.

Hubbard, R.G. (1998). Capital-market imperfections and investment. Journal of Economic Literature, 36(1): 193–225.

Jensen, M.C. (1986) Agency costs of free cash flow, corporate finance, and takeovers. American Economic Review, 76(2): 323-329.

Jensen, M.C., & Meckling, W.H. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure, Journal of Financial Economics, 3(4): 305-360.

Jorgenson, D. W. (1963). Capital Theory and Investment Behavior. American Economic Review, 53(2): 247-59.

Kadapakkam, P., Kumar, P., & Riddick, L.A. (1998). The impact of cash flows and firm size on investment, The international evidence. Journal of Banking & Finance, 22(3): 293-320.

Kaplan, S.N., & Zingales, L. (1997). Do Investment-Cash Flow Sensitivities provide useful Measures of Financing Constraints?, Quarterly Journal of Economics, 112(1): 169–215.

Kaplan, S.N., & Zingales, L. (2000). Investment-Cash Flow Sensitivities Are Not Valid Measures Of Financing Constraints. Quarterly Journal of Economics, 115(2): 707-712.

López-Gracia, J., & Sánchez-Andújar, S. (2007). Financial Structure of the Family Business: Evidence From a Group of Small Spanish Firms, Family Business Review, 20(4): 269–287.

Manigart, S., Baeyens, K., & Verschueren, I. (2003). Financing and investment interdependencies in unquoted Belgian companies, The role of Venture Capital. In P. Butzen & C. Fuss. (Eds.), Firms' investment and finance decision. Cheltenham: Edward Elgar.

Martí, J., Menéndez-Requejo, S., & Rottke, O.M. (2013). The impact of venture capital on family businesses: Evidence from Spain, Journal of World Business, April.

Martí, J., Salas, M., & Alférez, A. (2011). Economic and social impact of venture capital and private equity in Spain. 2011. Madrid: ASCRI.

McConaughy, D.L. (1999). Is the Cost of Capital Different for Family Firms?, Family Business Review, 12(4): 353–360.

McConaughy, D.L., & Phillips, G. (1999). Founders versus descendents: The profitability, efficiency, growth characteristics and financing in large, public, founding-family-controlled firms. Family Business Review, 12(2): 123–131.

Megginson, W.L., & Weiss, K.A. (1991). Venture Capitalist Certification in Initial Public Offerings. Journal of Finance, 46(3): 879-903.

Modigliani, F., & Miller, M.H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment, The American Economic Review, 48(3 (June)): 261–297.

Myers, S.C., & Majluf, N.S. (1984). Corporate financing and investment decisions when firms have information that investors do not have, Journal of Financial Economics, 13(2): 187–221.

Poutziouris, P.Z. (2000). Venture capital and small-medium size family companies: An analysis from the demand perspective. In P. Poutziouris (Ed.), Family business—Tradition or entrepreneurship in the new economy (pp. 255-282). Book proceedings: 11th Annual Family Business Network World Conference, FBN, London 2000.

Poutziouris, P.Z. (2001). Venture Capital: empirical Evidence from the UK Small to Medium-Size Enterprising Economy, Family Business Review, 14(3), 277-291.

Randøy, T., & Goel, S. (2003). Ownership structure, founder leadership, and performance in Norwegian SMEs: implications for financing entrepreneurial opportunities: The Evolving Family / Entrepreneurship Business Relationship, Journal of Business Venturing, 18(5): 619–637.

Sahlman W.A (1990). The structure and governance of Venture Capital organizations. Journal of Financial Economics, 27(2), Journal of Financial Economics, 27(2): 473–521.

Sapienza, H.J., Manigart, S., & Vermeir, W. (1996). Venture capitalist governance and value added in four countries. Journal of Business Venturing, 11: 439-469.

Schulze, W.S., Lubatkin, M.H., & Dino, R.N. (2003). Exploring the Agency Consequences of Ownership Dispersion among the Directors of Private Family Firms. Academy of Management Journal, 46(2): 179–194.

Sharma, P., Chrisman, J.J, & Chua, J.H. (1997). Strategic management of family business: Past research and future challenges. Family Business Review, 10(1): 1–35.

Sirmon, D.G., & Hitt, M.A. (2003). Managing Resources: Linking Unique Resources, Management, and Wealth Creation in Family Firms, Entrepreneurship: Theory & Practice, 27(4): 339–358.

Sørensen, M. (2007). How Smart Is Smart Money? A Two-Sided Matching Model of Venture Capital. Journal of Finance, 62(6): 2725-2762.

Tykvová, T. (2006). How do investment patterns of independent and captive private equity funds differ? Evidence from Germany. Financial Markets and Portfolio Management, 20(4): 399-418.

Vogt, S. (1994). The cash flow/investment relationship, evidence from U.S. manufacturing firms. Financial Management, 23(2): 3-20.

Ward, J., & Aronoff, C.E. (1991). Ward, J. (1991). The power of patient capital. Nation's Business, 79(9)., Nation's Business, 79(9): 48–49.

Windmeijer, F., (2005). A finite sample correction for the variance of linear efficient two-step GMM estimators. Journal of Econometrics, 126: 26_51.

Zellweger, T. (2007). Time Horizon, Costs of Equity Capital, and Generic Investment Strategies of Firms, Family Business Review, 20(1): 1–15.

Zellweger, T.M., Kellermanns, F.W., Chrisman, J.J., & Chua, J.H. (2012). Family Control and Family Firm Valuation by Family CEOs: The Importance of Intentions for Transgenerational Control. Organization Science, 23(3): 851–868.

Table 1. Full sample of VC-backed and control group (CG) FCBs.

Panel A. Breakdown by activity sector.

	VC-backed FCBs		*CG FCBs*		*Total*	
	Nº firms	*%*	*Nº firms*	*%*	*Nº firms*	*%*
Industry						
Pharma and R&D	0	0.00%	5	1.57%	5	1.07%
Manufacturing	96	63.58%	201	63.21%	297	63.33%
Primary & Utilities	2	1.32%	10	3.14%	12	2.56%
Commerce	22	14.57%	49	15.41%	71	15.14%
Transport	3	1.99%	13	4.09%	16	3.41%
Hotel & Leisure	7	4.64%	8	2.52%	15	3.20%
ICT	9	5.96%	6	1.89%	15	3.20%
Other services	12	7.95%	26	8.18%	38	8.10%
Total	*151*	*100.00%*	*318*	*100.00%*	*469*	*100.00%*
Foundation year						
before 1960	6	3.97%	59	18.55%	65	13.86%
1960-1964	10	6.62%	43	13.52%	53	11.30%
1965-1960	11	7.28%	18	5.66%	29	6.18%
1970-1974	20	13.25%	27	8.49%	47	10.02%
1975-1979	15	9.93%	34	10.69%	49	10.45%
1980-1984	26	17.22%	34	10.69%	60	12.79%
1985-1989	29	19.21%	37	11.64%	66	14.07%
1990-1994	20	13.25%	40	12.58%	60	12.79%
1995-2000	13	8.61%	22	6.92%	35	7.46%
2001-2005	1	0.66%	4	1.26%	5	1.07%
Total	*151*	*100.00%*	*318*	*100.00%*	*469*	*100.00%*
Generation						
First generation	76	50.33%	165	51.89%	241	51.39%
Following generations	75	49.67%	153	48.11%	228	48.61%
Total	*151*	*100.00%*	*318*	*100.00%*	*469*	*100.00%*

Source: Based on the information collected from ASCRI, www.webcapitalriesgo.com and the AMADEUS Database.

Table 2. Variables description

Variable	Description
$I_{i,t}$	Increase from *t*-1 to *t* in the book value of tangible and intangible assets net of depreciation of firm *i*
$CF_{i,t}$	Cash flow of firm *i* at the end of period *t* after taxes but before dividends
$S_{i,t}$	Sales of firm *i* at the end period *t*
$D_{i,t}$	Sum of short- and long-term debt of firm *i* at the end of period *t*
$K_{i,t}$	Book value of tangible and intangible assets of firm *i* at the end of period *t*
d_VC_i	Dummy variable that equals 1 for VC-backed FCBs (i.e. FCBs receiving VC financing during their life)
d_CG_i	Dummy variable that equals 1 for control group FCBs (i.e. FCBs that do not receive VC financing)
$d\_VC\_post_{i,t-1}$	Dummy variable that equals 1 from the year that follows the one in which the focal firm obtains the VC financing up to the end of the observation period for a FCBs *i*
$d\_VC_i^g$	Dummy variable that equals 1 for VC-backed FCBs (i.e. FCBs receiving VC financing during their life) in generation *g* with *g* equal to G1 for first generation FCBs and FG for descendant generation FCBs
$d\_CG_i^g$	Dummy variable that equals 1 for control group FCBs (i.e. FCBs that do not receive VC financing) in generation *g* with *g* equal to G1 for first generation FCBs and FG for descendant generation FCBs
$d\_VC\_post_{i,t-1}^g$	Dummy variable that equals 1 from the year that follows the one in which the focal firm obtains the VC financing up to the end of the observation period for a FCBs *i* in generation *g* with *g* equal to G1 for first generation FCBs and FG for descendant generation FCBs

Table 3. Descriptive statistics

Panel A: All FCBs

				pre VC investment period					post VC investment period				
	CG FCBs			VC-backed FCBs			VC vs CG		VC-backed FCBs			VC vs CG	
	mean	*median*	*obs*	*mean*	*median*	*obs*	*mean*		*mean*	*median*	*obs*	*mean*	
$\left(\frac{Sales_{i,t} - Sales_{i,t-1}}{Sales_{i,t-1}}\right)$	0.203	0.031	1805	0.116	0.073	529	-0.087		0.044	0.018	975	-0.159	
$\left(\frac{Total\ assets_{i,t} - Total\ assets_{i,t-1}}{Total\ assets_{i,t-1}}\right)$	0.071	0.042	1813	0.183	0.099	529	0.112	***	0.058	0.012	975	-0.013	
$\left(\frac{I_{i,t}}{K_{i,t-1}}\right)$	0.247	0.124	2184	0.384	0.198	684	0.137	***	0.226	0.096	992	-0.021	
$\left(\frac{S_{i,t}}{K_{i,t-1}}\right)$	7.863	3.966	2184	5.334	3.516	684	-2.529	***	3.365	2.161	992	-4.498	***
$\left(\frac{D_{i,t}}{K_{i,t-1}}\right)$	1.010	0.640	2184	1.226	0.967	684	0.217	***	1.226	0.931	992	0.217	***
$\left(\frac{CF_{i,t}}{K_{i,t-1}}\right)$	0.342	0.239	2184	0.273	0.226	684	-0.069	***	0.160	0.128	992	-0.182	***
$Age_{i,t}$	31.156	28.000	2184	20.265	18.000	672	-10.891	***	26.543	25.000	992	-4.613	***
$\left(\frac{Intangibles_{i,t}}{K_{i,t-1}}\right)$	0.205	0.180	2183	0.144	0.180	684	-0.061	***	0.346	0.298	992	0.142	***

***, **, and * represent statistical significance of 1%, 5% and 10%, respectively. Data are expressed in thousand € and deflated by CPI (reference year: 2005).

Panel B: First generation FCBs

	CG FCBs			pre VC investment period					post VC investment period				
				VC-backed FCBs			VC vs CG		VC-backed FCBs			VC vs CG	
	mean	*median*	*obs*	*mean*	*median*	*obs*	*mean*		*mean*	*median*	*obs*	*mean*	
$\left(\frac{Sales_{i,t} - Sales_{i,t-1}}{Sales_{i,t-1}}\right)$	0.385	0.038	826	0.133	0.087	260	-0.252		0.031	0.029	471	-0.353	
$\left(\frac{Total\ assets_{i,t} - Total\ assets_{i,t-1}}{Total\ assets_{i,t-1}}\right)$	0.078	0.045	829	0.215	0.122	260	0.137	***	0.060	0.012	471	-0.018	
$\left(\frac{I_{i,t}}{K_{i,t-1}}\right)$	0.262	0.120	1020	0.447	0.225	339	0.186	***	0.221	0.100	480	-0.041	
$\left(\frac{S_{i,t}}{K_{i,t-1}}\right)$	9.696	4.596	1020	5.625	3.591	339	-4.071	***	3.354	2.154	480	-6.342	***
$\left(\frac{D_{i,t}}{K_{i,t-1}}\right)$	1.058	0.606	1020	1.238	1.025	339	0.180	**	1.231	0.948	480	0.173	**
$\left(\frac{CF_{i,t}}{K_{i,t-1}}\right)$	0.376	0.243	1020	0.309	0.224	339	-0.067	*	0.180	0.127	480	-0.196	***
$Age_{i,t}$	24.701	24.000	1020	15.764	14.000	339	-8.937	***	22.250	21.500	480	-2.451	***
$\left(\frac{Intangibles_{i,t}}{K_{i,t-1}}\right)$	0.214	0.192	1019	0.122	0.179	339	-0.092	***	0.353	0.290	480	0.139	***

***, **, and * represent statistical significance of 1%, 5% and 10%, respectively. Data are expressed in thousand € and deflated by CPI (reference year: 2005).

Panel C: Descendant generations FCBs

				pre VC investment period					post VC investment period				
	CG			VC			VC vs CG		VC			VC vs CG	
	mean	*median*	*obs*	*mean*	*median*	*obs*	*mean*		*mean*	*median*	*obs*	*mean*	
$\left(\frac{Sales_{i,t} - Sales_{i,t-1}}{Sales_{i,t-1}}\right)$	0.050	0.025	979	0.100	0.065	269	0.050	**	0.055	0.010	504	0.005	
$\left(\frac{Total\ assets_{i,t} - Total\ assets_{i,t-1}}{Total\ assets_{i,t-1}}\right)$	0.065	0.038	984	0.153	0.080	269	0.088	***	0.056	0.010	504	-0.009	
$\left(\frac{I_{i,t}}{K_{i,t-1}}\right)$	0.234	0.126	1164	0.321	0.176	345	0.087	***	0.231	0.089	512	-0.004	
$\left(\frac{S_{i,t}}{K_{i,t-1}}\right)$	6.257	3.566	1164	5.049	3.470	345	-1.208	**	3.376	2.176	512	-2.880	***
$\left(\frac{D_{i,t}}{K_{i,t-1}}\right)$	0.967	0.670	1164	1.215	0.887	345	0.248	***	1.223	0.905	512	0.255	***
$\left(\frac{CF_{i,t}}{K_{i,t-1}}\right)$	0.312	0.234	1164	0.238	0.228	345	-0.074	***	0.141	0.128	512	-0.171	***
$Age_{i,t}$	36.813	33.000	1164	24.847	23.000	333	-11.966	***	30.568	29.000	512	-6.244	***
$\left(\frac{Intangibles_{i,t}}{K_{i,t-1}}\right)$	0.197	0.174	1164	0.166	0.182	345	-0.031		0.340	0.306	512	0.143	***

***, **, and * represent statistical significance of 1%, 5% and 10%, respectively. Data are expressed in thousand € and deflated by CPI (reference year: 2005).

Table 4. FCB's investment-cash flow sensitivity in the pre-investment period

Panel A. Regression results of VC-backed vs. CG FCBs

Variable	Coeff.	Model 1a		Model 1b		Model 1a First generation FCBs		Model 1a Descendant generations FCBs	
$\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right)$	γ_1	0.1471		0.1323		0.3016	**	-0.0993	
		(0.092)		(0.088)		(0.131)		(0.089)	
$\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right)^2$	γ_2	-0.056		-0.0479		-0.1166	**	0.0467	
		(0.036)		(0.035)		(0.049)		(0.04)	
$\left(\frac{S_{i,t}}{K_{i,t-1}}\right)$	γ_3	-0.0033		-0.0019		-0.0093	*	0.0091	
		(0.006)		(0.005)		(0.005)		(0.006)	
$\left(\frac{D_{i,t}}{K_{i,t-1}}\right)^2$	γ_4	0.0092	*	0.0085		0.0105	**	-0.0003	
		(0.005)		(0.005)		(0.004)		(0.007)	
$d\_CG_i\left(\frac{CF_{i,t}}{K_{i,t-1}}\right)$	γ_5	0.3641	***						
		(0.129)							
$d\_CG_i^{G1}\left(\frac{CF_{i,t}}{K_{i,t-1}}\right)$	γ_5^{G1}			0.2154	*	0.3994	***		
				(0.129)		(0.106)			
$d\_CG_i^{FG}\left(\frac{CF_{i,t}}{K_{i,t-1}}\right)$	γ_5^{FG}			0.4544	**			0.2008	
				(0.181)				(0.137)	
$d\_VC_i\left(\frac{CF_{i,t}}{K_{i,t-1}}\right)$	γ_6	1.1203	***						
		(0.196)							
$d\_VC_i^{G1}\left(\frac{CF_{i,t}}{K_{i,t-1}}\right)$	γ_6^{G1}			1.0582	***	1.0359	***		
				(0.206)		(0.179)			
$d\_VC_i^{FG}\left(\frac{CF_{i,t}}{K_{i,t-1}}\right)$	γ_6^{FG}			1.2149	**			0.8816	***
				(0.483)				(0.303)	
Cons.	α	0.1883	*	0.2133	**	0.1098		0.3297	***
		(0.091)		(0.091)		(0.084)		(0.123)	
N.obs		2868		2868		1359		1509	
N. firms		469		469		241		228	
Hansen		192.227 [193]		191.809 [191]		185.448 [187]		187.370 [187]	
AR1		-5.5243	***	-5.4712	***	-3.8229	***	-4.3817	***
AR2		0.987		0.9023		0.8902		0.3686	

Panel B. Wald tests: VC-backed vs. CG FCBs

Variable	Coeff.	Model 1a	Model 1b	Model 1a First generation FCBs	Model 1a Descendant generations FCBs
CF(VC-backed)-CF(CG) Before VC entry	$\gamma_6 - \gamma_5$	0.7561 ***			
		0.2262			
	$\gamma_6^{G1} - \gamma_5^{G1}$		0.8428 ***	0.6365 ***	
			0.2205	0.183	
	$\gamma_6^{FG} - \gamma_5^{FG}$		0.7605		0.6808 **
			0.5412		0.2888

The table reports two-step System-GMM estimates with finite sample correction on equations 1a and 1b, using different assumptions about the structural break as presented in Section 4. The dependent variable is firm *i*'s investment ratio at time *t*. Standard errors are reported in parentheses. ***, ** and * indicate, respectively, significance levels of <1%, <5% and <10%. AR(1) and AR(2) are tests of the null hypothesis of, respectively, no first or second-order serial correlation. Hansen is a test of the validity of the overidentifying restrictions based on the efficient two-step GMM estimator. Investments, cash flows, and debt are all normalized by beginning of period level of fixed assets and winsorized at the 1% level. Pooled rows refer to coefficients which are assumed to remain constant. Columns (1) and (2) report estimations of the pre-investment period on all VC-backed FCBs. Column (3) reports estimations of the pre-investment period in first generation VC-backed FCBs (i.e. G1) and column (4) reports estimations of the pre-investment period in descendant generation VC-backed FCBs (i.e. FG). A detailed description of independent variables is available in Table 2.

Table 5. Impact of VC on FCB's investment-cash flow sensitivity and investment rate

Panel A. Regression results of VC-backed and CG FCBs

Variable	Coeff.	Model 2a		Model 2b		Model 2a First generation FCBs		Model 2a Descendant generations FCBs
$\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right)$	γ_1	0.1297	*	0.1359	*	0.2355	**	-0.0114
		(0.073)		(0.072)		(0.101)		(0.076)
$\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right)^2$	γ_2	-0.0361		-0.0364		-0.0711	*	0.0069
		(0.028)		(0.027)		(0.037)		(0.031)
$\left(\frac{S_{i,t}}{K_{i,t-1}}\right)$	γ_3	-0.0047		-0.0038		-0.0116	**	0.0068
		(0.005)		(0.005)		(0.005)		(0.005)
$\left(\frac{D_{i,t}}{K_{i,t-1}}\right)^2$	γ_4	0.0124	**	0.013	**	0.019	***	0.0034
		(0.006)		(0.005)		(0.005)		(0.005)
$d\_CG_i\left(\frac{CF_{i,t}}{K_{i,t-1}}\right)$	γ_5	0.2821	**					
		(0.116)						
$d\_CG_i^{G1}\left(\frac{CF_{i,t}}{K_{i,t-1}}\right)$	γ_5^{G1}			0.2371	*	0.381	***	
				(0.129)		(0.101)		
$d\_CG_i^{FG}\left(\frac{CF_{i,t}}{K_{i,t-1}}\right)$	γ_5^{FG}			0.3544	**			0.1466
				(0.163)				(0.131)
$d\_VC_i\left(\frac{CF_{i,t}}{K_{i,t-1}}\right)$	γ_6	0.9328	***					
		(0.172)						
$d\_VC_i^{G1}\left(\frac{CF_{i,t}}{K_{i,t-1}}\right)$	γ_6^{G1}			0.8765	***	1.0669	***	
				(0.176)		(0.154)		
$d\_VC_i^{FG}\left(\frac{CF_{i,t}}{K_{i,t-1}}\right)$	γ_6^{FG}			0.9023	**			0.4912
				(0.428)				(0.304)
$d\_VC\_post_i\left(\frac{CF_{i,t}}{K_{i,t-1}}\right)$	γ_8	-0.3302						
		(0.249)						
$d\_VC\_post_i^{G1}\left(\frac{CF_{i,t}}{K_{i,t-1}}\right)$	γ_8^{G1}			-0.2534		-0.4659	**	
				(0.26)		(0.211)		
$d\_VC\_post_i^{FG}\left(\frac{CF_{i,t}}{K_{i,t-1}}\right)$	γ_8^{FG}			-0.5044				-0.1146
				(0.502)				(0.375)
$d\_VC\_post_i$	γ_7	0.0429						

		(0.045)							
$d\_VC\_post_i^{G1}$	γ_7^{G1}			-0.1074		-0.0363			
				(0.088)		(0.059)			
$d\_VC\_post_i^{FG}$	γ_7^{FG}			0.0326				-0.0154	
				(0.065)				(0.053)	
Cons.	α	0.187	***	0.1821	***	0.1426	*	0.2508	***
		(0.058)		(0.057)		(0.076)		(0.078)	
N.obs		3860		3860		1839		2021	
N. firms		469		469		241		228	
Hansen		214.080 [228]		243.789 [255]		194.554 [219]		172.373 [222]	
AR1		-7.8321	***	-7.8306	***	-5.3237	***	-5.8141	***
AR2		1.0736		1.1193		0.5917		0.8983	

Panel B. Wald tests: VC-backed vs. CG FCBs

Variable	Coeff.	Model 2a		Model 2b		Model 2a First generation FCBs		Model 2a Descendant generations FCBs	
	$\gamma_6 + \gamma_8$	0.5937	***						
		(0.1972)							
CF for VC-backed firms after the entry of VC	$\gamma_6^{G1} + \gamma_8^{G1}$			0.6231	***	0.601	***		
				(0.2084)		(0.1486)			
	$\gamma_8^{FG} + \gamma_8^{FG}$			0.3979				0.3446	
				(0.3281)				(0.3083)	
	$\gamma_6 - \gamma_5$	0.6418	***						
		(0.187)							
CF(VC-backed firms)- CF(CG firms) Before VC entry	$\gamma_6^{G1} - \gamma_5^{G1}$			0.6394	***	0.6859	***		
				(0.1693)		(0.1486)			
	$\gamma_6^{FG} - \gamma_5^{FG}$			0.5479				0.3765	
				(0.4407)				(0.2009)	
	$\gamma_6 + \gamma_8 - \gamma_5$	0.3116							
		(0.2276)							
CF(VC-backed firms)- CF(CG firms) After VC entry	$\gamma_6^{G1} + \gamma_8^{G1} - \gamma_5^{G1}$			0.386		0.220			
				(0.2259)		(0.1597)			
	$\gamma_6^{FG} + \gamma_8^{FG} - \gamma_5^{FG}$			0.0435				0.23	
				(0.4094)				(0.2455)	

The table reports two-step System-GMM estimates with finite sample correction on equations 2a and 2b, using different assumptions about the structural break as presented in Section 4. The dependent variable is firm *i*'s investment ratio at time *t*. Standard errors are reported in parentheses. ***, ** and * indicate, respectively, significance levels of <1%, <5% and <10%. AR(1) and AR(2) are tests of the null hypothesis of, respectively, no first or second-order serial correlation. Hansen is a test of the validity of the overidentifying restrictions based on the efficient two-step GMM estimator. Investments, cash flows, and debt are all normalized by beginning of period level of fixed assets and winsorized at the 1% level. Pooled rows refer to coefficients which are assumed to remain constant. Columns (1) and (2) report estimations of the pre and post-investment periods on all VC-backed FCBs. Column (3) reports estimations of the pre and post-investment periods in first generation VC-backed FCBs (i.e G1) and column (4) reports estimations of the pre and post-investment periods in descendant generation VC-backed FCBs (i.e FG). A detailed description of independent variables is available in Table 2