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# Government, venture capital and the growth of European high-tech entrepreneurial firms

Luca Grilli\*, Samuele Murtinu

Politecnico di Milano, Department of Management, Economics and Industrial Engineering, Via R. Lambruschini 4/b, 20156 Milan, Italy

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## ABSTRACT

Using a new European Union-sponsored firm-level longitudinal dataset, we assess the impact of government-managed (GVC) and independent venture capital (IVC) funds on the sales and employee growth of European high-tech entrepreneurial firms. Our results show that the main statistically robust and economically relevant positive effect is exerted by IVC investors on firm sales growth. Conversely, the impact of GVC alone appears to be negligible. We also find a positive and statistically significant impact of syndicated investments by both types of investors on firm sales growth, but only when led by IVC investors. Our results remain stable after controlling for endogeneity, survivorship bias, reverse causality, anticipation effects, legal and institutional differences across countries and over time and are stable with respect to potential non-linear effects of age and size of entrepreneurial firms. Overall, our analysis casts doubt on the ability of governments to support high-tech entrepreneurial firms through a direct and active involvement in VC markets.

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## 1. Introduction

The gap in public and private R&D spending is reputed by policymakers to be one of the main factors that is responsible for the slower growth rate that European economies have been experiencing with respect to international competitors. Although the relationship between R&D and economic growth is far from finding full support in the scientific literature and cannot be considered to be automatic (see, for example, the Swedish case and the R&D-growth paradox discussed in [Dosi et al., 2006](#), and [Ejermeo et al., 2011](#)), the need to increase R&D spending has been at the center of the Communitarian policies since the Lisbon 2000 strategy. In this respect, one important cause that is individuated by the European Commission for explaining the European R&D gap is the low presence of high-tech rapid-growth entrepreneurial firms on the old continent. In the words of the Europe 2020 agenda ([European Commission, 2010](#): p. 10), 'R&D spending in Europe is below 2%, compared to 2.6% in the US. [...] Our smaller share of high-tech firms explains half of our gap with the US'.

One widely shared belief is that the creation of a florid pan-European venture capital (VC) market is a fundamental

pre-requisite to bridging the above-mentioned gap and increasing the European Union (EU) performances in terms of innovation ([Kortum and Lerner, 2000](#)), job creation ([Puri and Zarutskie, 2012](#)) and economic growth ([Samila and Sorenson, 2011](#)).

However, the development of VC markets in the European Member States has been dramatically different from the development that is experienced in the US. The ratio between VC and private equity (PE) investments was estimated in 2009 to be 17% in Europe and 67% in the US,<sup>1</sup> and the overall value of the VC investments over the GDP is nearly three times higher in the US than in Europe ([Bertoni and Croce, 2011](#); [Croce et al., 2013a](#)). The recent financial crisis has further weakened the EU VC fundraising ability in the subsequent years ([Kraemer-Eis and Lang, 2011](#)).

The need for an efficient EU VC market to spur economic growth is well understood at the policy level and has resulted in a series of initiatives (the most important one is the Risk Capital Action Plan in 1998) at various playing field-levels (e.g., measures that aim at increasing stock market openness and/or labor market flexibility or tax incentives), which targeted both the supply of and the demand for VC. According to market operators, even though some structural problems remain (e.g., thin and fragmented exit

\* Corresponding author. Tel.: +39 02 2399 3955; fax: +39 02 2399 2710.  
E-mail addresses: [luca.grilli@polimi.it](mailto:luca.grilli@polimi.it) (L. Grilli), [samuele.murtinu@polimi.it](mailto:samuele.murtinu@polimi.it) (S. Murtinu).

<sup>1</sup> VC investments include seed, early stage and expansion deals. PE investments also include buyout deals (sources: European Venture Capital Association, EVCA; National Venture Capital Association, NVCA).

markets, limited fundraising ability due to different national regulatory regimes), these attempts contributed to strengthening the EU VC markets, especially after the dot-com bubble (EVCA, 2010). Such policy initiatives also led to a specific peculiarity of the EU context: the relative importance compared to other geographical contexts (the US *in primis*) of governmental VC funds (GVCs) (Leleux and Surlemont, 2003). GVCs are not indirect government support programs to stimulate the supply of VC funds managed by independent companies (IVCs), and they are not public subsidies that are directed toward the assistance of high-tech entrepreneurial firms.<sup>2</sup> Instead, GVCs are defined as funds that are managed by a company that is entirely possessed by governmental bodies.<sup>3</sup> Such funds are intended to complement the thin private supply of VC by entering directly into the VC markets and helping to solve the typical chicken-egg paradox of nascent markets—in which the deal flow is scarce because of a shortage of VC and, at the same time, VC is poorly developed because there are few potential viable targets. Examples of such programs in Europe are several. In Belgium, the Biotech Fonds Vlaanderen was founded by the Flemish government in 1994 with the aim of financing promising biotechnology companies and now is managed by another public body: GIMV. In Finland, SITRA (the Finnish Innovation Fund) was founded in 1967 by the Bank of Finland and now is managed by public bodies that are affiliated with the Finnish Parliament. In the UK, Scottish Enterprise is a public agency (born as a merger of the Scottish Development Agency and the Scottish Training Agency), which is almost fully financed by the Scottish government and selects equity investments in promising start-ups. Public initiatives that fall into the definition of GVC are also quite typical in other European contexts (e.g., France, Germany, Italy, Spain, among others), and they share the same mission of nurturing through public equity(-like) investments the development and growth of interesting business projects.

Despite the numeric relevance of GVCs in Europe and their important degree of syndication and co-financing activities with IVCs, there is a total dearth of contributions that evaluate the role that GVCs play in fostering the growth of high-tech entrepreneurial firms in Europe. In fact, the extant empirical literature has prevalently been devoted to examining the characteristics of specific (extra-European) GVC programs or the moderating role that GVCs exert on the (different from growth) performance of firms backed by private VC funds (Brander et al., 2012). Alternatively, previous studies have adopted a macro perspective that highlighted country-specific policy (Cumming and MacIntosh,

2007b) and institutional factors that are aimed at sustaining the European VC industry (Armour and Cumming, 2006; Da Rin et al., 2006).

The present work aims at reducing the above-mentioned gap. Using the VICO dataset, a novel firm-level longitudinal dataset sponsored by the European Union under the 7<sup>o</sup> Framework Program (for more details, see the official website at: <http://www.vicoproject.org>), we assess the impact of GVCs in comparison (and in conjunction) with IVCs on the growth of European high-tech entrepreneurial firms. First, we analyze whether the GVCs and IVCs on their own exert any beneficial effect on the growth of European high-tech entrepreneurial firms. Second, given the existence of co-financing and syndication activities between GVCs and IVCs,<sup>4</sup> we also investigate whether the sequence between the GVC and IVC investments is relevant. In particular, we examine whether significant differences in the firms' growth emerge if a GVC (IVC) investment occurs after an IVC (GVC) investment and whether syndication – the presence of both GVC and IVC in the first VC investment received by a portfolio firm – is otherwise preferable.

The remainder of this paper is organized as follows. Section 2 highlights the background literature. Section 3 describes the data. Section 4 explains the methodology. Section 5 presents the results. Section 6 shows additional evidence and robustness tests. Section 7 concludes.

## 2. Background literature

### 2.1. VC and firm growth

VC is reputed to be the most tailored financing mode for the growth of high-tech entrepreneurial firms, as recognized by academics (Gompers and Lerner, 2001) and (European) policymakers (EU Economic Recovery Plan; European Council, 2008). The available empirical evidence points steadily toward a positive impact of VC on firm growth (e.g., Bertoni et al., 2011; Puri and Zarutskie, 2012). Typically, there are four main reasons that are advocated in support of this positive impact. First, VC investors (VCs) are better at screening entrepreneurial firms that have high-growth potential than are other capital market operators (Sahlman, 1990), and they provide firms with the financial resources that firms need. Second, VCs 'add value' to portfolio companies through the provision of both managerial skills and competencies (Hellmann and Puri, 2002) and the monitoring activity of their managerial conducts and results (Lerner, 1995). Third, VC endorsement represents a 'signal' of the quality of the portfolio firms to uninformed third parties. Hence, VC-backed firms access external resources and competencies that would be out of reach without VC endorsement (Hsu, 2006). Finally, VC-backed firms benefit from the network of business contacts (e.g., suppliers, customers, institutional investors) of their VCs (Hochberg et al., 2007).

### 2.2. Typology of VC and firm growth: IVC and GVC

VCs diverge along several dimensions, including investment targets, screening evaluation methods, skills and competencies, governance mechanisms and objectives. While the extant literature has been focused on how VCs differ in their experience/reputation

<sup>2</sup> With regard to the former type of public support, examples are private/public partnerships in Israel (i.e., the Yozma program: for more details, see Avnimelech and Teubal, 2006); mutual funds in Canada (i.e., the Canadian Labour Sponsored Venture Capital Corporation – LSVCC: for more details, see Cumming and MacIntosh, 2007a, b) and the UK (Cumming, 2003); and limited partnerships in IVCs, in which the government invests alongside other private and institutional investors: e.g., the Australian Innovation Investment Funds (IIFs) (for more details, see Cumming, 2007 and Cumming and Johan, 2012), the Danish fund Vækstfonden, the Fund for the Promotion of Venture Capital in France, the German fund ERP-EIF Dachfonds, and the Dutch fund TechnoPartner Seed facility. With regard to public subsidies that are directed toward high-tech entrepreneurial firms, the main examples are grants (Lerner, 1999, 2002; Wallsten, 2000; Audretsch et al., 2002; Lach, 2002; Gans and Stern, 2003; Colombo et al., 2011, 2013) and tax credits (Hall and Van Reenen, 2000).

<sup>3</sup> This study adopts the prevailing criterion followed by the most known commercial datasets in the field (e.g., Thomson One) that classify the different types of VC funds according to the type of company through which funds are managed. In particular, here we focus on two basic different types of VC funds: funds managed by a company that is entirely possessed by governmental sources (GVCs) and the typical 'US style' independent venture capital funds (IVCs). It is worth noting that we do not have information on the financing sources of the VC funds. In this respect, note that governmental sources are unlikely to represent the major source of independent VC fundraising (see Mayer et al., 2005: p. 591). More importantly, GVCs predominantly invest public financial resources.

<sup>4</sup> We closely adhere to the two definitions that were provided by Tian (2012: pp. 249–250). In particular, our definition of syndication and co-financing refer to his first and second definition of syndication, respectively. It is worth noting that our analysis is not at the round level. Thus, we implicitly assume that IVCs and GVCs syndicate when they invest in the focal portfolio firm in the same year (see Brander et al., 2002 for the same criterion).

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