



Venture Capital in Europe

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Document Identifier

D2.3 Venture capital in Europe

Version

Final

Date Due

M30

Submission date

24-11-2017

WorkPackage

2



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List of abbreviations

CPA	Normalized number of forward citations per article published in each journal and included in the review
EU	European Union
EVS	European Value Survey
FE	Fixed Effects
GDP	Gross Domestic Product
GLS	Generalized Least Squares
IPO	Initial Public Offering
M&As	Mergers & Acquisitions
RE	Random Effects
SEM	Structural Equation Modeling
U.S.	United States
VC	Venture Capital

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1. Executive summary

Entrepreneurship has been documented to be an important part of economic systems' efficiency, and one of the main engines of economic growth. One of the critical aspects of entrepreneurial success is access to financial resources. New innovative ventures, however, are often capital constrained as they by definition do not have a track record of past success (and hence reputation and credibility), neither they can offer tangible resources as collateral to traditional capital providers (e.g. banks). The barriers of information asymmetry and uncertainty perceived by debt providers has led to the establishment of specialized financial intermediaries called Venture Capital (VC) firms, more capable to overcome the hurdles and more prone to provide these inherently risky investments. Venture Capital as an industry exists for more than 50 years. While VC has flourished in the United States, it has only moderately developed in other geographical areas, despite numerous trials of governments to foster it. Europe does not represent an exception, where only a few countries (e.g. United Kingdom and Sweden) have managed to develop the VC industry to a reasonably high level. Instead, the continental European countries have shown relatively little activity (e.g. France, Italy, Spain), or even close to none (Greece, Poland, Czech Republic, Romania). Vast research endeavours have been carried out to understand the antecedents, barriers and facilitators of the industry, and the variations of degree of development and performance of the industry. Notwithstanding, there has only been a limited effort in the literature to systematize what we know (and what we do not know) about the institutional factors that spur VC activity. This study, which is made by two related papers, tries to close that gap, first through a systematic survey of the existing literature on the institutional and related determinants of VC activity. Grounding on the seminal work of North (1990), we consider formal (e.g., laws and formal rules) and informal (e.g., cultural norms and tacit codes of behaviour) institutions. Building on that careful review, our first paper proposes interesting avenues for future research in this domain, and highlights the unexplored determinants in the European environment. The second part of this study tries to address this latter issue. In particular, the focus of the to-date EU studies of VC activity has been rather limited and accounted almost exclusively for formal features of institutional environments, leaving the informal dimensions unexplored. We posit and show evidence that informal institutions represent relevant determinants of VC activity. Based on longitudinal country-level data on 18 European countries during the 1997-2015 period, we first explore whether the "usual suspects" mostly embodied in *reformable formal institutions* (i.e. investors protection laws, taxation regulations, labour market regulations) really play a role in the European context. Then, we investigate whether social capital, a prominent and rooted informal institutional feature, may exert a significant effect too. Finally, we test how *structural formal institutions* (e.g. rule of law, government effectiveness, etc.) influence the development of VC industry. Interesting findings emerge, yielding useful implications for regulators. The results indicate that the social capital does indeed play a role in VC activity. To that end, policy makers should be mindful about the features of informal institutions within which they operate, as social capital can be an insurmountable impediment (or also a facilitator) for fostering smoother entrepreneurial finance dynamics in the long-term. Moreover, we find evidence that the impact of social capital structures on VC is mainly channeled through their role in establishing those *structural formal institutions* which are keen on the development of VC. If structural formal institutions might be relatively easier to change than social capital, at least in the mid-term, nonetheless the picture that emerges from our analysis is the one for which VC is mostly influenced by deeply rooted (formal and informal) institutional features which are impervious to change. In this respect, the only *reformable formal institution* that is found to exert a non-negligible effect is taxation regulation. While, reforms aiming at increasing flexibility

in labour markets or investors' protection do not appear to provide an effective stimulus for VC industry in Europe. This way, we provide scientific insights on the reasons why most European countries have struggled to trigger and sustain a florid VC industry, despite all the governmental efforts lavished over the years. By doing so, we draw two important implications. On the one hand, informal and structural institutions do represent the most important drivers for VC and these have to be taken into account by policy makers, at least in the short-term, as "matter of facts". We believe that this awareness should lead European administrators to divert their exclusive attention to VC as the only best financial model, and instead push them to monitor with increasing interest (and probably regulate appropriately) all those different recent financial mechanisms (e.g. crowdfunding, blockchain) that may revolutionize in the near future the way start-ups finance themselves and that might be more favorable to the European landscape than VC. But, on the other hand, our analysis also sets a precise order of priorities on which *reformable formal institutions* have to be modified for sustaining VC, at least in the short-term. In this respect, if a generalized reduction in the (capital gains or corporate income) taxation levels could simply be unfeasible in most European countries, our analysis suggests that also vertical ad-hoc policy interventions in this domain could be equally effective. For example, all those VC-specific policies which aim at removing tax obstacles for VCs across EU countries and offer specific tax deductions to selected typologies of equity investors and innovative investee start-ups should be particularly welcome.

2. Institutional determinants of venture capital activity: a literature review and a research agenda

2.1. Introduction

Venture capital (VC) is the “professional asset management activity that invests funds raised from institutional investors, or wealthy individuals, into promising new ventures with a high growth potential” (Da Rin et al., 2013). Generally, VC firms are partnerships composed by few partners (‘the general partners’, GPs) that raise money from institutional investors and wealthy individuals (the ‘limited partners’, LPs). The typical time span of the raised fund ranges from seven to ten years. During this period, VC firms make the selection of portfolio companies, monitor, mentor and provide value-added services to them (Hellmann and Puri, 2002; Lerner, 1995), and ultimately exit from the companies, distributing the returns between LPs and themselves. VC investors are often considered as the preferred intermediary in the financing of young and risky high-tech start-ups, which would otherwise experience difficulties in attracting traditional sources of financing (Gompers and Lerner, 2001). Moreover, the available empirical evidence points steadily toward a positive impact of VC on a series of economic performances, both at micro-level (e.g., firm growth and innovativeness: Kortum and Lerner, 2000; Puri and Zarutskie, 2012) and at macro-level (e.g., entrepreneurship rates, employment, aggregate income, see for example Samila and Sorenson, 2011).

Venture capital, as we consider it nowadays, is an American “invention” that emerged after the Second World War. The first venture capital firm was American Research and Development (ARD), established in 1946 by MIT President Karl Compton jointly with a professor Georges F. Doriot at Harvard Business School, and a few local businessmen. They made investments in high-risk companies that exploited technology developed during World War II. Following initial uncertainty and the adoption of different organisational models (see Gompers and Lerner, 2001 for a review of the early history), the United States (U.S.) VC firms rapidly evolved towards a consolidated organisational model, which comprises limited partnership with a closed-end structure (Gompers and Lerner, 2001).

While remaining a “cottage” industry until the late seventies (Gompers, 1996), the industry took off starting from the eighties and despite it went through several upturns and downturns since then, it has grown substantially. Accordingly, a notable portion of the present-day successful American tech companies have received venture capital in their start-up phase. The list includes Microsoft, Cisco Systems, Apple Computer, Sun Microsystems, Amazon, and many others.

In spite of its strong geographical locus (most of the investments were made and still are prevalently localized in California and Massachusetts) and technological focus (IT and biotech are the preferred target industries), there were numerous attempts to replicate and export this model of financing for new high-tech ventures in countries around the world with a plethora of policy initiatives aimed at incentivizing the birth and consolidation of thriving VC industries. Apart from some remarkable exceptions (e.g., Israel, Sweden, United Kingdom), the results were highly unsatisfactorily. VC is still very much a U.S.-centric industry, with the U.S. accounting for nearly 70% of the global worldwide activity (Ernst and Young, 2014). Looking at Europe, the venture capital industry is less than one-fourth compared to the U.S. (Ernst and Young, 2014; Grilli and Murtinu, 2014), and the performance is clearly highly heterogeneous across (as well as within) the different EU Member States. Other geographical areas (e.g., Asia *in primis*) are gaining momentum mainly because of an increasing internationalisation trend in the industry (Wright et al., 2005; Guler and Guillén, 2010), but their performance to date are incomparably lower than the Western countries (Preqin, 2015).

The disappointing results and the importance of the issues at stake have resulted in a growing number of studies on the institutional factors that may foster or hamper the birth and development of the VC industry in multiple fields (management, economics, entrepreneurship, finance) and the evidence provided is still inconclusive. Moreover, there has been no effort in the extant scientific discourse to systematise the existing evidence and developed knowledge.¹ For instance, in their otherwise complete review of the venture capital literature, Da Rin et al. (2013), do not take into consideration this crucial aspect. Furthermore, the work of Andrieu (2011) scrutinizes the existing scientific evidence on VC with a narrow perspective on organizational differences between VC firms. With the present work, we aim at filling this gap by means of a systematic survey of the existing literature on the topic. In this study, we portray the influence of institutions, both formal (e.g., laws, rules and regulations) and informal (e.g., cultural norms, tacit codes of conduct), to examine their impact on the development of the VC industry. This holistic overview may facilitate the identification of interesting avenues for future research.

The remainder of paper is organized as follows. Section 2 describes the theoretical considerations on how the institutional environment can shape the development of VC. Section 3 examines the methodology we followed for enucleating the scientific articles of interest. The results of the literature overview are presented in Section 4. Section 5 is devoted to the critical discussion of the results and it aims at suggesting a future research agenda. Finally, the concluding remarks are reported in Section 6.

2.2. Defining boundaries: institutions and venture capital

In economics, the scholars draw on the definition of North (1990), who defines institutions as “*the humanly devised constraints that shape human interaction*” (North, 1990, page 3), and divides them into two broad groups - formal and informal. In particular, formal institutions constitute a group of economic, political and contractual rules, whereas the informal ones include social norms, codes of behaviour, and conventions embedded within a cultural heritage of a specific geographical context (North, 1990; 1994, page 360). According to Hofstede et al. (2010), formal institutions have to necessarily fit in a cultural setup because political, economic and contractual rules are all connected to peoples' conceptions of how things ought to be done. As a result, the same formal institutions that exist in societies with different cultural values can produce different economic outcomes (North, 1990). In other words, the two groups of institutions shape individual characteristics and determine behaviour in a society, both independently as well as in combination; they are strongly intertwined (Hall and Soskice, 2001; Li and Zahra, 2012, page 97).

There is a general agreement in the literature that the supply and the allocation of entrepreneurial capabilities in a society are influenced by institutions (e.g., Acs et al., 2008; Baumol, 1990; 1993; Sobel, 2008). Moreover, the literature on entrepreneurship points to a plethora of formal rules of particular relevance for the development of entrepreneurship: the protection of property rights, savings policies, taxations as well as regulation of labour markets (Henrekson, 2007, page 1).

¹ There is a modest number of literature reviews produced so far, which overview the development of the venture capital industry in general, but without a delimited and exhaustive focus on the institutional drivers behind this specific typology of investment. One of the first example includes Gompers and Lerner (2001), then followed by Gompers (2007). The immense scientific work on VC contracts has triggered surveys of literature on the same topic, one conducted by Tykvová (2007) and the other from Zambelli (2014). Jääskeläinen (2011) clusters literature on syndication, one of the most integral components of VC activity. Among the most recent attempts to systematize research on the equity investment for start-ups in several different aspects (e.g., Kaplan and Strömberg, 2009; Metrick and Yasuda, 2011; Kerr and Nanda, 2011), one study which is close in spirit to the present work is Lerner and Tåg (2013). In this case, while authors enquire about the institutional causes that may lead to the development of VC, they confine their analysis to the comparison between the U.S. and Sweden, without enlarging their perspective and analysing evidence produced in other institutional contexts.

Nevertheless, there are also informal institutions that play a significant role in the entrepreneurial dynamics: they represent the degree to which a society is oriented to and approves entrepreneurial behaviour (e.g., Beugelsdijk, 2007).

As to entrepreneurial finance, ever since the works of Schumpeter (1934), availability and access to financial resources have been identified as a critical determinant of entrepreneurship and technological innovation. The information asymmetries between new ventures and suppliers of capital, particularly the debt providers which are caused by the absence of a firm's track record of past success, its alleged lack of credibility, the typical low ratio between tangible and total assets of many high-tech businesses in their infant stage, where intangibles can hardly be used as collateral-, are usually shown to be large and relevant (Hall and Lerner, 2010). The market failure prevents start-ups from accessing traditional sources of funding, i.e. banks *in primis* (Ghosh and Nanda, 2010; Murphy and Edwards, 2003). In this respect, VC funds are supposed to be able to overcome the typical financing hurdles of promising innovative start-ups. In fact, VC managing partners are commonly reputed to be capable of mitigating information asymmetries, take higher risks and invest in highly innovative and uncertain projects (Nahata, 2008). First, by usually being experts in the field or experienced entrepreneurs themselves, they may better comprehend the intangible value and potential of the new innovative ventures, and by that alleviate the problem of adverse selection. Then, by becoming shareholders and active managers, and by sustaining frequent interactions, they may reduce the moral hazard concerns (Jeng and Wells, 2000; Hellmann et al., 2000; Hellman and Puri, 2002; Baum and Silverman, 2004). Venture capital is hence argued to be a critical component of an advanced entrepreneurial ecosystem. However, despite the advantages with respect to the traditional sources of start-up funding, VC activity is still a process inherently accompanied by information asymmetries and potential opportunistic behaviour (Amit et al., 1998; Gompers, 1995; Wright et al., 2005; Zacharakis et al., 2007). To that end, previous research has well documented the role of formal institutions in mitigating market imperfections relevant for VC. One case that relates to information asymmetries as well as to possible opportunistic behaviour by the involved parties are represented by the venture capital contracts, which are specifically designed and detailed to overcome such problems. Several contract features are directly intended to reduce the transaction costs and are usually related to control allocation (Chan et al., 1990), staging (Neher, 1999; Sahlman, 1990), syndication (Brander et al., 2002), and convertible securities (Repullo and Suarez, 2004) for the investor(s). Of course, such contract properties can only be viable and enforced in the presence of effective political and economic institutions (Li and Zahra 2012). Accordingly, the literature identifies multiple features of an institutional environment that might be relevant for the well-functioning of VC industry. Primarily, formal institutions such as government quality, fiscal policy, legal system structure, labour market regulation and the structure of financial markets are reputed to have pertinent influence. In addition, the literature, albeit in a smaller volume, proposes several dimensions of informal institutions, i.e. willingness of individuals to engage in entrepreneurship, cultural attitudes inherited in societies, dimensions of social capital (trust, networks, participation in civic life) as significant determinants of VC activity. This literature on the informal institutional determinants of VC activity is by far less conspicuous than the one pointing to formal institutions, but it is still present and, accordingly, will be taken into duly consideration in our review effort.

2.3. Methodology and bibliometric analysis

2.3.1. Search methodology

We pursue three objectives: (i) to systematise all the scientific empirical evidence produced to date on the institutional determinants of VC activity; (ii) to critically appraise the current state of the literature and (iii) to guide an agenda that reports the gaps and new avenues for future research. In order to comprehensively do that, principles of systematic review suggested by Tranfield et al. (2003) were followed. This approach helped us establish a complete list of all peer-reviewed and non-peer-reviewed studies (Cronin et al., 2008, page 39) – so that we made sure to cover a large-scale of works in the respective field. We limited our focus on the literature produced from the year 1998 onward, aligned with the timing of the development of the related scientific discourse. Guided by the objective of creating a reliable and reproducible literature review, a list of pre-designed steps have been specified. The first step was the systematic search of the literature in the largest international bibliographic databases (Scopus and ISI Web of Science) and Science Search Engines (Google Scholar), based on a keyword search (see Ely and Scott, 2007). The primary combination of keywords included the terms “*venture capital*” and “*determinants*”. In order to be more inclusive, we also searched for synonyms of the original keywords (i.e. “*equity capital*”, “*risk capital*”, “*smart capital*”, “*backing capital*” and “*seed capital*” for “*venture capital*”, and “*antecedents*”, “*drivers*”, “*driving forces*”, “*motivators*”, “*promoters*”, “*supporting programs*” and “*institutions*” for “*determinants*”). After a preliminary screening of the abstract of the emergent articles, 532 of them were pre-selected. The whole procedure of papers’ selection is illustrated in Figure 1.

In the second step, out of the initial pool of articles, a total of 99 unique contributions were assessed to be relevant for the survey following a strict pre-defined inclusion criteria in line with the research objectives. Table 1 illustrates that these research endeavours include quantitative and qualitative empirical studies that provide novel and concrete evidence on the phenomenon under investigation – which basically is our first inclusion criterion.² The other criterion for the inclusion of scientific articles is the nature of their dependent variable - venture capital activity as defined in Section 1. The last important issue with the selection of the papers relates to the geographical context covered by a certain study. To be selected papers had to study and report original evidence on the relationship between institutions and VC activity in a particular country or region.

Table 1.
Inclusion criteria for the literature review.

No.	Inclusion criteria	Description
I	Empirical studies	Include the qualitative and quantitative (i.e. empirical) articles that provide novel and concrete evidence on the topic.
II	Dependent variable	Include the articles if their dependent variable is venture capital activity within the scope of the definition that we employ in this work.
III	Geographical dimension	Include the articles that provide novel and concrete evidence for specific geographical regions.

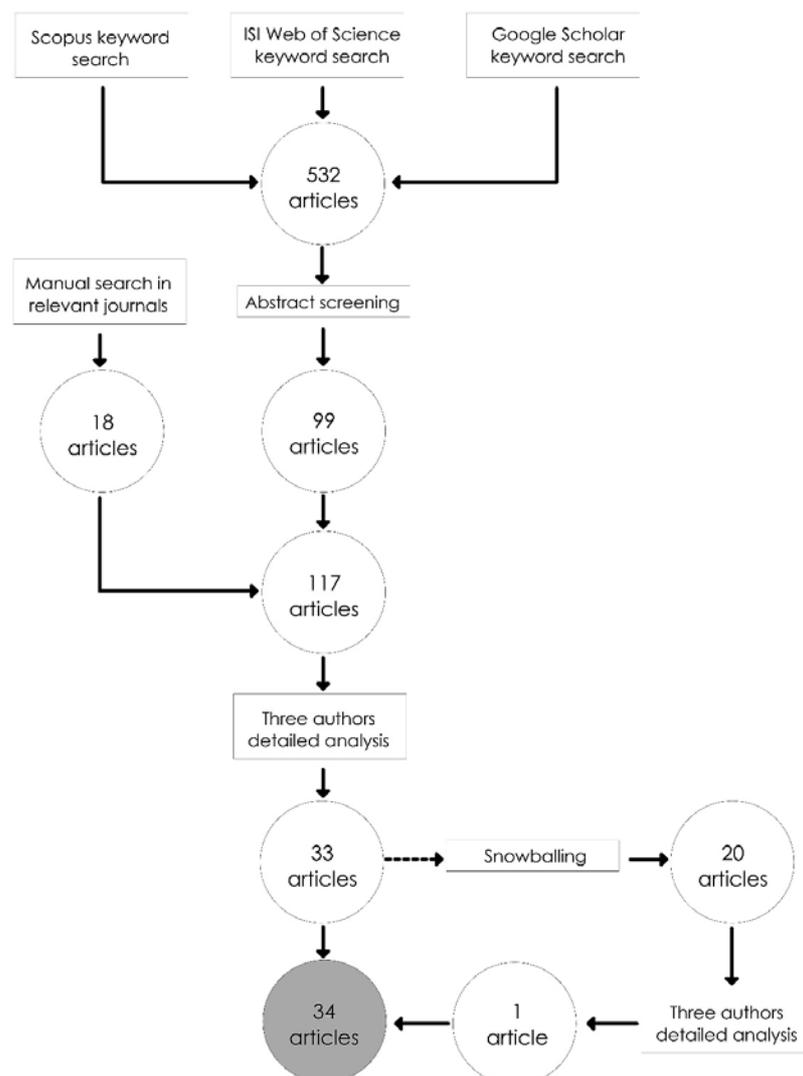
Third, we manually reviewed key journals in the fields of management, economics, entrepreneurship and finance to assure that no relevant work was overlooked. We found 18 more potentially

² This restriction implies exclusion of all purely speculative papers, literature reviews and other works of an anecdotal nature such as essays, personal opinions and perspectives due to the difficulties on the judgement of this type of work (Colling, 2003, page 297).

appropriate articles. This pool of 117 manuscripts was separately analysed in details by all three authors of this paper (to avoid any bias), who assessed whether the articles should (or should not) be included in the review based on pre-defined inclusion criteria. A paper was included in the final sample only if all three researchers would agree upon its relevance for the survey.

Finally, we employed a supplementary procedure called snowballing technique (Greenhalgh and Peacock, 2005) by examining the backward citations of the selected articles. This step yielded one more original article. In total, 34 empirical articles were included in the survey: 28 quantitative articles and six of a qualitative nature.³

Figure 1.
Key steps in the process of article search.



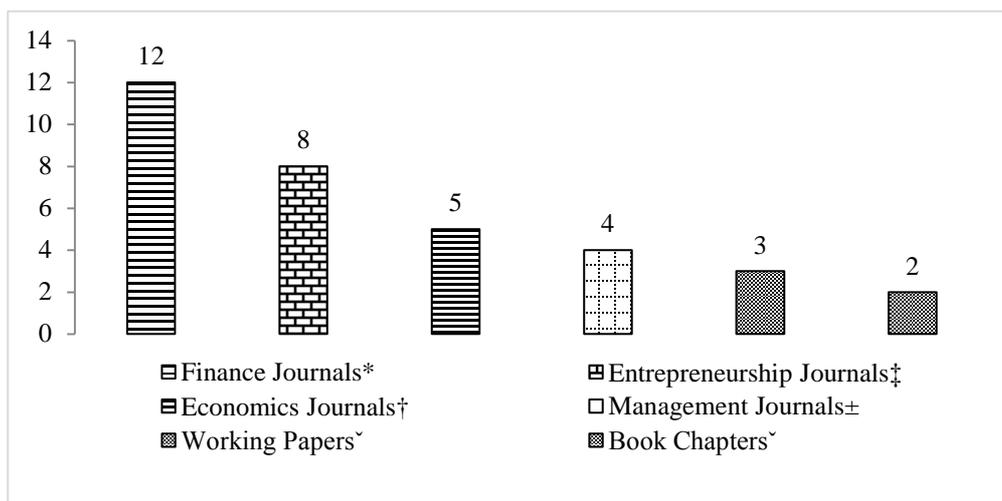
³ In order not to overlook any potentially influential contribution, we also include in our literature review research products such as book chapters and works in progress published in well-known economics and management repositories (e.g., Ideas Repec, SSRN).

2.3.2. Bibliometric analysis

In order to make the literature review more complete, a bibliometric analysis is also performed. The outcome of such analysis may help us to better highlight the relevant dynamics in the field. Specifically, we investigated the patterns of publications over journals, the structure of backward and forward citations and the co-authorship relationships, the evolution of publication trends and methodological approaches over time. For such kind of analysis, we use the software BibExcel (Persson et al., 2009).⁴

Figure 2 reports four subject areas (containing 21 different journals) where the 34 articles included in the present literature review have been published from 1998 to 2016. Most of the articles (35%) are published in the finance journals (12 articles), the entrepreneurship journals account for 23,5% of the articles in the sample (eight), followed by the economics journals with 14,7% (five) and the management journals with 11,7 % (four). The remaining consists of 14,7% of total works (two book chapters and three working papers). This distribution testifies that the investigation of the institutional determinants of VC has been relevant to different streams of research, with only a slight relative prominence of the finance domain.

Figure 2.
Number of reviewed articles by subject area/type of publication outlet.



*Notes: * Finance Journals include: Emerging Markets Review, International Journal of Banking, Accounting and Finance, International Review of Financial Analysis, Journal of Corporate Finance, Journal of Financial Economics, Journal of Financial Services Research, Research in International Business and Finance, Review of Financial Studies, Venture Capital;*

† Economics Journals include: Journal of Economics and Management Strategy, Journal of Public Economics, Socio-Economic Review, Oxford Economic Papers, Industrial and Corporate Change;

‡ Entrepreneurship Journals include: International Entrepreneurship and Management Journal, Small Business Economics, Journal of Business Venturing, Entrepreneurship Theory and Practice;

± Management Journals include: Journal of Business Ethics, International Journal of Public Sector Performance Management, Journal of International Business Studies.

Indeed, research on the institutional mechanisms behind VC has attracted an increasingly interest from scholars of diverse disciplines over the past few years, with a growing number of published

⁴ Ghio et al. (2015) and Raasch et al. (2013) chose a similar approach.

papers. If the first publication is dated on 1998 out of the 29 journal articles published since then, more than one-third (12 articles, 41.4%) appeared in the time span 2013-2016.

In order to gain more insights on the scientific impact of the reviewed publications, Table 2 presents the number of articles per each journal, the total number of forward citations received by the articles of each journal (as of December 2016), the normalized number of forward citations per article published in each journal and included in the review (CPA, see Croce et al. 2017 for an analogous use of the index), and finally, the journal impact factor (last available year: 2016). The *Journal of Business Venturing* is the most active journal counting a total of four published articles. On average, these articles exerted a considerable impact, with a CPA equal to 8.5% citation per article, (i.e. on average an article in that journal is responsible for 8.5% of all the forward citations received by the reviewed articles). Then, two articles have been also published in the *Journal of Corporate Finance* (with a CPA of 14%), the *Journal of International Business Studies* (CPA of 5.6%), and also two articles were published in *Small Business Economics*. This latter journal shows a relatively low CPA (0.3%), especially when compared with the typical impact of an article published in that journal (Scopus impact factor is 4.3). Less differences in this respect are observable for other scientific outlets. Only one article was published in the *Journal of Financial Economics*, but it had a dramatic impact with a CPA of 39%. Similar behaviour is observed in the *Entrepreneurship Theory and Practice* (CPA of 7.4% and an impact factor of 5.2) and the *Journal of Public Economics* (CPA of 8.9% and an impact factor of 7.2) with only one published article each. As a matter of fact, most of the journals count for just one article, testifying the variety of channels through which research endeavours might be delivered to the community also *within* the same scientific discipline. Simultaneously, a specific entrepreneurship journal, i.e. the *Journal of Business Venturing*, is undoubtedly the one that has contributed more to constitute the empirical evidence on the institutional determinants of VC activity.

Table 3 presents the 20 most cited articles. The table also reports the citations per year for each article (CPY) in order to avoid any bias that could unfairly support eldest publications. The results are revealing in several ways: first, two of the oldest articles (Black and Gilson, 1998; Jeng and Wells, 2000) are the most cited ones, both in terms of total and CPY citations. Second, looking at the topics that these most cited literature address, we find a confirmation that the *informal* institutional dimension is of high relevance in terms of the scientific interest generated. In fact, out of nine articles that consider informal institutions in their analyses, seven (77.7%) of them are ranked in the top 20 most cited articles (in terms of both total citations and CPY).⁵ Interestingly, the recent analysis of Bottazzi et al. (2016) who investigate trust as an important aspect of the local presence of VC activity has received nine citations in its first year of appearance.

⁵ In order to be instrumental to the aim of this study, it is relevant to investigate the theoretical premises under which the studies are rooted. We expect most of the studies to originate on the seminal works of North (1990) on institutions from the economic point of view. However, when we looked manually the frequency of citations, we uncovered also Scott (1987, 1995) from sociological point of view to be cited. From 34 scientific works on VC and Institutions literature, we find 10 studies citing North (three times exclusively). Together with Scott (1987, 1995), North (1990) was cited five times whereas together with Fukuyama (1995), two times. Interestingly, North is likely to be considered especially when the literature investigates the role of both formal and informal institutions.

Table 2.
Number of reviewed articles by publication release.

Variable	No. of articles	No. of citations	CPA%	Scopus impact factor (2016)
Journal of Business Venturing	4	445	8.5	7.2
Venture Capital	3	87	2.2	2
Journal of Corporate Finance	2	367	14	1.8
Journal of International Business Studies	2	148	5.6	7.2
Small Business Economics	2	8	0.3	4.3
Journal of Financial Economics	1	510	39.0	5.4
Oxford Economic Papers	1	118	9.0	1.7
Entrepreneurship: Theory and Practice	1	116	8.9	7.2
Journal of Public Economics	1	98	7.5	5.2
Industrial and Corporate Change	1	22	1.7	5.2
Review of financial studies	1	9	0.7	4.1
Research in International Business and Finance	1	8	0.6	7.2
Journal of Economics and Management Strategy	1	7	0.5	1.8
Journal of Financial Services Research	1	6	0.4	2
International Journal of Banking, Accounting and Finance	1	6	0.4	1.9
Emerging Markets Review	1	2	0.1	1.3
Socio-Economic Review	1	2	0.1	2
International Journal of Public Sector Performance Management	1	2	0.1	1.3
International Review of Financial Analysis	1	1	0.1	3.4
Journal of Business Ethics	1	0	0	0.2
International Entrepreneurship and Management Journal	1	0	0	2.6
Total	29	1962	100	

Notes: Number of citations refers to December 31/12/2016.

Table 3.
Top 20 most cited articles by number of forward citations and by CPY.

Rank	Top 20 per forward citations		Top 20 per CPY	
	Authors	Cit.	Authors	Cit.
1	Black and Gilson (1998)	510	Black and Gilson (1998)	26.8
2	Jeng and Wells (2000)	318	Jeng and Wells (2000)	18.7
3	Bruton and Ahlstrom (2003)	186	Bruton and Ahlstrom (2003)	13.3
4	Armour and Cumming (2006)	118	Guler and Guillén (2010)	11.7
5	Ahlstrom and Bruton (2006)	116	Li and Zahra (2012)	11.2
6	Leleux and Surlemont (2003)	111	Armour and Cumming (2006)	10.7
7	Da Rin et al. (2006)	98	Ahlstrom and Bruton (2006)	10.5
8	Cumming and MacIntosh (2006)	92	Bottazzi et al. (2016)	9
9	Guler and Guillén (2010)	82	Da Rin et al. (2006)	8.9
10	Bruton et al. (2002)	80	Cumming and MacIntosh (2006)	8.3
11	Bruton et al. (2009)	66	Bruton et al. (2009)	8.2
12	Li and Zahra (2012)	56	Leleux and Surlemont (2003)	7.9
13	Groh et al. (2010)	49	Groh et al. (2010)	7
14	Lerner and Tåg (2013)	22	Lerner and Tåg (2013)	5.5
15	Bottazzi et al. (2016)	9	Bruton et al. (2002)	5.3
16	Aggarwal and Goodell (2014)	8	Aggarwal and Goodell (2014)	2.7
17	Bozkaya and Kerr (2014)	7	Bozkaya and Kerr (2014)	2.3
18	Groh and Liechtenstein (2011a)	7	Félix et al. (2013)	1.5
19	Félix et al. (2013)	6	Groh and Liechtenstein (2011a)	1.2
20	Bonini and Alkan (2012)	6	Bonini and Alkan (2012)	1.2

As what regards the analysis of backward citations, our reviewed articles count around 1,317 non-duplicated backward citations. In Table 4 we classify the 10 most cited studies. Backward citations are treated as internal (external) if an article cites another article included (excluded) in the current literature review. The three most cited articles in our review are indeed internal studies. Interestingly, the seminal work of Jeng and Wells (2000) figures at the top with 21 citations, while the other seminal contribution of Black and Gilson (1998), which is by far the most cited in general (see Table 3), has attracted relatively less attention by the studies of our literature review and does not even figure in Table 4. Then, all the other most cited external references are quite close to the VC literature, and especially refer to the economics and finance streams.

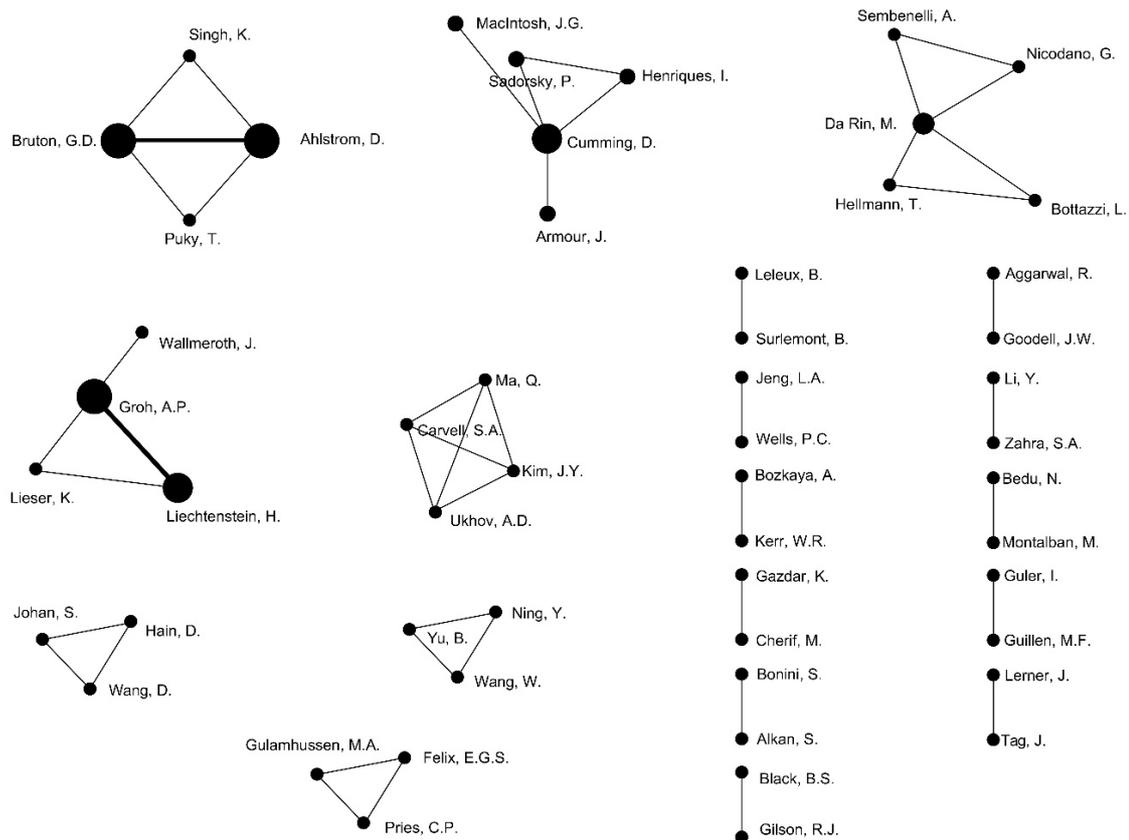
Table 4.
Top 10 most cited articles by number of backward citations.

Authors	Backward Citations
Jeng and Wells (2000) *	21
Armour and Cumming (2006) *	9
Da Rin et al. (2006) *	7
Keuschnigg and Nielsen (2003) †	7
Bruton and Ahlstrom (2003)*	5
Kaplan and Stromberg (2003) †	5
Gompers and Lerner (2001) †	4
Cumming et al. (2006) †	4
Lerner (2009) †	4
Ahlstrom and Bruton (2006) *	3

Notes: * internal papers (papers that are included in the literature review);
 † external papers (papers that are not included in the literature review).

In Figure 3 we analyse co-authorship networks, showing clusters compiled by two and more authors of the reviewed articles. Interestingly, the field has been covered by several scholars which appear only loosely connected. In general, clusters are formed by a small number of researchers (i.e. the most populated ones count from four to five researchers) and inter-cluster connections are also rare. The most prolific authors turn out to be Gerry Bruton and David Ahlstrom (four articles), Alexander Groh (four articles), Douglas Cumming (three articles), Heinrich Liechtenstein and Marco Da Rin (two articles).

Figure 3.
Co-authorship analysis.



Notes: Unpublished working papers (3 articles) and book chapters (2) are excluded from this analysis.

Finally, we have also analysed the approaches used by the reviewed articles. Over the course of the last two decades, empirical research on the institutional determinants of VC has employed both quantitative and qualitative methods. Admittedly, quantitative approaches prevail accounting for 82.4% of the articles (28 studies out of 34). While qualitative case studies are a minority (17.6%), they are particularly concentrated in the investigation of the role of informal institutional characteristics as promoters of VC activity. Specifically, these studies unfold evidence on the role of networks on the relationship between venture capitalists and new entrepreneurs. One possible reason for this clustering is related to the fact that such aspects are indeed examined most effectively through the qualitative means, considering that they deal with complex social issues.

2.4. Formal and informal institutions as determinants of VC

In this section, we report an elaborate and critical review of the existing research on the institutional determinants of VC. All 34 surveyed papers are presented in the Appendix, together with a basic

description illustrating their unit of analysis, data and methodology used by these studies, how VC activity was measured and which formal and informal institutions were considered. Here below, following Cowell (2012, page 60), we classify this literature review with respect to the content, which yielded three broad thematic groups. First, we present evidence regarding *formal* institutions as VC determinants, by distinguishing three different subgroups: *regulatory institutions*, *government quality*, and *financial market conditions*. Second, we provide an elaboration of the articles that account for the *informal* institutions. In this regard, three main subgroups are identified: *entrepreneurialism* (i.e. the propensity of individuals to start a firm), *cultural dimensions*, and *social capital*. Finally, we present other contextual determinants that are in addition found to play a role in the appliance of VC activity. A cumulative summary of the articles with respect to the above-mentioned institutional classification is illustrated in Table 5, together with the evidence on their impact on VC activity.⁶ This process enables us to depict a clear synopsis of the focal points of research and to identify under-investigated relationships and research gaps.

Table 5.
Empirical findings of articles included in the literature review, classified with respect to the type of institutional dimension they investigate. The dependent variable is VC activity.

Row No.	Type of institution	Negative impact (-)	No significant impact (0)	Positive impact (+)
[1]	FORMAL INSTITUTIONS			
[2]	Regulatory institutions			
[3]	Fiscal Policy			
[4]	<i>High corporate capital gain tax</i>	Bedu and Montalban (2014); Da Rin et al. (2006); Gompers and Lerner (1999).	Jeng and Wells (2000)	
[5]	<i>High corporate income tax</i>	Bonini and Alkan (2012); Bedu and Montalban (2014); Romain and van Pottelsberghe (2004); Schröder, C. (2011); Groh and Wallmeroth (2016).	Groh and Wallmeroth (2016).	
[6]	Other regulatory aspects			
[7]	<i>Legal system structure (English)</i>		Aggarwal and Goodell (2014); Bottazzi et al. (2016).	Bonini and Alkan (2012); Guler and Guillén (2010); Hain et al. (2016); Jeng and Wells (2000); Leleux and Surlemont (2003).
[8]	<i>Investor protection</i>		Cumming et al. (2016); Jeng and Wells (2000).	Aggarwal and Goodell (2014); Bedu and Montalban (2014); Groh and Wallmeroth (2016).
[9]	<i>Liberal bankruptcy law</i>			Armour and Cumming (2006)

⁶ Since a precise impact of each institution driver can be detected only in the case of quantitative evidence, this analysis is confined only to quantitative studies.

[10]	<i>Rigid labor market regulations</i>	Bonini and Alkan (2012); Bozkya et al. (2014); Da Rin et al. (2006); Félix et al. (2007); Groh and Wallmeroth (2016); Jeng and Wells (2000); Romain and van Pottelsberghe (2004).	Bedu and Montalban (2014).	Schertler (2003).
[11]	<i>Pension investments</i>		Bedu and Montalban (2014); Jeng and Wells (2000).	Gompers and Lerner (1999).
[12]	Government quality			
[13]	<i>Governmental programs</i>	Armour and Cumming (2006); Cumming and MacIntosh (2006); Lelux and Surlemont (2003)		Da Rin et al. (2006).
[14]	<i>Governmental effectiveness</i>			Cherif and Gazdar (2009); Cumming et al. (2016).
[15]	<i>Regulatory quality</i>		Cumming et al. (2016).	Cherif and Gazdar (2009).
[16]	<i>Rule of law</i>	Cherif and Gazdar (2009)	Jeng and Wells (2000).	Cumming et al. (2016).
[17]	<i>Political stability</i>		Bonini and Alkan (2012); Hain et al. (2016); Cumming et al. (2016).	Cherif and Gazdar (2009); Guler and Guillén (2010).
[18]	<i>Voice and accountability</i>		Cumming et al. (2016).	Cherif and Gazdar (2009).
[19]	<i>Corruption</i>	Groh and Wallmeroth (2016).	Bonin and Alkan (2012); Cumming et al. (2016).	Cherif and Gazdar (2009).
[20]	<i>World Governance Index¹</i>			Li and Zahra (2012).
[21]	Financial market conditions			
[22]	<i>Stock market development</i>	Félix et al. (2013).	Bonini and Alkan (2012); Hain et al. (2016); Jeng and Wells (2000).	Armour and Cumming (2006); Bonini and Alkan (2012); Black and Gilson (1998); Carvell et al. (2013); Cumming and MacIntosh (2006); Cumming et al. (2016); Da Rin et al. (2006); Gompers and Lerner (1999); Groh and Wallmeroth (2016); Guler and Guillén (2010); Ning et al. (2015); Li and Zahra (2012); Schertler (2003); Schröder, C. (2011).

[23]	<i>IPO activity</i>		Gompers and Lerner (1999); Jeng and Wells (2000).	Black and Gilson (1998); Bonini and Alkan (2012); Carvell et al. (2013); Félix et al. (2013); Ning et al. (2015).
[24]	<i>M&A activity</i>			Félix et al. (2013) (size of M&A); Groh and Wallmeroth (2016).
[25]	INFORMAL INSTITUTIONS			
[26]	Entrepreneurialism	Félix et al. (2013).	Armour and Cumming (2006); Li and Zahra (2012).	Bonini and Alkan (2012); Romain and van Pottelsberghe (2004).
[27]	Other cultural attitudes			
[28]	<i>Uncertainty avoidance</i>	Aggarwal and Goodell (2014); Cumming et al. (2016); Li and Zahra (2012).		
[29]	<i>Individualism</i>		Aggarwal and Goodell (2014).	Li and Zahra (2012).
[30]	<i>Power distance</i>		Aggarwal and Goodell (2014).	
[31]	<i>Masculinity</i>	Aggarwal and Goodell (2014).		
[32]	<i>Cultural distance (in terms of the four cultural dimensions)</i>	Hain et al. (2016).		
[33]	<i>Corruption perception</i>	Hain et al. (2016).		
[34]	Social Capital			
[35]	Trust			Bottazzi et al. (2016), Hain et al. (2016).
[36]	CONTEXTUAL DETERMINANTS			
[37]	Technological opportunities			
[38]	<i>Innovation and R&D</i>		Bonini and Alkan (2012).	Da Rin et al. (2006); Félix et al. (2013); Gompers and Lerner (1999); Groh and Wallmeroth, (2016); Romain and van Pottelsberghe (2004); Schertler (2003); Schröder (2011).
[39]	<i>Patents</i>		Armour and Cumming (2006).	Guler and Guillén (2010); Romain and van Pottelsberghe (2004); Schertler (2003); Schröder (2011).
[40]	<i>Human capital endowment</i>			Schertler (2003).
[41]	Macroeconomic conditions			

[42]	GDP		Bonini and Alkan (2012); Schröder, C. (2011).	Aggarwal and Goodell (2014); Bozkaya and Kerr (2014); Carvell et al. (2013); Chen et al. (2010); Cumming et al. (2013); Félix et al. (2013); Hain et al. (2016).
[43]	GDP growth rate		Cumming and MacIntosh (2006); Jeng and Wells, (2000).	Armour and Cumming (20016); Cherif and Gazdar (2009); Gompers and Lerner (1999); Hain et al. (2016); Li and Zahra (2012); Romain and van Pottelsberghe (2004); Ning et al. (2015).
[44]	Industrial production			Ning et al. (2015)
[45]	Interest rates	Cumming and MacIntosh (2006).	Bonini and Alkan (2012).	Félix et al. (2013); Ning et al. (2015); Romain and van Pottelsberghe (2004); Schröder (2011).
[46]	Unemployment rate	Ning et al. (2015).		
[47]	Inflation		Bonini and Alkan (2012).	Ning et al. (2015).

Notes: As mentioned in Section 4.1, Table 5 presents only quantitative studies, while qualitative studies are excluded from this analysis.

¹ *This index is constructed by the incorporation of six institutional dimension i.e. government effectiveness, quality of regulatory policies, rule of law and property rights protection, political stability, voice and accountability.*

2.4.1. Formal institutions

2.4.1.1. Regulatory Institutions

Regulatory institutions have been considered by a growing body of literature which attests their function for venture capital activity. Under such stream, the selected articles point their attention to the role of both (i) fiscal policy and (ii) other regulation acts which comprise the legal system, investor protection, bankruptcy law and labour market legislation (rigid labour market regulation). Considering that VC is a two-sided activity consisting of both supply- and demand-sides, these formal institutional arrangements likewise do have a potential to shape VC activity in both ways, i.e. by having an influence on both sides.

Fiscal Policy

There are eight studies that investigated how fiscal policy rules alter VC activity. Among fiscal arrangements that impact VC, the literature has considered corporate capital gains taxation and the corporate income tax regime.

With regard to capital gains tax rates, the theory explains that they are linked with venture capital in two ways. In the first place, low capital gains taxes could increase the supply of venture capital funds by increasing the post-tax returns achievable from this type of investment compared to alternatives. In the same vein, an alteration of the relative tax burdens on wage and capital gains in favour of this latter, may also produce sizeable effects on the demand for VCs, by pushing more talented individuals to opt for an entrepreneurial career, and in doing so, increasing the potential deal flow

for VCs (Poterba, 1989). An interesting and representative work on this specific relationship is the one by Da Rin et al. (2006). Relying on a unique panel of data about 14 European countries the authors find that among the institutions that foster VC markets, a significant positive impact stems from low corporate capital gains taxation regimes. An unfavourably high taxation regime was found to particularly depress early-stage investments in high-tech projects. Gompers and Lerner (1999) find that reductions in the capital gains taxation in the U.S. has incentivized individuals to become entrepreneurs thus contributing to the early development of the VC industry in the eighties. However, the evidence is not univocal in this respect. For example, Jeng and Wells (2000) by analysing 21 worldwide countries and using data on individual capital gains tax rates do not find any significant relationship between corporate capital gains taxation and VC activity.

In like manner, several works have appeared in recent years documenting the role of the corporate income tax. Bonini and Alkan (2012), as well as Romain and van Pottelsberghe (2004), find that high corporate income taxes negatively influence the development of VC. Similarly, Schröder (2011) finds coherent results using VC data from 15 European countries in the 1995-2005 period. All these studies suggest that a low corporate income taxation increases the return to both investors and entrepreneurs by increasing the present value of future (after tax) corporate income.

Another interesting approach has been presented by Bedu and Montalban (2014) who investigate the general role of tax initiatives for VC activity. The authors employ a variable that presents the role of fiscal environment for managers and individuals in investee companies and management funds. This index is an arithmetic mean of six sub-indexes: (1) capital gains taxation for private individuals, (2) income tax rate for private individuals, (3) timing of taxation of stocks options (before or after the sale of stock), (4) method of taxation of stock options (5) ability to incorporate performance-related incentives for funds managers, (6) method of taxation of carried interests. They find robust evidence that a favourable tax rate regime strengthens the development of VC activity.

In view of all this evidence, it is possible to assert that fiscal policy is an important institutional driver for VC activity. Overall, six out of eight studies highlight that both low corporate capital gains and corporate income taxation regimes have favoured the development of the VC industry, taking into consideration different time periods and spanning across different geographical contexts. Among the two articles detecting a null impact for fiscal policy, Jeng and Wells (2000) and Groh and Wallmeroth (2016), this latter study finds mixed evidence on the role of corporate income tax on VC activity, depending on the countries under investigation. In the case of emerging economies, the authors find a negative and statistically significant impact while in the developed ones statistically negligible effects prevail.

Other regulatory aspects

The explanation of cross-country variation in VC has commonly been attributed also to other regulations embracing the legal system (investor protection, accounting standards, easing pension investments, investors protection) and labour market regulations.

Introduced initially by the groundbreaking work of La Porta et al. (1997), the legal system of a country quickly became one of the most discussed determinants of VC. The legal system of a country is important for venture capital activities since it influences the enforcement of contracts between venture capitalists and entrepreneurs including the screening, monitoring and rewarding process (La Porta et., al. 1997). La Porta et al. (1997) cluster legal schemes in four groups: English, French, German, and Scandinavian. While English legal tradition denotes the common law tradition, the other legal traditions are categorised as civil law traditions which differ by the extent to which

shareholder and creditor rights are protected. French tradition is considered the weakest in this respect, while the English law tradition provides the best ground for legal protections. Among seven studies that considered this determinant, an emblematic work is represented by the analysis of Bonini and Alkan (2012).⁷ The authors utilise a panel dataset for 16 worldwide countries during the time period 1995-2002 and control for the impact of the legal system prevailing in every nation. They find solid evidence that legal system captures a significant fraction of the cross-national variation in VC activity. Countries with the English origin legal system have comparatively higher levels of VC investments than countries characterized by the French, German and Scandinavian systems. Another relevant contribution that suggests the importance of the English legal environment in the context of VC internationalisation, is provided by Guler and Guillén (2010). Analysing a sample of 216 American venture capital firms that invested in 95 countries during the 1990–2002 period, the authors discover that venture capital firms enter foreign markets based on specific properties of host countries and specifically rely on a strong legal environment that protects investors' rights. In other words, the entry in a new country increases with the local level of protection of investors' rights.

The majority of the reviewed articles, five out of seven articles, strongly support the positive relationship between the English legal system and the development of the VC industry. The significance of English legal origin is found to decline (see Aggarwal and Goodell, 2014), when investor protection is added into the econometric specification, suggesting a potential substitution effect between the two constructs.⁸

Such situation has influenced an important strand of literature to frequently consider the strength of investor protection as a substitution of legal system particularly when internationalisation of VC is studied. Table 5 (row eight), shows that this thematic area has involved a total of five studies among which, two studies found this regulation to have a null impact on VC, whereas three studies suggest its significant role. A recent study that tackles the issue of the relationship between investor protection regulation and strength of VC markets is the one of Groh and Wallmeroth (2016). The authors analyse 118 countries using panel data from the year 2000 to 2013. For measuring the investor protection in a more detailed manner, they employ a disclosure index which encompasses the obligations of disclosing information related to financial transactions in an economic system. The impact of the variable in attracting venture capital investments as a percentage of GDP, results with a coefficient that is positive and statistically significant at the 5% level.

Another derivative of the legal systems studied in literature is the bankruptcy law. An environment tolerant to bankruptcy is expected to stimulate in turn risky ideas which do not necessarily succeed at the first attempt. How such tolerance toward bankruptcy correlates positively with VC activity, was inspected by Armour and Cumming (2006). Using a reduced form measure of different bankruptcy law regimes across 15 Western European and North American countries, they found this index to have a high explanatory power with regard to VC investments. More specifically, less liberal bankruptcy laws are found to severely discourage the demand for venture capital reducing thus, VC investments in general.

The influence of labour market regulations on the VC markets has also been largely investigated. A batch of nine articles have linked this formal institution to VC activity. In fact, these policies are

⁷ See other examples that control for the legal environment: Hain et al. (2016); Jeng and Wells (2000); Leleux and Surlemont (2003).

⁸ See other examples that consider the role of investor protection regulation: Bedu and Montalban (2014); Groh and Wallmeroth (2016); Jeng and Wells (2000).

reputed to have an impact especially on the demand-side by modulating the number of entrepreneurs that require ambitious financing (Lerner and Tåg, 2013). Rigid labour market regulations may in fact come as a barrier to entrepreneurs since they increase the costs that relate to the firm entry and growth (Fonseca et al., 2001).

Bonin and Alkan (2012) measure labour market rigidities grounded on the employment protection legislation index taken from OECD. This metric is based on the aggregation of 18 basic items capturing the strength of the legal framework governing the hiring and laying off of employees. They find that VC investment activity is reduced through increasing rigidity in labour market regulations. Similar results are found by six other studies. Among these ones, it is worthwhile to mention Bozkaya and Kerr (2014) who undertook an exhaustive study, drawing a distinction between systems which are more in favour of employment protection laws, from those that rely on labour market expenditures (e.g., unemployment subsidiaries and insurance), to estimate their influence on VC activity. Analysing the European context over the 1990–2008 period, the authors find that it is particularly the latter dimension that exerts a great impact on the development of VC markets.

Taken together, seven out of nine studies point (with difference and nuances) to the positive role that a rather flexible labour market may exert on the development of VC activity.⁹

2.4.1.2. Quality of the governmental institutions

The role of formal institutions on VC activity has been also investigated from the lens of governmental programs (including different public intervention forms, i.e. Lelux and Surlemont, 2003) and governance indicators such as government effectiveness, regulatory quality, rule of law, political stability, voice and accountability and control of corruption which we systematise in the research stream named government quality.¹⁰ This stream is comprised of 12 articles.

The results are somewhat mixed for most of the dimensions. For example, the government direct intervention through ad-hoc programs designed to stimulate the emergence and development of VC has been proven to be ineffective by three out of four studies (see Table 5, row 13). Then, Bonini and Alkan (2012) investigate the roles of political stability and control of corruption but they do not find them to be significant for the presence of VC activity. Guler and Guillén (2010) analyse political stability and find its positive impact on VC activity; Groh and Wallmeroth (2016) reports the negative impact of bribery and corruption index on VC activity. Li and Zahra (2012) use a World Government Index which is an index constructed by Kaufmann et al. (2009) that considers several of the dimensions aforementioned. The authors find a significant positive relationship between this variable and the VC activity, both on the number and the amount of investments at the 1% statistical significance level. More recently, Cumming et al. (2016) investigate the relationship between government quality indicators and VC in a cross-country analysis on Cleantech venture capital investments. Using a unique worldwide dataset of 31 countries spanning over the period 1996–

⁹ Easing pension investments is another regulation categorized under “other regulatory aspects” group. The position of the studies that consider this dimension are reported in Table 5, row 11.

¹⁰ Voice and accountability shows the extent to which a country’s citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association and free media. Political stability is an indicator that captures the absence of violence/terrorism by unconstitutional mass. Government effectiveness includes the quality of public service, the capacity of the civil service and its independence from political pressures, and the quality of policy. Regulatory quality stands for the potential of the government to provide sound policies and regulations that support the development of private sector. Rule of law defines the extent to which individuals have confidence in the reliability of rules of a society. It includes the quality of contract enforcement and property rights. Finally, control of corruption reports the level on which public power is used for private gains, including both petty and grand forms of corruptions, as well as ‘capture’ of the State by elites.

2010, they show that that government effectiveness and rule of the law have both positive and statistically significant impacts on VC deals.

2.4.1.3. Financial market-related conditions

VC is a financial instrument. Accordingly, its functionality also depends on how vibrant financial markets are. There is an ongoing debate about the importance of a sound stock market for the development of the VC industry. Our literature review uncovers 17 different studies that deal with this issue among which the majority reveals that the variable has a statistically significant positive effect on VC (14 articles). One of the first seminal pieces of evidence that asserts the role of stock exchanges on VC activity was provided by Black and Gilson in 1998. The authors illustrate the importance of developed stock markets by comparing venture capital markets in the United States, United Kingdom, Japan, and Germany. Their study suggests that a higher intensity and also higher returns of VC funding is present in countries with a high stock market capitalization/GDP ratio. By the same token, Schertler (2003) brings to light the positive relationship between stock market development and VC using a dynamic panel estimator. He finds that stock market capitalization has a significant positive impact on early stage VC investments. Similar results are obtained by most of the studies, even if also in this case, there are some exceptions (see Félix et al. 2013; Bonini and Alkan 2012, which seem nevertheless be contingent on the specific variables used to proxy stock market capitalization).

VC activity is a process that eventually demands an exit from the investment. The preferred mechanism through which venture capitalists cash out their investments is Initial Public Offering (IPO) (see for example Black and Gilson 1998; Fleming 2004; Cumming et al., 2006), and so the ability to realize gains through an IPO is often considered critical to the existence of an active VC market. This mechanism permits both venture capitalists and the entrepreneurs to enter into an implicit contract over upcoming control of the portfolio company and this contract may hardly apply in a bank-centred system (Black and Gilson, 1998). Going public will simultaneously return wealth to the venture capitalist but it will also potentially re-confer control to the entrepreneur (assuming that outside ownership following an IPO is sufficiently dispersed), while a sale to another investor will usually not do it. Hence, if only a sale to another single investor can *ex ante* be realistically expected, the entrepreneur's incentives will be lower. Having said that, there is a considerable number of papers that provide foundation on the importance of an active IPO market for the development of VC activity. Black and Gilson (1998) present one of the earliest empirical work related to this aspect. The authors test the significance of the relation between IPOs and capital contribution to VC funds over time in the U.S. and find evidence that IPOs trigger fundraising in the succeeding year. In a likewise manner, Bonini and Alkan (2012) highlight the positive role of the number of IPOs on VC early stage investments. Apart from few exceptions (e.g., Gompers and Lerner, 1999), the available evidence points to a positive and significant relationship between IPOs and VC activity. It is noticed that IPO activity has been considered overall by seven articles, among which five find the role of IPOs crucial for VC activity, while two of them present no significant evidence for such a relationship.

As to other possible exit modalities, Félix et al. (2013) for the first time, incorporate Merger & Acquisition (M&A) as an expected determinant that may stimulate VC markets. They find that M&A dynamics do significantly influence VC investments but not necessarily early stage investments. Furthermore, such results suggest that the presence of an active M&A market provides support to VC markets even in the presence of weak IPO dynamics. In this respect, it is worthwhile to note that according to Groh and Wallmeroth (2016), M&A market is found to matter more in developed economies rather than in emerging ones.

2.4.2. Informal institutions

This literature review pays specific attention to the studies that investigate the role of informal institutions in influencing the VC activity in a given geographical area, both directly and indirectly. Among the included literature for this review, there is a clear imbalance of the studies that consider the role of informal institutional arrangements in understanding the functionality of VC industry. Translating it in numbers, there are 11 papers altogether that consider the role of such aspect out of the 34 surveyed. We cluster these works in three groups: entrepreneurialism, other cultural attitudes and social capital.

2.4.2.1. Entrepreneurialism

In the light of what is mentioned in Section 2, entrepreneurialism is legitimately a trait that enters the informal institutional group of VC determinants. This research line counts a number of five papers that have overall produced inconclusive results. In spite of the evidence that asserts the influence of entrepreneurial culture on VC activity as positive, there are a few studies that either do not find a significant relationship between the two, or find the relationship to be negatively significant. This inconsistency can be attributed to the different mechanisms at hand that measure entrepreneurship attitude.

Among the first to establish an empirical relationship between entrepreneurial activities and the volume of venture capital in markets were Gompers and Lerner (1999). In the same vein, Romain and van Pottelsberghe (2004) point out that any economic system should provide a minimum level of entrepreneurship and entrepreneurial activities in order to trigger the demand for VC. Apparently, measuring entrepreneurship is a difficult task (Storey, 1991). In the context here considered, studies generally proxy the propensity of individuals to become entrepreneurs through the total entrepreneurship activity (TEA) index. This index was firstly established by the Global Entrepreneurship Monitor (GEM) Adult Population Survey and represents the prevalence of individuals that are currently starting a business or are owners and managers of young (i.e. aged less than 42 months old) firms (see for further details Reynolds et al., 2002). But this proxy does present relevant shortcoming. First of all, it measures realized entrepreneurial acts rather than a cultural propensity towards entrepreneurship. Secondly, it fails to distinguish between the high quality start-ups and those that are driven by other circumstances (e.g., necessity, life-style, etc.). This has often led to surprising results. For instance, a higher TEA might equally imply more work for VC investors since more time is needed for the selection of projects and this may be detrimental to the supply of VC (Félix et al., 2012).¹¹ Pointing to the supposed noise of the TEA index, Bonini and Alkan (2012) use an alternative measure in their investigation of the determinants of cross-country variances in venture capital (VC) investments. They weight TEA with the national level of business expenditures in R&D in order to capture only the high potential entrepreneurs. With the use of this refined TEA index, authors find that higher levels of entrepreneurial activity increases the amount of VC capital in a country, at both early- and later-stage entrepreneurial ventures.

2.4.2.2. Other cultural attitudes

Recently, scholars have focused on the link between cultural attitudes and VC finance, measuring culture primarily in terms of the well-known Hofstede dimensions.¹² Five studies deal with this

¹¹ Another work that agrees for the ambiguous impact of self-employment rate on the demand for VC funds is reported by Li and Zahra (2012).

¹² Initially, Hofstede (1980) provided four dimensions of culture: power (equality versus inequality), individualism (versus collectivism) masculinity (versus femininity), uncertainty avoidance (versus uncertainty tolerance). Later, the group of national culture measures was extended to two new additions: temporal orientation (suggested by Michael Harris Bond), and

aspect. Amongst them, the uncertainty avoidance index is the most frequent indicator analysed (three articles consider it). Individualism is then investigated by two other articles whereas power distance as well as masculinity are elaborated in just one study.

To understand how aspects such as uncertainty avoidance and collectivism (versus individualism) influence VC activity, Li and Zahra (2012) analyse 68 countries worldwide during the 1996–2006 period. Their main findings suggest that uncertainty avoidance is a critical dimension. In societies characterized by a high degree of uncertainty avoidance, VC activity is less sensitive (or responsive) to formal regulations, becoming thus the first study to investigate the interaction between formal and informal institutions on VC activity. Uncertainty avoidance was also found by Hain et al. (2016) as a relevant determinant of cross-border VC investments. Similar conclusions are reached by Aggarwal and Goodell (2014) and Cumming et al. (2016). The latter focus on VC investment activity in a more specific industrial sector such as the clean-tech. The authors find uncertainty avoidance to be negatively correlated with clean-tech VC activity, implying that the societies where VC clean-tech deals occur are characterized by a significantly lower rate of uncertainty avoidance.

Li and Zahra (2012) additionally consider the impact of the collectivism versus individualism on VC activity. Collectivism (individualism) is another cultural trait of a society that represents members' dependence (independence) with respect to broader associations and groups within the society. This characteristic may also be represented by the preference of members to define themselves in terms of "We" rather "I". In relation to VC activity, they find that collectivism impacts negatively the development of VC. In addition, the authors interact this informal institution with the formal ones and find that this cultural dimension negatively moderates the (positive) impact of formal institutions on VC.

Another example that links the dimension of individualism and VC activity is presented by Aggarwal and Goodell (2014) who find no particular influence of individualism on the development of VC. The authors add in their analysis a third dimension of culture, named power distance. This dimension describes the level to which the less advantaged people (less powerful members) accept the unequal distribution of power among society. No significant evidence is found on the impact of this variable on VC activity.

Finally, masculinity is the last Hofstede's trait taken into account in the literature as a possible VC determinant (yet not extensively). It represents the attitude of society toward achievement, heroism, assertiveness and other material rewards that bring success whereas the opposite is related to the degree of preference for cooperation, modesty, caring for the weak and quality of life (Hofstede, 1980, 2010). Aggarwal and Goodell (2014) find evidence that masculinity has a negative impact on VC.

2.4.2.3. *Social capital*

Social capital has a great importance for the functioning of any economic system.¹³ As to entrepreneurship, it may influence individuals' decision to start-up a firm (e.g., Bauernschuster et al., 2010; De Carolis and Saporito, 2006; Walker et al., 1997), and in a similar fashion, may facilitate access to financial capital resources like VC, by easing the matching process on both the demand and the supply sides (Ahlstrom and Bruton, 2006). Social capital is commonly defined as a fusion of

indulgence (suggested by Michael Minkov) totalling a number of six national culture measures which are assembled and explained in Hofstede et al. (2010).

¹³ For an overview see for instance the works of Dasgupta (2005); Knack and Keefer (1997), Paldam (2000); Sobel (2002).

trust, formation of social networks and civic participation.¹⁴ In the context of the institutional determinants of VC activity, the first two dimensions have been particularly studied. In particular, Hain et al. (2016) use a distinctive international dataset and propound a multidimensional approach to explain cross-border VC investments over the 2000-2012 period. Among other results, they highlight that, for emerging economics, institutional trust is identified to be a necessary precondition for foreign VC inflows, especially for the formation of foreign-domestic syndicates. Interestingly, in developed economies, relational trust is found to be even more relevant for VC activity. Another empirical study that examines how VC is influenced by trust is represented by Bottazzi et al. (2016). Using self-collected data on a sample of 107 VC firms active in the U.S. and 15 EU countries, the authors find again that trust is a significant driver of VC deals emergence. In their estimates, the probability of a VC investment in one country increases by +7% for a one percent increase in trust in that country.

But apart these two exceptions that strongly point to the importance of trust for VC activity, the theme of social capital has been left rather unexplored, especially in quantitative research, as it can be seen in Table 5. However, the role of the other measures of social capital on VC activity has been treated only in qualitative research, especially starting from 2003.¹⁵ In particular, network dimension has been suggested as an important determinant of VC by four contributions (see Ahlstrom and Bruton, 2006; Bruton and Ahlstrom, 2003; Bruton et al., 2002; Bruton et al., 2009), looking primarily to a specific institutional context, i.e. Asia, and to the importance of specific typologies of network, e.g., Guanxi in China (see in particular, Bruton and Ahlstrom, 2003). Overall, the qualitative evidence produced by the means of semi-structured interviews and archival data, highlights how networks could be important for venture capitalists in terms of firms' selection, as well as for monitoring purposes. Such networks are reported to be helpful also for building relations with institutions (regulatory and normative institutions) so that a better environment is established before VC invest their funds.

2.4.3. Additional contextual determinants

Institutions can influence VC in several indirect ways as well. Technological opportunity is one of the most studied alternative channels. In this category, we find 11 studies (see Table five, rows 38-40) that have used indicators such as innovation rate and R&D expenditure, patents, and human capital endowment. Broadly speaking, the presence of technological opportunities is found to have a positive impact on the demand for VC mainly through increasing the number of new start-ups exploiting those available opportunities (Lerner and Tåg, 2013). An example in this stream is the study of Da Rin et al. (2006), who found a positive link between public R&D spending and venture capital activities at the aggregate level. Similar findings are obtained by Schertler (2003), Romain and van Pottelsberghe (2004), Schröder (2011), Schertler (2011), Félix et al. (2013); even if some exceptions do exist in this respect, e.g., Bonin and Alkan (2012).

Other contextual determinants that have been studied in relation to the development of venture capital activity are macroeconomic conditions: GDP, GDP growth rate, industrial production, interest rate, unemployment rate, and inflation. As it can be seen, GDP and GDP growth are the most considered determinants and both are found to significantly impact VC activity. In the case of

¹⁴ Trust includes trust in fellow people and in institutions (see for e.g., Rainer and Siedler, 2009). Networks represent a measure of the nodes and frequency of peoples' interactions. Civic participation identifies membership in voluntary organizations (hobby activities) where more intense horizontal interactions are promoted and the chances for positive externalities are higher (see Putnam, 1993).

¹⁵ The results of qualitative studies do not fit in Table 5 but when necessary their results are textually reported in the paper.

interest rates, four studies document it to be positively correlated with VC activity, while exactly the opposite holds in the case of Cumming and MacIntosh (2006). Bonini and Alkan (2012) do not find it significant at all.

2.5. Research agenda

Based on the systematic overview of the existing knowledge in the field, we aim at presenting several highly prominent scientific steps that can be taken in the future to better understand the institutional roots of the heterogeneity of VC markets. In fact, we believe that there are several scientific aspects that remain overlooked, whereas there are also a number of others that are considered only superficially. As such, this paper sheds light on the understudied topics and provides the ground for a future research agenda.

2.5.1. Formal institutions and VC

Our literature review uncovered many formal institutional dimensions that have been studied during the last decades. For most of them (e.g., taxations, labour market regulations, financial market conditions), strong evidence has been produced on the significant effect that these dimensions exert on the development of VC. However, few exceptions do exist, which suggests that further research endeavours are needed. Rigorous and robust empirical research on the impact of these formal dimensions on VC activity will enable us to better understand the reasons behind these unexpected results. In this domain, we see two interesting avenues for providing more compelling findings on the impact of formal institutions on VC. First, a very much needed, but often neglected aspect (also due to data limitation issues), is the investigation of the effect of these variables not only on the equilibrium (i.e. the development of VC in a given geographical area), but on the demand and supply sides that contribute to that final outcome, separately. This differentiation, which has been rarely pursued in the literature, would enable a more *thorough* comprehension of the phenomena at stake and on the reasons why some studies (e.g., Schertler, 2003) fail to detect the expected impact of a specific institutional mechanism (e.g., labour market regulation). Secondly, the lack of impact of formal institutional arrangements highlighted by some studies may hide a more nuanced picture than what is generally thought. In fact, the effect of these formal institutions could be neutralized by other specific (formal and informal) institutional characteristics of the geographical area and of the time periods to which these studies refer to. Adhering to this view, a reform that makes more liberal the bankruptcy law is likely to be ineffective (at least in the short-run) in areas where the cultural stigma stemming from failure is nevertheless high. Such types of possible interdependencies between formal and informal institutions have been almost completely neglected so far. The inclusion in the empirical analyses of these possible intervening factors could enable us to better elucidate the *boundary* conditions under which we may expect an effect of these formal institutions on the development of VC.

More generally, to the best of our knowledge, there are only two studies (Cumming et al., 2016; Li and Zahra, 2012), which investigate the mutual interrelationships between formal and informal institutions in their impact on VC. While following the well-established views on institutional economics (for instance the *Variety of Capitalism* approach by Hall and Soskice, 2001), the interaction between the two constructs could be the cause of fairly different effects of regulations on the VC activity in different geographical areas. This type of analysis could also be helpful to the extent that identifies the specific reforms of formal institutions which are likely to produce the most sizeable changes in VC dynamics in any given context. In this respect, it is worthwhile noting that remains fairly unclear, by looking at the literature, how much of the relationships between formal

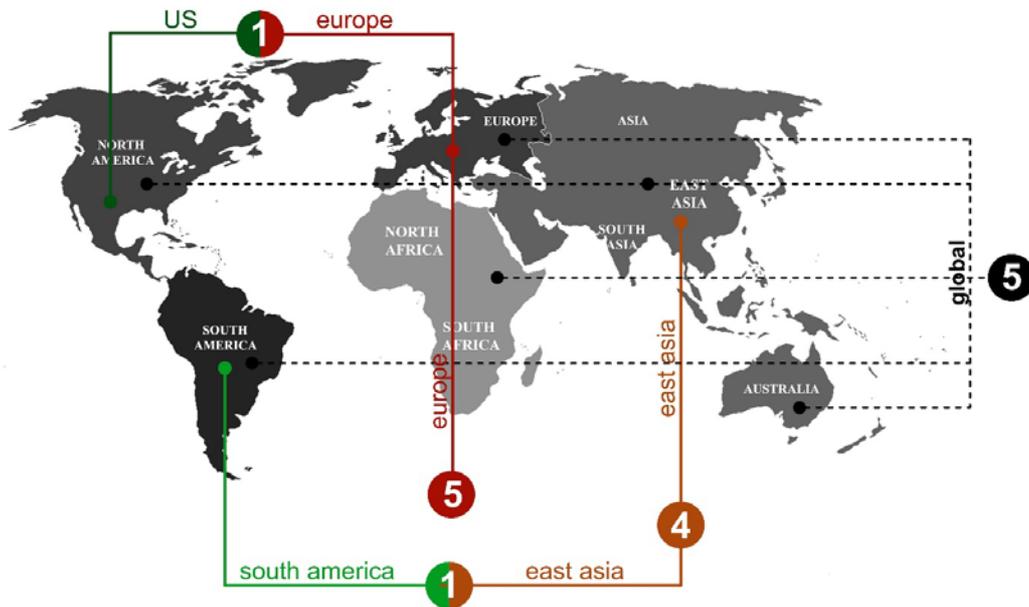
institutions and VC are simply due to “cross-national and hard-to-change” institutional traits or they are conversely produced also by an active involvement of governments over time. Disentangling this issue would represent another important step toward a better understanding of the institutional reforms that have to be put in place to stimulate the VC industry.

Finally, and linked to this, another important underinvestigated dimension is the analysis of the effectiveness of direct ‘hands-on’ public programs aimed at stimulating the VC market. Out of three reviewed studies, Armour and Cumming (2006) and Cumming and Macintosh (2006) find governmental programs to impact VC activity in a negative way, while Da Rin et al. (2006) reports the opposite. In this respect, we think, there is a need for more research *tout court* as to increase our information set about the impact of these programs at different latitudes and to investigate in depth the specific contexts and the conditions where successful programs for enlargement of VC activity could prove to be successful.

2.5.2. Informal institutions and VC

There is a systematic dominance of formal aspects of institutions when compared to informal ones. The analysed articles predominantly focus on the role of regulatory institutions, government quality and other contextual determinants (34 studies), whereas less than half of them (47,05%) are concerned with the informal dimensions of institutions: entrepreneurialism (six studies, five of a quantitative nature whereas one of qualitative character), other cultural attitudes (four studies of quantitative nature) as well as the endowment of societies in terms social capital (six studies in total, four of qualitative nature whereas only two of quantitative type). This dearth of studies, particularly the quantitative ones, is worth of attention, and it is also evident by looking at the geographical coverage of the studies that deal with the informal dimension. Figure 4 portrays that among 16 articles that include in their analysis the role of informal institutions, only five of them take a global approach. Most of the research efforts have been concentrated in the sole Europe that count for a total of five exclusive studies, with only one article investigating the role of trust as a facet of social capital, while the others do attempt to understand the role of entrepreneurial culture. Countries that include the dimension of networks are generally focused in Asia (four articles) and they are of qualitative nature.

Figure 4.
The geographical concentration of scientific papers that study informal institutions.



This lack of attention is worrisome especially with regards to the social capital dimension. Social capital affects the engagement of entrepreneurs in venture creation and the demand for finance. Moreover, it is also likely to strongly determine the supply of venture funds as it is the case of Guanxi networks in China. Inspecting more deeply how social capital in different institutional contexts may impact the development of VC, and do that in a more quantitative fashion than what has been pursued so far, should figure high in the research agenda of scholars in entrepreneurial finance. Needless to say, enlarging the spectrum of possible relevant informal institutions at work (e.g., religion, civic participation and norms) is also advisable. Such directions should be a priority of high relevance for future research since informal institutions are persistent in their very nature, and consequently they can leave a distinguishable imprint in the VC activity. In a nutshell, also in order to deliver sound advices to policy makers, we suggest that there is an urgent need for a more thoughtful analysis on the role of informal institutions in their relationship with VC activity.

2.6. Concluding remarks

VC industry has heterogeneously developed across the World despite extensive efforts of governments to stimulate it. Scholars have studied these dynamics, yet the findings about the causes of this disparity are non-conclusive, while no thorough and complete overview of the produced findings exists. Hence, we review the state-of-the-art literature on the institutional determinants of VC activity. Specifically, drawing on studies in finance, economics, entrepreneurship and management, we have reviewed the literature relating to the determinants of VC activity with a particular focus on institutions. Following a consolidated research protocol (Tranfield et al., 2003), we have enucleated 34 papers that shed light from an empirical point of view on which formal and informal institutions matter (and which not) for the development of a florid VC market. Our systematization effort harmonizes these studies by delineating a research agenda for further advance our understanding of the institutional roots of VC. The analysis of this literature has revealed that the most frequently investigated institutional dimensions are regulatory policies, indicators of government quality, financial markets and other contextual determinants. Little effort has been dedicated to the analysis of the role of informal institutions towards the development of

VC. And even less attention has been devoted to the analysis of whether informal institutions may represent antecedents, moderating and mediating factors of the 'usual suspects' related to formal institutions (e.g., legal system structure, political stability, the rule of law, etc.). Specifically, the role of social capital has been particularly neglected and, in our view, it deserves a supplement of attention in future research endeavours.

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3. Venture capital in Europe: social capital, formal institutions and mediation effects

3.1. Introduction

Entrepreneurship has been documented to contribute to the real economy (Audretsch, 1995; Audretsch and Keilbach, 2007), as new ventures are considered to be an engine of both the static and the dynamic efficiency of economic systems (e.g. Kirzner 1997; Schumpeter 1934). One of the critical aspects of entrepreneurial success is access to financial resources. However, startups (particularly the high-tech ones) are capital constrained as they lack a track record of past success (and hence reputation and credibility), they often do not have tangible resources to use as collateral, and they typically face the so-called “Valley of Death” (Ghosh and Nanda, 2010; Murphy and Edwards, 2003). The information asymmetry and uncertainty tightly coupled with entrepreneurship represent extensive barriers for debt providers, which has led to the establishment of specialized financial intermediaries called Venture Capital (VC) firms, more capable to overcome the hurdles and more prone to provide these inherently risky investments (B. H. Hall and Lerner, 2010).

Despite the proven importance of VC, there have been evident spatial variations in VC activity across the World (Groh, von Liechtenstein, and Lieser, 2010; Jeng and Wells, 2000). The differences are stark even among developed countries. For instance, the United States (U.S.) is the pioneer and the leader by far, and only a handful of other countries such as the United Kingdom or Sweden have strong VC markets. On the contrary, continental European countries have shown relatively little activity (e.g. France, Italy, Spain), or even close to none (Greece, Poland, Czech Republic, Romania). Developing countries are typically even more laggard in the development of VC markets. This significant variation has been primarily explained by the differences in the stock market conditions, specific regulations (labour and tax laws, investors and intellectual property protection, etc.), or other individual features of the environment where the VC takes place (e.g. Black and Gilson 1998; Jeng and Wells 2000). That is, most of the studies have devoted major attention to macroeconomic conditions or an array of regulations. Nevertheless, general economic literature has criticized this one-dimensional approach, as it has been shown that both formal and informal institutional characteristics of a country matter for economic activities (North 1990; Peng et al. 2009; Williamson 2000). As a matter of fact, both types of institutions have already been shown to impact entrepreneurship (e.g. Stenholm et al. 2013) and innovation activities (e.g. Shane 1993). Hence, they seem to be important to account for when studying VC activity across different geographical areas— a perspective that has been overlooked by the extant literature (Zacharakis, McMullen, and Shepherd, 2007).

In this respect, we complement the recent work of Li and Zahra (2012), who empirically test the determinants of VC activities across countries by deploying an institutional perspective, which comprises the two broad components of institutions, coherent with the work of North (1990) on institutional theory. In that case authors test the impact of the formal component that covers “a set of political, economic and contractual rules that influence individual behavior and shape human interactions” (Li and Zahra 2012, page 96), as well as two informal institutional features of the countries, i.e. uncertainty avoidance and the level of collectivism characterizing different national communities. Similarly to Li and Zahra (2012), we also rely on the institutional theory to examine the impact of formal and informal institutions on VC activity, as well as study how both institutional dimensions interact in terms of their impact on VC activity.

In doing so, we aim at making several steps forward from the existing literature. First, we investigate in more depth the role of informal institutions as a significant source of the differences in VC activity levels across geographical areas, by focusing on social capital theory to explain the mechanisms through which the informal institutions manifest their effect (Putnam, 1993). The literature already emphasized the relevance of social capital for entrepreneurship and innovation (Brüderl and Preisendörfer, 1998; Dakhli and De Clercq, 2004), while only a few authors have focused on the impact they have on VC activity (see the work of Hain et al. 2016 on the determinants of cross-border VC investments). We account for the fundamental building blocks of the social capital – networks, trust and civic norms (Pollitt, 2002; Putnam, 1993), and rely on the argument of the institutional theory that social capital determines the range and the sorts of available entrepreneurial opportunities and empowers their exploitation through facilitation of resources and capabilities (Gedajlovic, Honig, Moore, Payne, and Wright, 2013). Particularly, social capital facilitates coordination activities in a society and impact transaction costs and information asymmetries, two of the key market features for VC activity (Petersen and Rajan, 1995). Social capital (i.e. “weak” ties mainly) enables novel information flows to individuals through their networks (Granovetter, 2005; Wu, 2008). By putting the impact of social capital on VC activity to test, we try to extend the literature on entrepreneurship (e.g. George and Zahra 2002), and in particular, some still not conclusive evidence in the literature on VC related to its institutional determinants (Aggarwal and Goodell, 2014; Antonczyk and Salzmann, 2012; Cumming, Henriques, and Sadorsky, 2016; Hain et al., 2016; Li and Zahra, 2012).

Second, instead of including only general formal components aggregated in an index of formal institutions as done by Li and Zahra (2012), we additionally include in the model formal regulations which the literature considers most relevant for the VC industry (see the recent review of Grilli et al. 2017). In particular, we include measures of three of the key regulations for VC activity – rigidity of labour regulations, capital gain taxations and minority investor protection regulations. This addition is important not only for the sake of completeness of the model but also for the fact that the added regulatory instruments are controllable to a greater degree, at least in the short term, by the policy makers. In fact, the former group of general components comprises only the features that are harder to change in the short and medium term and usually exhibit important path dependence dynamics (Kingston and Caballero, 2009; North, 2005; Williamson, 2000), such as the governmental effectiveness, political stability or the rule of law. While these structural aspects are of great importance, the additional measures integrate the regulations that may be relatively easy to implement, such as taxation regulations, ease of starting and doing business, investors and shareholders protection rights, which is considerably more informative for policy makers.

Third, we examine whether social capital has a dual role as a determinant of VC activity. Namely, as Hume (2000, page 526) argues, formal rules of a society are a result of what is already in “*hearts and minds of its citizens*”. Hence, informal institutions may additionally impact VC activity, as antecedents and foundation of structural formal institutions. We make theoretically founded propositions about how the impact of social capital on VC could be mediated by formal institutions. In that manner, we hope to contribute to the literature on venture capital, and corroborate the intuition that the impact of informal institutions (i.e. social capital, in this case) is not significant *per se*, but it rather matters for VC activity as a predecessor of formal institutions, which are the ones critical for economic behavior in general (North, 1990), as well as for VC activity.

Fourth, we conduct the analysis in the European context, which represents an interesting case due to the great variation in the degree of VC industry development despite active involvement of both European level authorities and national governments. The European context is particularly relevant

for investigation as the formal, and most importantly, informal institutions are widely heterogeneous across the continent. Moreover, despite its worldwide relevance in economic and geopolitical terms, and the well-known deficiency in fuelling the birth of high-tech rapid-growth ventures and unicorns (European Commission, 2010; Grilli and Murtinu, 2014), studies that investigate the institutional determinants of VC activity and, at the same time, explicitly and solely focus on the old continent, are largely absent (Grilli et al., 2017). To this purpose, we collect country-level data from multiples sources on VC activity in Europe, formal and informal institutions as key explanatory variables, and an array of relevant control variables. We focus on the 1997-2015 period for an unbalanced panel dataset of 18 European countries.

The rest of the paper is organized as follows. We first overview the literature on the institutional determinants of venture capital. We crossbreed that with the literature on social capital, and based on those two, we develop a set of theoretical hypotheses. Then, we describe the methodology and data used to test them. We proceed with presenting and discussing the results, and conclude with implications for theory and public policy.

3.2. Theoretical development

In this section, we provide a definition of Venture Capital (VC), identify and present the state-of-the-art literature on institutional as well as other determinants of VC activity, and hypothesize about the understudied impact of social capital on it, in combination with formal institutions.

3.2.1. Venture capital as an institution

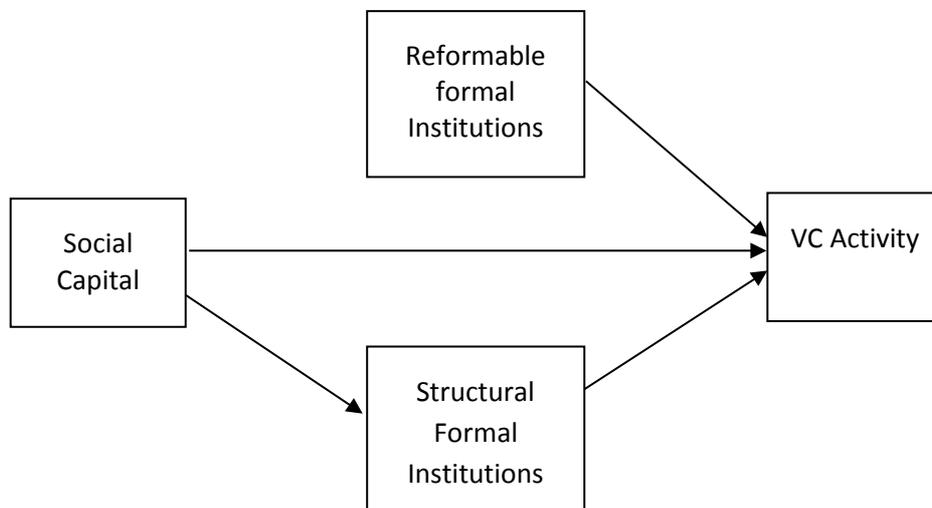
VC, as we consider it nowadays, is a relatively recent “invention” that has emerged in the U.S. following the end of the Second World War. After initial uncertainty and the adoption of different organizational models (see Gompers and Lerner 2001 for a review of the early history), the U.S. VC industry rapidly evolved towards a consolidated organizational model. Based on the sizeable success of the industry in the U.S., and the impact the VC industry had on the technological progress (e.g. Florida and Kenney 1988) and new firm creation and growth (e.g. Samila and Sorenson 2011), this typology of investments has been promptly reputed to represent a key financing ingredient for economic development overall (Gompers and Lerner, 2004). This notwithstanding, the VC industry has not diffused as successfully as expected across the world, despite extensive efforts of governments to promote it. Moreover, despite globalization and diffusion of technologies that allow access to remote markets, which could in turn enable venture capitalists to relatively easily invest abroad, venture capital can still very much be considered a local and geographically bounded market (Bruton, Fried, and Manigart, 2005). This applies to both the U.S. (e.g. Chen et al. 2010; Gompers and Lerner 2004; Sorenson and Stuart 2001) as well as to Europe (e.g. Bertoni et al. 2015; Lutz et al. 2013).¹⁶ Therefore, VC activity, which refers to the volume of successful transactions between equity capital providers (i.e. more precisely, general managers of VC funds) and entrepreneurs seeking for the financial resources, appears to be strongly contingent on the setting within which VC firms operate, similarly to any other economic transaction. In other terms, VC is itself a (market-based) institution and likewise other institutions, it is very likely to be influenced by the surrounding institutional framework (P. A. Hall and Soskice, 2001). There have been vast attempts in the

¹⁶ Despite globalization and diffusion of technologies that allow access to remote markets, which in turn enables venture capitalists to relatively easily invest abroad, they still choose to work nationally, or even locally (Bruton et al., 2005). Some VC firms do decide to invest internationally, but the proportion of them is still relatively small. For recent studies on cross-border VC investments, see for instance Bottazzi, Da Rin, and Hellmann (2011), Groh and Liechtenstein (2011), Groh and von Liechtenstein (2011), and Hain et al. (2016).

literature to understand why VC activity has failed to widely grow in some institutional habitats. Most of the studies have tested the usual suspects – formal institutions such as regulations and contractual rules, governmental quality and political conditions of the environment, the structure and development of financial markets and macroeconomic conditions. What most of these studies have, however, missed out to do is to account for the informal group of institutions, which are intangible features embedded in the society (e.g. conventions, codes of conduct, and social norms) and stem from the cultural heritage (North 1990; Williamson 2000). The general economic literature has shown that both formal and informal institutional characteristics of a country define the “rules of the game” that are met by the economic agents (Peng et al., 2009).¹⁷ To this extent, both groups of institutions have already been shown to impact entrepreneurship (e.g. Stenholm et al. 2013) and innovation activities (e.g. Shane 1993), and hence they appear to be critical to consider when comprehensively studying VC activity across different geographical areas—an approach that has been fairly neglected by the extant literature on VC (Zacharakis et al., 2007).¹⁸

Grounding on the seminal contributions in the new institutional economics perspective, we consider VC as potentially affected by formal and informal features that compose a specific institutional matrix (North, 1990), that in turn, is subject to some degree of changes over time. Specifically, similarly to other contributions in entrepreneurship studies (e.g. Aidis et al. 2012), we follow Williamson’s (2000) model of hierarchy of institutions to analyse the effects of different types of institutions on VC. Figure 5 summarizes the proposed conceptual framework.

Figure 5.
The conceptual model of the study.



A first layer, the most resistant to change, is represented by social capital (Level 1 in Williamson’s terminology) which is an informal institution that, as such, may shape formal institutions related to the institutional environment and governance structures of an economic system (L2 and L3). These formal features do change in the long and medium terms (respectively), while they are rather stable

¹⁷ The need for considering informal institutions together with formal ones in analyzing the occurrence and the efficiency of economic transactions was already made clear by North (1990, page 35): ‘Thus, it should be readily apparent that to develop a model of institutions, we must explore in depth the structural characteristics of informal constraints, formal rules, and enforcement’.

¹⁸ It is worthwhile to acknowledge that the studies of the relationship between institutions (including the informal ones and culture) and economic development have been largely present in the literature. However, venture capital activity, as a potential mechanism in place between institutions and economic development, has been understudied in this context.

in the short-run. We refer to them as *structural formal institutions* (e.g. rule of law, government effectiveness, etc.) Both social capital and *structural formal institutions* do impact the ‘resources allocation and the employment’ (Williamson 2000, p. 597) arising from an economy, and hence, also VC (L4). In this respect, VC is a market that is likely to be also affected by the formal institutions at the same level (L4) that directly and immediately impact resources allocation and the employment performances of an economy. Those formal institutions are (comparatively) more receptive to change (e.g. taxation, administrative procedures, investors’ protection, etc.), specifically under a policy-making perspective. We label this second type of formal institutions as *reformable formal institutions*.

3.2.2. Hypotheses development

Indeed, there have been only few exceptions that did take into account (only to a certain degree) informal institutions in the study of VC development. Aggarwal and Goodell (2014) study 82 countries and find that access to start-up financing is negatively associated with uncertainty avoidance and masculinity of a country. Antonczyk and Salzmann (2012) take a behavioral perspective and show evidence of a negative correlation between both collectivism and uncertainty avoidance, and VC activity. Li and Zahra (2012) find symmetric results and provide additional evidence that these two informal institutions also dampen the positive impact of developed formal institutions. Cumming et al. (2013) confirm the negative impact of uncertainty avoidance on, in their case, Cleantech VC activity. Hain et al. (2016) focus on cross-border VC investments, yet find that another informal institution—trust plays a significant role for VC. Namely, they provide evidence that high levels of relational and institutional trust decrease transaction costs and thus increase the probability of VC investments by foreign VC funds. However, trust is a key yet only one component of social capital, which is also described through civic norms and social networks (Arrow, 1972; Glaeser, Laibson, and Sacerdote, 2002). Surprisingly, none of the studies comprehensively included these other two important aspects of informal institutions, while social capital as a whole has already been shown to be a prominent determinant of closely related phenomena: entrepreneurial opportunity recognition (e.g. De Carolis and Saporito 2006), entrepreneurial success (Bosma, Van Praag, Thurik, and de Wit, 2004; Brüderl and Preisendörfer, 1998), and even access of entrepreneurial ventures to external financial capital, as the amount of time and investment required to gather information, as well as willingness to share the information, are expected to be lower in the case of high social capital (Florin, Lubatkin, and Schulze, 2003). To that end, social capital is believed to alleviate transaction costs and informal asymmetries, two of the most significant impediments of VC activity that yield adverse selection and moral hazard issues (e.g. Amit et al. 1993; MacIntoch 1994), which imposes the importance of studying social capital as a determinant of VC activity.

3.2.2.1. Social capital as a determinant of VC activity

While the definition of social capital has not been fully consolidated yet (Wu, 2008), it may be widely defined as the capacity of agents to obtain benefits from their social structures (Davidsson and Honig, 2003). It thus describes more than a structure or a network. Social capital also embraces social interactions, ties, trust, and value systems that facilitate the activities of individuals located in a particular context (Liao and Welsch, 2005; Nahapiet and Ghoshal, 1998). Social capital theory is valid on both a micro level, as the ability of single agents such as individuals or organizations to take advantage of their social networks and ties, and on a macro level, as the capacity of communities to leverage the extent to which social exchange takes place (Nahapiet and Ghoshal, 1998).

High levels of social capital in a society can be expected to abate information asymmetries, and by that, have a positive influence on VC activity (Davidsson and Honig, 2003; Leff, 1979). Namely, social capital may assist entrepreneurs by facilitating access to novel and original information (e.g. Aldrich and Zimmer 1986). By that, the prospective entrepreneurs will be able to discover more innovative and promising ideas (Laursen, Masciarelli, and Prencipe, 2012), which have a higher potential of being VC financed. Furthermore, being diversely connected enhances information sharing, which principally improves the adverse selection issue and matching (Shane and Cable, 2002). As proposed by Burt (1992), referrals are more common in communities with highly developed social capital, and they help having “your name mentioned at the right time in the right place” (page 63), which leads to more opportunities. Entrepreneurs and venture capitalists, who do not have to be necessarily members of the same networks, can increase the probability of meeting each other and sharing the right information that will facilitate a match between them. A social system that relies extensively on ties will reduce the time and investment needed to gather the relevant information (Florin et al., 2003). Additionally, the high inter-relational trust plays a major role in post-investment process that should lessen moral hazard issues, and alleviate the transaction costs. Once a match takes place between VC investor(s) and an entrepreneurial venture, having the society relying on social networks also creates disciplinary measures to behave ethically. In the latter case, the moral hazard of misbehaving and taking advantage of the investment by the entrepreneurs or VCs (see de Bettignies and Brander 2007 for the ‘double-sided moral hazard’ problem in VC financing) is dampened by the high risk of consequent negative reputation widely diffusing among the wide networks. Relatedly, individuals in societies with high social capital are more commonly prone to rely on professional relationships, as they trust more their acquaintances (Davidsson and Honig 2003) and are more open to information sharing (Dyer and Chu 2003). All these arguments are also fully in line with both bridging social capital based on weak ties and bonding social capital based on strong ties (Granovetter, 1973; Wu, 2008).

In a nutshell, social capital is expected to propel information flow, decrease transaction costs (Adler and Kwon 2002; Putnam 2000), and in turn boost VC activity, so we hypothesize the following:

***Hypothesis 1:** More developed social capital leads to more VC activity in a country.*

3.2.2.2. Formal institutions as determinants of VC activity

As previously mentioned, the extant studies have theorized and empirically confirmed the role of formal institutions in VC activity. In particular, entrepreneurial finance literature has examined four broad features of the institutional environment that define formal boundaries for entrepreneurial and financial activities as determinants of VC activity. First, regulations and contractual rules that cover a large range of legislations such as low taxations levels (Bonini and Alkan, 2012; Da Rin, Nicodano, and Sembenelli, 2006; Gompers and Lerner, 1999; Romain and van Pottelsberghe, 2004; Schroeder, 2011), advantageous accounting standards (Jeng and Wells, 2000), flexible labour market regulations (Félix, Pires, and Gulamhussen, 2013; Jeng and Wells, 2000; Romain and van Pottelsberghe, 2004), bankruptcy laws (Armour and Cumming, 2006), and investors protection legislations (Aggarwal and Goodell, 2014; Bedu and Montalban, 2014; Groh and Wallmeroth, 2016). Second, governmental quality and political conditions of the environment appear to have a noteworthy influence on VC activity too (Li and Zahra, 2012). Among others, the following are found to be relevant: governmental effectiveness, quality of bureaucracy, political stability, rule of law, voice and accountability (Cherif and Gazdar, 2009), corruption (Groh and Wallmeroth, 2016), and structure of the legal system (Bonini and Alkan, 2012). Third, the structure and development of

financial market occur as an additional set of relevant determinants of VC, particularly on the supply side. The development level of equity markets such as stock market capitalization (Armour and Cumming 2006; Guler and Guillén 2010), stock market turnover (Schroeder 2011), financial architecture (i.e. ratio of the size of the stock market to the size of banking, see for instance Aggarwal and Goodell 2014), Initial Public Offering (IPO) rate (Black and Gilson 1998; Bonini and Alkan 2012; Ning et al. 2015) Mergers and Acquisitions (M&A) activity (Groh and Wallmeroth, 2016), as well as previous successful VC investments (Chen et al. 2010; Li and Zahra 2012) are found to be important drivers of VC activity. Fourth, macroeconomic conditions are proven to play a relevant part in determining VC activity also, including Gross Domestic Product (GDP) level (Carvell, Kim, Ma, and Ukhov, 2013; Félix et al., 2013; Li and Zahra, 2012), GDP growth rate and industry production index (Ning et al., 2015), short and long term interest rates (Romain and van Pottelsberghe, 2004), trends like financial crisis or early 2000s' Internet bubble (Cumming and MacIntosh, 2006; Li and Zahra, 2012; Ning et al., 2015; Schertler, 2003), and unemployment rate (Groh and Wallmeroth, 2016).

What is missing in these studies is a holistic framework that provides a classification of the formal institutions accordingly to the degree to which they can be influenced or modified. Not all formal institutions are the same in this respect. For instance, what is referred to as governmental quality and political conditions is a feature that cannot be directly impacted nor changed (i.e. improved) in the short-term. These characteristics of formal institutions usually exhibit important path dependence dynamics, and require decades, if not even centuries, to be altered (Kingston and Caballero, 2009; North, 1990, 2005; Williamson, 2000). They are rather structural in their nature. Moreover, their improvement would clearly benefit a much wider scope of economic activities that date back much further than VC, yet some countries are still considerably laggard in their development. On the positive note, there are formal institutions that are indeed reformable in the short-term too. Mainly, these are legislation and regulations (taxation regulations, administrative procedures for starting a new business, investors and shareholders protection rights, etc.) put in place by governmental bodies, and they can be modified and enforced virtually instantaneously (North 1990, perhaps too optimistically, literally sustains 'overnight', page 6). In turn, understanding their impact on VC activity separately from the other formal institutions appears to be critical for drawing useful implications for policy makers, whose goals are to spur high-potential entrepreneurs (Levie, Autio, Acs, and Hart, 2014). Therefore, we make a distinction between formal institutions and posit the following two related hypotheses:

***Hypothesis 2a:** More developed structural formal institutions lead to more VC activity in a country.*

***Hypothesis 2b:** More developed reformable formal institutions lead to more VC activity in a country.*

3.2.2.3. Social capital and formal institutions in relation to VC activity

Apart from formal and informal institutions having the direct effects on VC activity, it is reasonable to ponder the mutual relationship of the former two in relation to the VC activity. To shed more light on that issue, it is worthwhile to explore more complex theoretical models using mediators, as suggested by Dubin (1978) and Sutton and Staw (1995). In particular, following the mainstream literature on the determinants of VC activity and Williamson's (2000) level (L) classifications of institutions, we posit that social capital (L1) impacts VC activity (L4) through formal institutions (L2

and L3). Grounding on the evidence put forward by Djankov et al. (2003) that long lasting social capital structures have been able to explain institution's design and performance, we can expect that *structural formal institutions* are the product of social capital structures (Arrow, 1972; Glaeser et al., 2002). North (1989) suggests that the transaction costs related to monitoring and enforcement increase in the absence of social networks, but can be replaced and/or complemented by formal organizations and institutions (see also North 1990, page 47). Moreover, there is empirical evidence that there is a substitution effect between social capital and other institutions (e.g. Guiso et al. 2004). While formal institutions may not fully solve the transaction costs and information asymmetries, they may create an appropriate incentive structure for VC activity that can offset the adverse selection and moral hazard issues (e.g. Sahlman 1990). That is, once the *structural formal institutions* are present and strong, they are sufficient to elevate the information asymmetries and substitute the role of social capital. Furthermore, social capital is argued to be an antecedent of *structural formal institutions*. While being only one of many determinants, social capital has historically shown to be paramount for *structural formal institutions'* development, due to the path dependence and slow change in the structural institutions. On the contrary, social capital should not, by definition, be expected to significantly impact *reformable formal institutions*, which can be reformed virtually at (political) will. Moreover, there should be no reverse causality between social capital and *structural formal institutions* in the short-term, as social capital has been proven to be even more consistent over time (e.g. Becker et al. 2016; Grosjean 2011; Putnam 1993).¹⁹ Hence, we hypothesize the following:

Hypothesis 3: The relationship between social capital and venture capital activity is mediated by structural formal institutions.

3.3. Data and methodology

Our analysis is based on a longitudinal European cross-country dataset composed of information from multiple secondary sources. We focus on the 1997-2015 period, so that we can compare VC activity over a period that covers the years during which VC became "institutionalized" and gained significance in Europe (Da Rin et al., 2006; Li and Zahra, 2012). Overall, we have an unbalanced panel dataset of 18 European countries that are extensively heterogeneous in financial market conditions, economic development, and technological opportunities, as well as in the levels of informal institutions development.²⁰ For example, looking at one of the most important exit mechanisms for VC investors – Mergers & Acquisitions (M&As), this activity was on average high in volume in Ireland and UK in the period under consideration (around 15 per cent of GDP), medium in Spain, France and Italy (around 7 per cent), and relatively low in Austria (around 4 per cent) and Czech Republic (around 2 per cent). Or considering private R&D spending, that is generally high in Finland and Sweden (more than two per cent of GDP), at a relatively medium level in Ireland and the Netherlands (one per cent), and low in Italy and Portugal (less than 0.5 per cent). Even more importantly, the European context is an attractive test bed due to the significant variation in the degree of VC industry development. Only a few countries have managed to cultivate a vibrant VC

¹⁹ Multiple studies, such as Guiso et al.'s (2008) and Putnam's (1993) works on the Northern and Southern Italy, have shown that social capital is path dependent and that it has barely changed over centuries across a range of regions. And also the circumstance that informal institutions may rapidly evolve in response to changes in formal institutions is unlikely to occur. Again North (1990) was amongst the firsts to make this point (p. 45): 'Equally important is the fact the informal constraints that are culturally derived will not change immediately in reaction to changes in the formal rules.'

²⁰ The countries included in the study are Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

industry to date. For instance, VC investments in Sweden and the United Kingdom have reached more than six per cent of GDP on average. The rest of the countries, and in particular in the Southern Europe (Italy, Portugal, Spain, Greece) have mostly failed to spark the VC activity, with barely one per cent of GDP invested in VC.²¹

3.3.1. Variables

3.3.1.1. Dependent variables

The dependent variable (**VC activity**) is sourced from the Invest Europe (former European Venture Capital Association), whose yearbooks are compiled from an elaborate yearly survey of member and non-member VC firms.²² The variable is constructed as an aggregate amount of total investments in companies headquartered in the country in a given year, as reported in the Invest Europe yearbooks. The variable includes the following three groups of investments: seed, start-up and expansion,²³ and in the further analyses, we additionally estimate the model with each of the investment categories separately, for the sake of understanding better the VC activity dynamics, and for robustness of our results. We normalized the aggregate amount of VC investments per GDP (collected from the World Bank database) to facilitate a valid comparison among the countries of various size classes, as the majority of related works do too (e.g. Da Rin et al. 2006; Li and Zahra 2012).²⁴

3.3.1.2. Explanatory variables

As for the explanatory variables, information on social capital was collected from the European Values Survey (EVS), which represents the most comprehensive research project on human values in Europe. EVS is a large-scale, cross-national, and longitudinal survey research program on how Europeans think about family, work, religion, politics and society. As the survey has been periodically carried out (every nine years), but on a varying sample of countries in each of the iterations, and given the fact that this type of indicators are fairly inert and require decades or even centuries to evolve (see *supra*), they have been considered constant over the examined period. In particular, an index (**Social Capital**) has been created based on an array of available indicators: (1) active membership in a range of organizations and associations (political, professional, religious and leisure related) proxying the extent of social networks development in a society; (2) degree to which the people can be trusted as a measure of trust within the society; and (3) voluntary activity for various causes (similar to the associations related to membership) accounting for the civic norms in a society. Factorization grounded on the principal component analysis was carried out to generate the index, with Cronbach's alpha of the constructed index equal to 0.678.

The variable approximating the level of development of *structural formal institutions* (**FI Index**) is also built using factorization (again based on the principal component analysis, with Cronbach's alpha of 0.956) of indicators related to the general institutional characteristics of a country, as well as the institutional dimensions that are key to entrepreneurial and VC activity. Analogously to Li and Zahra (2012), this group of indicators is sourced from the widely used World Bank's Worldwide

²¹ See the descriptive statistics below for a more detailed overview of VC activity across the sampled countries.

²² For a detailed overview of the methodology used for the creation of the database refer to the official website of Invest Europe (<http://www.investeurope.eu/>).

²³ We exclude the replacement capital and buyouts from the analysis and focus only on the narrow definition of Venture Capital (Jeng and Wells, 2000), in order to avoid mixing VC activity with total Private Equity (PE) activity.

²⁴ Using an alternative normalization, i.e. VC investments amount per capita does not essentially change the obtained results.

Governance Indicators and include measures of **Political Stability**, **Government Effectiveness**, **Voice and Accountability**, **Regulatory Quality**, **Rule of Law** and **Control of Corruption**.²⁵

Equally important, we include as explanatory variables also the measures of legislations that more specifically define the formal boundaries for entrepreneurial and financial activities (Antonczyk and Salzmann, 2012; Jeng and Wells, 2000) and that are (in principle) modifiable in the short-run by policy makers (Coenen, McAdam, and Straub, 2008; Nickell and Layard, 1999). We refer to these as *reformable formal institutions*. In particular, we employ three variables sourced from the World Bank database. First, we use the strictness of **Employment protection** legislations, which has been previously found to be a significant driver of VC activity (Félix et al. 2013; Jeng and Wells 2000), especially on the demand-side as rigid employment regulations can act as a barrier to entrepreneurship by increasing the cost of human capital (Fonseca, Lopez-Garcia, and Pissarides, 2001; Lerner and Tåg, 2013). Second, we include the levels of capital gains and other-related taxes that are found to influence the incentive system for VC in the variable **Taxations** (Da Rin et al. 2006; Gompers and Lerner 1999). As explained by Poterba (1989), the argument for the importance of taxations for VC activity are the facts that high taxes could decrease incentives for both the supply of venture capital funds (investors' payoff will be decreased) and the demand for VC investments (new venture founders will also be penalized for potential extra-profits). Third, we add to the model a measure of **Investor Protection** rights accounting for the strength of minority shareholder protections against misuse of corporate assets by directors. The protection of investors is intended to prevent opportunistic behavior by the entrepreneurs following the investment, and by that induce the supply of VC (Bedu and Montalban, 2014; Cumming et al., 2016).²⁶

3.3.1.3. Control variables

The control variables are collected from a broad list of secondary data sources. First, we include in the model a set of measures to account for the level of development of financial markets, as a relevant determinant of VC activity, particularly on the supply side, according to an array of empirical studies (e.g. Black and Gilson 1998; Bonini and Alkan 2012; Guler and Guillén 2010; Ning et al. 2015). The more the equity markets are developed, the more the incentive for institutional investors and VCs to invest. We include the volume of Initial Public Offerings (**IPO volume**) and Mergers & Acquisitions (**M&A Volume**), both as percentages of total GDP in a given year. We source them from the Bureau van Dijk's Zephyr database and World Bank database. Furthermore, we control for macroeconomic conditions that are proven to have a relevant part in determining VC activity; **GDP growth** and **Inflation** rates (Ning et al., 2015) sourced from the World Bank database,

²⁵ From the World Bank website source: “*Voice and Accountability* captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media; *Political Stability* captures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism; *Government Effectiveness* captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies; *Regulatory Quality* captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development; *Rule of Law* captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence; *Control of Corruption* captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as “capture” of the state by elites and private interests.” For further methodological details on how indicators are built see Kaufmann et al. (2011).

²⁶ As we are not able to obtain the values of **Investor Protection** variable for the full period of interest, by relying on the fact that the value (for the known) period does not fluctuate significantly, we use a time-invariant indicator for each country. As a robustness check, we include a longitudinal version of the measure of investor protection for a subsample of country-year pairs (year 2004 onwards), and the results remain unchanged.

business enterprise expenditure on R&D as a percentage of GDP (*Technological Opportunity*) as a proxy of innovative potential of a country in a given year sourced from the OECD, trends such as *Financial crisis* and *Internet bubble* (Cumming and MacIntosh, 2006; Li and Zahra, 2012; Ning et al., 2015; Schertler, 2003), as well as legal system structure as divided by (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1998) in four categories: *Common, French, German* and *Scandinavian* (Bonini and Alkan, 2012; Hain et al., 2016; Leleux and Surlemont, 2003).²⁷

The full list of variables including also the used control variables is presented in Table 6, while their correlation is shown in Table 7. Summary statistics on the key variable of interest, VC activity, is presented in Table 8.

Table 6.
List of variables.

Variable	Description	Source (available period)
VC Activity	Total amount of VC investments per GDP PPP.	Invest Europe, World Bank (1997-2015)
Social Capital	Proxy of the level of social capital development; The composite index is generated by factorization from the following indicators related to the extent of social networks, trust and civic norms: Membership in labour unions, political parties or organizations, professional associations, religious organizations, sports, educational, art, music or cultural organizations; People can be trusted; Voluntary work for in labour unions, political parties or organizations, professional associations, religious organizations, sports, educational, art, music or cultural organizations.	European Value Survey (time-invariant)
FI Index	Proxy of the level of <i>structural formal institutional</i> development; The composite index is generated by factorization from the following six indicators: Governmental Effectiveness, Rule of Law, Political Stability, Voice and Accountability, Regulatory Quality, Control of Corruption.	World Governance Index (1998-2014)
Employment Protection	Index that captures strictness of employment protection legislation in terms of individual and collective dismissals (regular contracts).	OECD (1997-2013)
Taxations	Taxes on income, profits and capital gains as a percentage of total taxes.	World Bank (1997-2013)
Investor Protection	Strength of minority investor protection index (0-10).	World Bank (time-invariant)
IPO Volume	Total value of IPO as a percentage of GDP.	Zephyr Database (1997-2015)
M&A Volume	Total value of M&A deals as a percentage of GDP.	Zephyr Database (1997-2015)
GDP Growth	Annual percentage GDP PPP growth.	World Bank (1997-2015)
Inflation	Annual growth rate of the GDP implicit deflator.	World Bank (1997-2015)
Technological Opportunity	Business enterprise expenditure on research and development (BERD) as a percentage of GDP.	OECD (1998-2014)
Internet Bubble	Dummy variable that equals 1 for the years of the Internet Bubble (1999-2000), and 0 otherwise.	-
Financial Crisis	Dummy variable that equals 1 for the years of the Financial Crisis (2007-2008), and 0 otherwise.	-
Legal System dummies	Dummy indicators that capture the effect of legal institutions and classifies countries according to legal tradition by taking into account several characteristics of the legal system; The legal systems are clustered in four groups: Common (English), French, German and Scandinavian.	La Porta et al. (1998) (time-invariant)

²⁷ A discussion on alternative controls is presented in the robustness analysis section (see *infra*).



Table 7.
Correlation matrix.

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) VC Activity	1																
(2) Social Capital	0.4774	1															
(3) FI Index	0.5436	0.7508	1														
(4) Employment Protection	-0.1670	-0.0866	-0.2726	1													
(5) Taxations	-0.0393	-0.0879	-0.0666	-0.1990	1												
(6) Investor Protection	0.3168	0.2143	0.2386	-0.2106	0.1833	1											
(7) IPO Volume	0.2783	0.1046	0.2037	-0.2001	0.0995	0.1100	1										
(8) M&A Volume	0.3993	0.2490	0.2802	-0.2176	0.1007	0.2074	0.5130	1									
(9) GDP Growth	0.1810	0.0410	0.1740	-0.0606	-0.0238	0.0901	0.0344	0.2051	1								
(10) Inflation	0.0742	-0.1241	-0.0859	0.0985	-0.0089	0.0387	-0.0167	0.0194	0.2776	1							
(11) Tech. Opportunity	0.3997	0.5204	0.6919	-0.2937	-0.2940	0.0461	0.1176	0.1327	-0.0442	-0.2962	1						
(12) Internet Bubble	0.1769	-0.0065	0.0238	0.0861	-0.0345	0.0110	0.0743	0.1626	0.2821	0.1351	-0.0661	1					
(13) Financial Crisis	-0.0194	-0.0019	-0.0125	0.0528	0.0543	-0.0079	0.1151	0.1352	-0.0158	0.0984	0.0086	-0.1190	1				
(14) Common Legal System	0.1493	-0.0102	0.1439	-0.4428	0.2123	0.5568	0.2647	0.3445	0.2022	0.0003	-0.0980	0.0006	-0.0032	1			
(15) French Legal System	-0.2600	-0.2938	-0.4823	0.3805	0.3571	-0.3178	-0.0094	-0.0889	-0.1599	-0.0852	-0.4658	0.0058	-0.0029	-0.3125	1		
(16) German Legal System	-0.2404	-0.2652	-0.1434	-0.0290	-0.2650	-0.4389	-0.1394	-0.1875	0.0307	0.0704	0.0439	-0.0083	0.0109	-0.1980	-0.4510	1	
(17) Scandinavian Legal Sys.	0.4194	0.6040	0.5854	-0.0731	-0.3154	0.3687	-0.0552	0.0223	0.0005	-0.0295	0.5684	0.0009	-0.0049	-0.2089	-0.4758	-0.3014	1

Table 8.
Summary of country-level venture capital activity.

Country	Mean annual VC activity: VC investments as a portion of GDP [‰]	Mean annual VC activity: VC investments per capita [Euro]	Mean annual VC activity: Total amount [Mil. Euro]
Austria	0.224	11.1163	61.5517
Belgium	0.669	31.7894	218.9635
Czech Republic	0.073	1.8866	13.5587
Denmark	0.074	58.7760	211.3741
Finland	0.834	38.6939	135.1269
France	0.627	28.8312	1173.3640
Germany	0.487	22.0462	1220.0690
Greece	0.113	3.4676	25.4425
Hungary	0.160	4.0850	28.0795
Ireland	0.519	27.5164	77.4037
Italy	0.253	10.6141	408.5370
Netherlands	0.839	42.1471	460.1069
Norway	0.887	59.6494	182.2057
Portugal	0.340	10.9076	76.3198
Spain	0.418	15.6522	458.8827
Sweden	1.259	66.5008	391.6044
Switzerland	0.751	48.2713	248.0176
United Kingdom	1.265	61.5254	2434.2730

Notes: Top three values in each category (i.e. column) are highlighted.

3.3.2. Methodology

Our baseline estimation model is random effects generalized least squares (GLS), which allows the variances to differ across countries, while it controls for unobservable country characteristics. The random effects GLS model also permits inclusion of time-invariant variables in our estimation, such as legal system structure and informal institutions. In order to test the hypotheses 1, 2a and 2b we include the direct effects of the key explanatory variables, step by step. We first estimate a model with the social capital variables (**Social Capital**) as an explanatory one (Model 1). Second, we run a model with a measure of *structural formal institutions (FI Index)* in Model 2, as well as add the three *reformable formal institutions (Employment protection, Taxations, Investor Protections)* in Model 3. In order to test the mediation effect and hypothesis 3, we closely follow the instructions provided by Baron and Kenny (1986). We use Model 1 as the first step of the recommended procedure, which should support the hypothesis that social capital does have an effect on VC activity. Second, and as a middle step necessary to establish a mediation effect, we test whether the social capital variable (**Social Capital**) is also a determinant of the level of development of *structural formal institutions*, and we use the same model specification with **FI Index** as the dependent variable (Model 4). Third, we estimate the original model, with **VC activity** as the dependent variable, in which both social capital variable (**Social Capital**) and the potential mediator (**FI Index**) are included, in order to test if the effect of the former disappears once the latter is added to the model (Model 5). Finally, we estimate the full specification of the model with all the variables included (Model 6).

3.4. Results and discussion

The main results are presented in Table 9. The estimates of Model 1 suggest confirmation of *hypothesis 1*. Namely, social capital yields to be a significant determinant of VC activity. These findings are in line with those put forward by Bottazzi et al. (2016), who prove that trust is a critical

feature of the environment for investments in general and for VC in particular, and Hain et al. (2016) who show how countries with high levels of trust attract more cross-border VC investments. We complement this view by providing evidence that not only trust but also the other features of social capital (social networks and civic norms) facilitate VC transactions.

Based on further analysis, *structural formal institutions* are found to have a significant positive impact on VC activity too (see Model 2), in line with *hypothesis 2a* and corroborate the findings of Li and Zahra (2012), by verifying them also when one looks at the sole European context. On the contrary, *hypothesis 2b* is only partially confirmed. Out of the three *reformable formal institutions* added in Model 3, only the level of taxations appears to be a significant determinant of VC activity in our sample. High tax rates negatively influence VC activity in Europe and represent a major obstacle for the development of the VC industry. This result confirms the findings of Da Rin et al. (2006) and Schroeder (2011) on similar samples of European countries. The result is not only significant in statistical but also economic terms. For instance, based on our estimates, *ceteris paribus*, decreasing the total taxation level from 50 to 40 per cent would lead a country to a stable 10.11 per cent more of VC activity in 15 years. Nevertheless, it is worth noting that the effect of the taxation level change is relatively lower than what would be the effect of changing the *structural formal institutions*. If the *structural formal institutions* were improved to the same degree as the taxation level in the example above (from 37th to 71st percentile in our sample), the VC surge after 5 years would be 8.96 per cent; after 10 years 18.72 per cent; and after 15 years 29.36 per cent. While the impact of the *structural formal institutions* on VC activity is, in principle, greater than the one exerted by the overall taxation level, changing the former is by far more demanding and uncertain than the latter. Furthermore, we do not find clear support for *hypothesis 2b* related to the other two measures of regulations. Unlike the majority of the existing studies (e.g. Bonini and Alkan 2012; Jeng and Wells 2000), though we also find an adverse effect of the rigidity of labour regulations on VC activity, they yield to be non-significant. Bedu and Montalban (2014) reach the same conclusion, even though they focus on leveraged buyouts and not narrowly defined VC investments. Similarly, the coefficient of the strength of minority investors protection is positive and non-significant in our analysis, coherent with the results of Cumming et al. (2016) and Jeng and Wells (2000). While these two policies seem to push the VC activity in the right direction, they do not appear to be capable of providing a strong effect.

Finally, based on the estimations of Models 4-6, the relationship between social capital and VC activity appears to be mediated by *structural formal institutions*, as *hypothesis 3* predicts. Social capital is a significant driver of *structural formal institutions* (Model 4), which is the necessary condition for the mediation to hold (Baron and Kenny, 1986). Then, when both the variables related to social capital and *structural formal institutions* are included in the same model (Models 5), the significance of the direct effect of social capital disappears. The same result holds when the *reformable formal institutions* are introduced (Model 6), speaking in favour of the robustness of the model. This finding, in fact, provides a mechanism through which social capital impacts VC – social capital *per se* is not crucial for the volume of VC investment, but the fact that it determines the level of development of *structural formal institutions* makes it relevant as an indirect driver of VC activity. This finding represents another original contribution of this work and highlights that even if social capital is ‘in the back seat’, its role cannot be neglected when VC activity is studied.

The results related to the control variables also provide interesting insights. We confirm the empirical findings of the previous studies that exit markets play a significant role for VC activity (e.g. Bonini and Alkan 2012; Guler and Guillén 2010; Ning et al. 2015). In particular, similarly to Félix et al. (2013), we find that rich M&A markets represent a substantial driver in Europe, where start-ups

typically get acquired and IPO markets are not as vibrant. The results also confirm that the exogenous worldwide trends play a major role. The Internet bubble has brought more VC activity across the old continent, while the latest financial crisis has hindered the industry. Additionally, we find that GDP growth is positively correlated with VC activity, in line with the extant literature (e.g. Gompers and Lerner 1999; Ning et al. 2015). The surprising result is found for technological opportunities, as unlike the existing studies, we find a negative correlation with VC activity. The negative relationship could also depend on the particular measure we use, i.e. the volume of private R&D investments (analogously to many others in the field, e.g. Da Rin et al. 2006; Félix et al. 2013; Groh and Wallmeroth 2016). Namely, the more capital private companies invest in R&D, the less they might rely on start-ups as a source of technological innovation and they might have less money available for acquisitions, which is one of the key exit mechanisms for start-up. That, in turn, could result in less (innovative) new firms and hence decrease the demand for VC, but also the supply of VC funds (if the investors have fewer opportunities to exit and cash out on their investments).

Table 9.
Determinants of venture capital activity on a country level (unbalanced panel data, 1997-2015).

Model	1	2	3	4	5	6
Dependent variable	VC Activity	VC Activity	VC Activity	FI Index	VC Activity	VC Activity
<i>Social Capital</i>	0.007 ** (0.030)			0.671 *** (0.000)	-0.003 (0.572)	-0.002 (0.592)
<i>FI Index</i>		0.016 *** (0.000)	0.018 *** (0.000)		0.017 *** (0.002)	0.020 *** (0.001)
<i>Employment Protection</i>			-0.000 (0.703)			-0.000 (0.969)
<i>Taxations</i>			-0.001 ** (0.014)			-0.001 ** (0.014)
<i>Investor Protection</i>			0.011 (0.106)			0.011 (0.109)
<i>IPO Volume</i>	0.861 (0.106)	0.699 (0.191)	0.725 (0.177)	-1.010 (0.543)	0.688 (0.195)	0.697 (0.188)
<i>M&A Volume</i>	0.329 *** (0.003)	0.312 *** (0.004)	0.320 *** (0.003)	-0.382 (0.282)	0.313 *** (0.004)	0.314 *** (0.004)
<i>GDP Growth</i>	0.005 *** (0.000)	0.005 *** (0.000)	0.004 *** (0.000)	0.034 *** (0.001)	0.005 *** (0.000)	0.004 *** (0.000)
<i>Inflation</i>	0.001 (0.516)	0.001 (0.326)	0.001 (0.220)	0.019 (0.286)	0.001 (0.339)	0.001 (0.240)
<i>Technological Opportunity</i>	-0.000 *** (0.003)	-0.000 *** (0.002)	-0.000 *** (0.003)	-0.000 (0.519)	-0.000 *** (0.002)	-0.000 *** (0.003)
<i>Internet Bubble</i>	0.044 *** (0.001)	0.044 *** (0.001)	0.043 *** (0.001)	0.036 (0.527)	0.044 *** (0.001)	0.043 *** (0.001)
<i>Financial Crisis</i>	-0.047 *** (0.000)	-0.044 *** (0.000)	-0.043 *** (0.000)	-0.071 * (0.082)	-0.044 *** (0.000)	-0.043 *** (0.000)
<i>French Legal System</i>	-0.007 (0.758)	0.003 (0.903)	0.022 (0.370)	-0.734 *** (0.003)	0.003 (0.876)	0.020 (0.424)
<i>German Legal System</i>	-0.012 (0.603)	-0.010 (0.634)	0.005 (0.852)	-0.207 (0.565)	-0.011 (0.617)	0.002 (0.936)
<i>Scandinavian Legal System</i>	0.033 (0.197)	0.028 (0.297)	0.028 (0.229)	-0.005 (0.982)	0.030 (0.252)	0.028 (0.226)
<i>Constant</i>	0.015 (0.455)	0.018 (0.375)	-0.039 (0.537)	0.019 (0.879)	0.019 (0.352)	-0.035 (0.599)
Observations	318	318	318	318	318	318
Number of countries	18	18	18	18	18	18
Wald chi2	533.44	374.54	612.91	97.08	674.61	709.31
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Models 1-6 are estimated using GLS (random effects). Errors (in parenthesis) are clustered with respect to country ID. * p<0.1, ** p<0.05, *** p<0.01.

3.4.1. Robustness analysis

We run several robustness analyses to corroborate the findings. We deploy Structural Equation Modeling (SEM) technique, which should offer a reliable alternative method for estimating mediation effect. SEM allows for relatively easier interpretation and estimation of mediation hypotheses because it can yield results based on longitudinal data in a single step of analysis (MacKinnon, 2008). We estimate the full model with social capital, *structural* and *reformable formal institutions* variables, as well as all controls. The results presented in Table 10 (Models 7a and 7b) are almost completely coherent with the mainline analysis. Social capital's impact on VC activity is fully mediated by *structural formal institutions*, while high taxation levels impact VC activity negatively. In this case, the minority investor protection yields to be not only a positive driver of VC like in the baseline analysis, but also a significant one.

Furthermore, as our primary dependent variable is highly correlated through time, we use a dynamic panel data estimator to additionally corroborate the findings. We opt for system generalized method of moments (GMM-SYS) approach given that some of our independent variables are time-invariant. The results of this additional robustness check, which are presented also in Table 10 (Model 8), are virtually the same as the results of the main analysis. Moreover, in order to address the possible problems of endogeneity, we lag all our independent variables and we additionally estimate another specification that excludes two potentially most worrying control variables – GDP growth and inflation. The results are presented in Table 10 (Models 9a and 9b) and fully support the findings of the main analysis.

Then, we execute several tests to corroborate that multicollinearity does not corrupt our results. First, we conduct variance inflation factors (VIF) test, which indicates no concerns of severe multicollinearity (global VIF value is 7.34 for the fully specified model, which is below the “rule of thumb” critical value of 10 according to Gujarati and Porter, 2003). Second, we follow an alternative method proposed by several authors that comprises orthogonalizing highly correlated variables of interest with a modified Gram-Schmidt procedure (Cohen, Cohen, West, and Aiken, 2013; Saville and Wood, 2012). This technique creates transformed variables that are uncorrelated with one another (using *orthog* command in Stata). In this case, the VIF values are substantially lower in general, while the average one was 2.36, and the estimates based on the orthogonalized variables yield virtually unchanged results. Third, we also introduce the variables of *reformable institutions* in the model, one by one, similarly to Desai et al. (2003) and Klapper et al. (2006). The obtained results are analogous to the original analysis (see Table 11, Models 10a, 10b and 10c), as all the coefficients sustain the direction of their impact. The significance of taxation coefficient is even higher in the full specification (from 15% to 1.5%), and hence we rule out the possibility of this finding being driven by multicollinearity, in which case adding highly correlated variables would decrease (and not increase) significance of the corresponding coefficients.

Finally, as we are not able to run fixed effects (FE) estimator because our main model specification includes some country-level time-invariant covariates, a part of the latter variables' (most importantly **Social Capital**) explanatory power might reside in unobserved country characteristics. However, it is fair to say that social capital, as many other institutions, is intrinsically rooted at the national level (see P. A. Hall and Soskice 2001). The inclusion of a set of dummy variables for the legal system of countries in our main model(s) captures a part of the country fixed effects and partially elevates the issue. Additionally, in order to increase the reliability and robustness of our analysis, we also conduct analysis with an alternative country classification following a consolidated approach based on the varieties of capitalism (P. A. Hall and Soskice, 2001). These new results,

presented in Appendix B, totally comply with our key findings. Likewise, we made a general distinction between the Northern European and Mediterranean countries and the results remain unchanged.

Table 10.
Determinants of venture capital activity on a country level (unbalanced panel data, 1997-2015):
Robustness analyses.

Model	7a	7b	8	9a	9b
Method	SEM	SEM	GMM-SYS	RE	RE
Dependent variable	FI Index	VC Activity	VC Activity	VC Activity	VC Activity
<i>Social Capital</i>	0.007 ** (0.030)			0.671 *** (0.000)	-0.003 (0.572)
<i>FI Index</i>		0.016 *** (0.000)	0.018 *** (0.000)		0.017 *** (0.002)
<i>Employment Protection</i>			-0.000 (0.703)		
<i>Taxations</i>			-0.001 ** (0.014)		
<i>Investor Protection</i>			0.011 (0.106)		
<i>IPO Volume</i>	0.861 (0.106)	0.699 (0.191)	0.725 (0.177)	-1.010 (0.543)	0.688 (0.195)
<i>M&A Volume</i>	0.329 *** (0.003)	0.312 *** (0.004)	0.320 *** (0.003)	-0.382 (0.282)	0.313 *** (0.004)
<i>GDP Growth</i>	0.005 *** (0.000)	0.005 *** (0.000)	0.004 *** (0.000)	0.034 *** (0.001)	0.005 *** (0.000)
<i>Inflation</i>	0.001 (0.516)	0.001 (0.326)	0.001 (0.220)	0.019 (0.286)	0.001 (0.339)
<i>Technological Opportunity</i>	-0.000 *** (0.003)	-0.000 *** (0.002)	-0.000 *** (0.003)	-0.000 (0.519)	-0.000 *** (0.002)
<i>Internet Bubble</i>	0.044 *** (0.001)	0.044 *** (0.001)	0.043 *** (0.001)	0.036 (0.527)	0.044 *** (0.001)
<i>Financial Crisis</i>	-0.047 *** (0.000)	-0.044 *** (0.000)	-0.043 *** (0.000)	-0.071 * (0.082)	-0.044 *** (0.000)
<i>French Legal System</i>	-0.007 (0.758)	0.003 (0.903)	0.022 (0.370)	-0.734 *** (0.003)	0.003 (0.876)
<i>German Legal System</i>	-0.012 (0.603)	-0.010 (0.634)	0.005 (0.852)	-0.207 (0.565)	-0.011 (0.617)
<i>Scandinavian Legal System</i>	0.033 (0.197)	0.028 (0.297)	0.028 (0.229)	-0.005 (0.982)	0.030 (0.252)
<i>VC Activity (t-1)</i>					
<i>Constant</i>	0.015 (0.455)	0.018 (0.375)	-0.039 (0.537)	0.019 (0.879)	0.019 (0.352)
Observations	318	318	318	318	332
No. of countries	18	18	18	18	18
Wald chi2				709.31	282.14
Prob > chi2				0.000	0.000
Log likelihood		-5332.958			
AR (1)			-2.13 (0.033) **		
AR (2)			1.23 (0.219)		
Hansen test (p-value)			6.08 [135] (1.000)		

Notes: Models 7a and 7b are estimated using SEM procedure in STATA.

Model 8 is estimated using GMM-SYS with moment conditions of endogenous variables restricted to the interval t-2 (t-3) to t-5 (t-4) for instruments in levels (differences) with finite-sample correction for the two-step covariance matrix developed by Windmeijer (2005); The time-varying independent variables are lagged one time period in the GMM-SYS estimation. Standard errors and p-values of Hansen statistics are reported in round brackets. Degrees of freedom are in square brackets.

Model 9a is estimated using GLS (random effects) with all independent variables lagged for one time unit (year). Models 9b repeats the same estimates with the exclusion of GDP Growth and Inflation variables.

Errors (in parenthesis) are clustered with respect to country ID; * p<0.1, ** p<0.05, *** p<0.01.

Table 11.
Determinants of venture capital activity on a country level (unbalanced panel data, 1997-2015).

Model	10a	10b	10c	11a	11b	12a	12b
Dependent variable	VC Activity	VC Activity	VC Activity	Start-up VC	Start-up VC	Expansion VC	Expansion VC
<i>Social Capital</i>	-0.002 (0.708)	-0.002 (0.719)	-0.002 (0.758)	0.003** (0.028)	-0.000 (0.883)	0.004 (0.200)	-0.001 (0.865)
<i>FI Index</i>	0.015 *** (0.002)	0.016 *** (0.000)	0.016 *** (0.003)		0.005 *** (0.000)		0.012 *** (0.002)
<i>Employment Protection</i>	0.000 (0.612)				-0.000 (0.502)		-0.000 (0.714)
<i>Taxations</i>		-0.001 (0.153)			-0.001 (0.705)		-0.001 *** (0.001)
<i>Investor Protection</i>			0.007 (0.430)		0.002 (0.451)		0.015 *** (0.004)
<i>IPO Volume</i>	0.665 (0.213)	0.653 (0.218)	0.680 (0.203)	0.153 (0.204)	0.124 (0.306)	0.693 (0.109)	0.570 (0.187)
<i>M&A Volume</i>	0.319 *** (0.004)	0.317 *** (0.004)	0.318 *** (0.004)	0.104 *** (0.003)	0.104 *** (0.002)	0.227 *** (0.005)	0.211 *** (0.006)
<i>GDP Growth</i>	0.004 *** (0.002)	0.004 *** (0.002)	0.004 *** (0.003)	0.001 *** (0.001)	0.001 ** (0.038)	0.003 *** (0.001)	0.003 *** (0.006)
<i>Inflation</i>	0.001 (0.394)	0.001 (0.300)	0.001 (0.393)	-0.001 (0.888)	-0.001 (0.663)	0.001 (0.262)	0.002 ** (0.048)
<i>Technological Opportunity</i>	-0.000 *** (0.001)	-0.000 *** (0.002)	-0.000 *** (0.002)	-0.000 (0.760)	-0.000 (0.716)	-0.000 *** (0.000)	-0.000 *** (0.000)
<i>Internet Bubble</i>	0.044 *** (0.001)	0.044 *** 0.001	0.044 *** (0.000)	0.014 *** (0.002)	0.014 *** (0.002)	0.027 *** (0.004)	0.027 *** (0.003)
<i>Financial Crisis</i>	-0.044 *** (0.000)	-0.043 *** (0.000)	-0.044 *** (0.000)	-0.007 *** (0.009)	-0.006 ** (0.026)	-0.039 *** (0.000)	-0.035 *** (0.000)
<i>French Legal System</i>	-0.001 (0.998)	0.002 (0.914)	0.012 (0.622)	-0.007 * (0.055)	-0.005 (0.409)	-0.001 (0.951)	0.028 (0.151)
<i>German Legal System</i>	-0.014 (0.524)	-0.016 (0.441)	0.002 (0.994)	-0.006 (0.141)	-0.009 (0.210)	-0.007 (0.713)	0.013 (0.542)
<i>Scandinavian Legal System</i>	0.028 (0.276)	0.023 (0.332)	0.033 (0.197)	0.012 ** (0.017)	0.010 * (0.070)	0.017 (0.451)	0.014 (0.451)
<i>Constant</i>	0.020 (0.329)	0.042 * (0.060)	-0.031 (0.659)	0.030 (0.213)	0.030 (0.213)	-0.006 (0.736)	-0.071 * (0.083)
Observations	318	318	318	318	318	318	318
No. of countries	18	18	18	18	18	18	18
Wald chi2	578.28	509.05	521.18	371.68	739.34	1010.17	633.69
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: All models are estimated using GLS (random effects).

Models 10a, 10b and 10c introduce the three *reformable* institutional variables one by one.

Models 11 and 12 provide additional evidence on the impact of institutions on more nuanced types of venture capital (start-up and expansions stages).

Errors (in parenthesis) are clustered with respect to country ID; * p<0.1, ** p<0.05, *** p<0.01.

3.4.2. Additional evidence

Then, in order to provide additional insights into the dynamics of VC industry, we repeat the main analysis (full model) for three subgroups of VC – investments in start-up and expansion phase of new ventures.²⁸ The results presented in Table 11 (Models 11-12) are coherent with the results of the estimates with the aggregate measure of VC activity. However, there are a few differences worth remarking. First, neither the fiscal policy nor inflation rate appear to have an impact on the VC

²⁸ We do not provide analysis regarding VC investments in the seed stage, as they are virtually negligible in the sample, and as such do not provide sufficient heterogeneity for econometric analysis.

investments in the start-up stage, while the Scandinavian legal system seems to be favourable for these early stage investments (see Models 11a and 11b). As for the VC investments in the expansion stage, the most notable difference is that the coefficient of the social capital variable seems to lose significance level in Model 12a. That is, the direct effect of social capital on the VC investment in the expansion stage is not as significant. This could be possibly explained by the fact that later stage investments are done between professional and mature ventures with a track record of success and more tangible assets, meaning the information asymmetries are not as severe as in the initial rounds of funding and strong country-level social capital does not add much of value to it. Another interesting difference is that minority investor protection regulation appears to be a significant factor (see Model 12b). The later stage investments require higher capital commitment leading to higher risk, and investor protection regulation could be an effective formal mechanism to abate some portion of that hazard.

Finally, in unreported regressions (available upon request), we also analysed further and deeper the role of social capital. Specifically, we searched for the possible presence of significant moderating and super-additive effects on VC activity arising between this construct and the *structural* and *reformable formal institutions*. No relevant interaction terms were found, suggesting interestingly that the impact of social capital on VC flows not only exclusively but also rather uniformly through *structural formal institutions*. Then, we also decomposed **Social Capital** into its three underlying constructs (proxying the extent of social networks, trust and civic norms) and introduced the three related variables (separately) into the models' specifications. Results confirm the role of social capital in all the three components in the terms exposed in the main analysis, albeit revealing a (slight) loss of statistical significance of the variable related to civic norms. Lastly, we also tried to reconstruct a time-varying index of social capital by accounting for three waves of the EVS conducted in years 1990, 1999 and 2008, though on a variable number of countries. The alternative longitudinal measure was, as expected, highly correlated with the original cross-sectional one ($r=0.930$), and produced similar results regarding the impact of social capital on VC activity.

3.5. Conclusions

Venture capital is widely argued to provide a solution to funding difficulties faced by young and innovative companies, the drivers of economic growth, yet what a suitable institutional environment for well-functioning VC industry is and how it can be adjusted, is still unclear (e.g. Lerner 2010). Additionally, understanding these dynamics in the European context, one of the regions with the highest potential for the creation of fast growing high-tech firms, is largely absent. Hence, in this study, we ground on the well-known Williamson (2000)'s taxonomy of hierarchy of institutions and complement the existing studies of VC, which provided inconclusive implications regarding the institutional environment that favours VC activity, especially in Europe (Grilli et al., 2017). More in detail, we propose an additional and to-date neglected institutional determinant, i.e. we argue and put to the test the role of social capital as a relevant driver of VC activity on a country level. We posit the reasoning behind the hypothesized relationship based on information sharing and trust that impacts new venture creation, empowers their exploitation, incentivizes the supply of VC and eventually facilitates the matching and post-investment relationship (Gedajlovic et al., 2013). We further explain another mechanism through which social capital influence VC activity – we show that the social capital impact is fully mediated by formal institutions, which are developed as a consequence of social capital structures (Arrow, 1972; Glaeser et al., 2002). In doing so, we make an important distinction between *structural* and *reformable formal institutions*, which allows for more tangible policy inferences (Kingston and Caballero, 2009). Specifically, we confirm the importance of

advanced *structural formal institutions* for VC activity (e.g. Li and Zahra 2012), but also test the role of *reformable formal institutions* concerning VC activity. In line with the varieties of capitalism approach (P. A. Hall and Soskice, 2001) and the argument on the importance of institutional complementarities, we find robust evidence that an institution like VC, which was born and flourished in liberal market economies, is particularly stimulated by low taxation levels that are more typical of that type of economies. More generally, we observe that VC activity is indeed negatively affected by high taxations, while it is only moderately influenced by minority investor protection regulations, and it is not touched at all by different labour regulation regimes. We do all that using a longitudinal sample of 18 European countries (during the 1997-2015 period) that exhibit heterogeneous levels of development of social capital, formal institutions and VC industry.

The present work is not free from limitations, which also represent appealing opportunities for future research. First, our analysis is constrained by the availability of data, and we would ideally have preferred to include the other European countries in the sample too. Moreover, the concepts of formal and informal institutions are multifaceted, and measuring them is fairly challenging and calls for further refinements. Then, the measure of social capital we could obtain is constant. While informal institutions show high degrees of inertia and rather slowly change (Kingston and Caballero, 2009; North, 1990), it would be worthy to collect longitudinal data on social networks, trust, civic norms and participation. The time varying measures could shed additional light on the role social capital has on VC activity, and more importantly, how social capital interacts with formal institutions to foster VC activity. Second, we did not take into account in the design of our study whether different institutional dimensions have disparate effects on the supply-side and demand-side of VC. Isolating the two sides of VC is appealing from a policy perspective (Armour and Cumming, 2006), and ranks high on our research agenda. Likewise, another avenue for future analysis would be how direct governmental involvement via public VC funds impacts the VC dynamics in different institutional contexts, and how it combines with indirect VC- and entrepreneurship-oriented policy measures. Finally, our study focuses on the institutional framework of countries. Nevertheless, as VC is a highly localized phenomenon (Bruton et al., 2005), and institutions, and most importantly social capital (Westlund and Bolton, 2003), vary greatly across regions within the same country, future research should elaborately emulate the extant analysis on a regional level and perhaps incorporate an entrepreneurial ecosystem approach (Acs, Stam, Audretsch, and O'Connor, 2017). This issue would be particularly appropriate to account for in Europe, where the regions have strong idiosyncrasies due to their historical mutual independence. The regional differences could be reflected on both supply and demand side of VC. The latter due to the wealth differences across regions, while the former due to the differences in ambitions, resources and actions of individuals.

Despite these limitations, our findings provide both theoretical and practical implications. We add to the literature on determinants of VC activity (e.g. Jeng and Wells 2000), and more particularly, on the institutional determinants of it. We find confirmation that the general key finding of Li and Zahra (2012) on the relevance of the development of governmental efficiency, rule of law, control of corruption and similar *structural formal institutions* for VC, as an economic transaction, still applies once the focus is narrowed only on the European landscape. Additionally, we augment the literature on informal institutions as determinants of VC by examining social capital as a possible impetus of VC activity (e.g. Aggarwal and Goodell 2014; Bottazzi et al. 2016). We find that social capital is, in principle, significant for VC activity as a facilitator of information flow and trust formation, and thus could diminish the inevitable consequences of information asymmetries (e.g. Shane and Cable 2002). Nonetheless, we further show that this effect is fully mediated by developed *structural formal institutions*, which are typically a consequence of social capital structures. These findings also shed

more light on the interaction of informal and formal institutions, and their complementarity, in general (P. A. Hall and Soskice, 2001).

The findings of our study are valuable for policy makers too. First, policy makers should be mindful about the features of informal institutions within which they operate, as social capital (among others) can be an insurmountable impediment (or also a facilitator) for fostering smoother entrepreneurial finance dynamics in the long-term. Moreover, we find evidence that the impact of social capital structures on VC is mainly channeled through their role in establishing those *structural formal institutions*, which are keen on the development of VC. If *structural formal institutions* might be relatively easier to change than social capital, at least in the mid-term, nonetheless the picture that emerges from our analysis is the one for which VC is mostly influenced by deeply rooted (formal and informal) institutional features which evolve slowly and are unlikely to change for the effect of a rapid ‘Deus ex Machina’ intervention. The conceptual distinction between *structural* and *reformable* institutions is particularly relevant, as only the latter are in the short-run under governments’ control and their change can be implemented more easily. In this respect, the only *reformable formal institution* that is found to exert a non-negligible effect is taxation regulation. While, reforms aiming at increasing flexibility in labour markets or raising investors’ protection do not appear to provide an effective stimulus for the VC industry in Europe. This way, we provide scientific insights on the reasons behind the often documented difficulty to trigger and sustain a viable VC industry in most European countries, despite all the governmental efforts lavished over the years. By doing so, we draw two important implications.

On the one hand, informal and *structural* formal institutions do represent the most important drivers for VC and these have to be taken by policy makers as “matter of facts”, at least in the short-term. We believe that this awareness should lead European administrators to divert their exclusive attention to VC as the only possible best financial model for creating successful firms, and instead push them to monitor with increasing interest (and probably regulate appropriately) all those alternative recent financial mechanisms (e.g. crowdfunding, blockchain) that may revolutionize in the near future the way start-ups finance themselves and that might be more favorable to the European landscape than VC.

On the other hand, our analysis also delivers prescriptive implications on which *reformable formal institutions* have to be modified for effectively sustaining VC, provided that

. Of course, in this domain, cautious approach should also be recommended since if strong institutional complementarities are present, the same institutional change may perform differently in different institutional contexts. Having said that, our study provides a clear roadmap, by setting a sort of order of priorities for the European policy makers. In fact, public policy measures such as fiscal policies (i.e. taxations) are shown to have a significant impact on VC activity, and regulators should bear that in mind when proposing new wide-ranging instruments. In any case, when the ‘type of capitalism’ or considerations on national budgets badly comply with a generalized reduction in taxation, our analysis suggests that also vertical ad-hoc policy interventions in this domain could be equally effective. For example, all those VC-specific policies which aim at removing tax obstacles for VCs across EU countries (see the recent EU Commission’s initiative on the pan-European passport for VCs, EU Regulation No. 345/2013, which will be further amended and strengthened in the near future as prospected by the European Commission, see the relative plan of actions published in 2016) and offer specific tax deductions to selected typologies of equity investors and innovative investee start-ups (as embodied in many recent national Start-up Acts, for a review see the European Digital Forum 2016) should be particularly welcome, according to our analysis. Conversely, other (often more difficult to implement) reforms

like those aiming at introducing flexibility in labour markets, whether of course could have additional purposes, do not appear to provide an effective stimulus for VC industry. In this picture, more targeted instruments, such as investor protection regulations, could also be important for specific VC segments (i.e. expansion VC) , yet their overall impact appears to be limited in the European context.

3.6. Appendix A: Factorisation of explanatory variables

The key explanatory variables are indexes built from a number of indicators. First, **Social Capital** measure is a composite index proxying the level of social capital development, and it is generated by factorization from the following indicators related to the extent of social networks, trust and civic norms: membership in labour unions, political parties or organizations, professional associations, religious organizations, sports, educational, art, music or cultural organizations (creating **Membership Index**); the extent to which people can be trusted (**Trust** variable); voluntary work in labour unions, political parties or organizations, professional associations, religious organizations, sports, educational, art, music or cultural organizations (creating **Voluntary Activity** Index). Second, FI Index is a composite index proxying the level of *structural formal institutional* development, and it is generated by factorization from the following six indicators: **Governmental Effectiveness, Rule of Law, Political Stability, Voice and Accountability, Regulatory Quality, Control of Corruption** (see footnote 25).

In order to generate the indexes, we followed a standard factorization technique based on principal-component factor analysis. Here below, we present the main results for each of the generated factors, comprising the eigenvalues from the scree test (to determine the number of factors to be generated) and loading factors of rotated matrix (to determine how much each of the indicators contributes to the synthesized factor) for each of the factors.

3.6.1. Membership index

Table 12.
Scree test for membership indicators.

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	5.37286	4.76	0.9119	0.9119
Factor 2	0.61286	0.48844	0.104	1.0159
Factor 3	0.12441	0.07206	0.0211	1.037
Factor 4	0.05236	0.06325	0.0089	1.0459
Factor 5	-0.01089	0.03244	-0.0018	1.0441
Factor 6	-0.04333	0.06032	-0.0074	1.0367
Factor 7	-0.10365	0.00907	-0.0176	1.0191
Factor 8	-0.11272	.	-0.0191	1

LR test: independent vs. saturated: $\chi^2(3) = 1.3e+06$, $\text{Prob} > \chi^2 = 0.0000$

Table 13.
Rotated factor loadings (orthogonal varimax, Kaiser off) for membership indicators.

Variable	Factor 1	Uniqueness
Membership in religious organization(s)	0.7857	0.3296
Membership in educational organization(s)	0.8852	0.1041
Membership in labour union(s)	0.6353	0.4204
Membership in political partie(s)	0.7196	0.3549
Membership in political organization(s)	0.7699	0.2058
Membership in professional association(s)	0.9431	0.0914
Membership in youth organization(s)	0.8404	0.2332
Membership in sports, educational, art, music or cultural organizations	0.9286	0.0982

(Blanks represent abs(loading)<.5)

3.6.2. Voluntary activity index

Table 14.
Scree test for voluntary activity indicators.

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	4.05572	3.51053	0.8941	0.8941
Factor 2	0.5452	0.36871	0.1202	1.0143
Factor 3	0.17649	0.06787	0.0389	1.0532
Factor 4	0.10862	0.06687	0.0239	1.0771
Factor 5	0.04176	0.08449	0.0092	1.0863
Factor 6	-0.04273	0.12813	-0.0094	1.0769
Factor 7	-0.17086	0.0072	-0.0377	1.0393
Factor 8	-0.17806	.	-0.0393	1

LR test: independent vs. saturated: $\chi^2(3) = 7.6e+05$, Prob> $\chi^2 = 0.0000$

Table 15.
Rotated factor loadings (orthogonal varimax, Kaiser off) for voluntary activity indicators.

Variable	Factor 1	Uniqueness
Voluntary activity in religious organization(s)		0.6302
Voluntary activity in educational organization(s)	0.7962	0.3184
Voluntary activity in labour union(s)		0.718
Voluntary activity in political partie(s)	0.5642	0.5069
Voluntary activity in political organization(s)	0.8043	0.3055
Voluntary activity in professional association(s)	0.8904	0.1289
Voluntary activity in youth organization(s)	0.8317	0.2183
Voluntary activity in sports, educational, art, music or cultural organizations	0.8151	0.2461

(Blanks represent abs(loading)<.5)

3.6.3. Social capital index

Table 16.

Scree test for social capital index based on membership index, trust and voluntary activity index.

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	2.07590	1.96178	1.0125	1.0125
Factor 2	0.11412	0.25389	0.0557	1.0682
Factor 3	-0.13977	.	0.0682	1.0000

LR test: independent vs. saturated: $\chi^2(3) = 3.0e+05$, $\text{Prob}>\chi^2 = 0.0000$

Table 17.

Rotated factor loadings (orthogonal varimax, Kaiser off) for social capital index.

Variable	Factor 1	Uniqueness
Membership index	0.9410	0.1145
Trust	0.7173	0.4224
Voluntary activity index	0.8222	0.2731

(Blanks represent $\text{abs}(\text{loading}) < .5$)

3.6.4. Formal institutions

Table 18.

Scree test for formal institutions index based on six World Governance Indicators by the World Bank.

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	4.97149	4.39919	0.8286	0.8286
Factor 2	0.5723	0.35482	0.0954	0.924
Factor 3	0.21748	0.09032	0.0362	0.9602
Factor 4	0.12716	0.05934	0.0212	0.9814
Factor 5	0.06782	0.02408	0.0113	0.9927
Factor 6	0.04375	.	0.0073	1

LR test: independent vs. saturated: $\chi^2(15) = 2234.18$ $\text{Prob}>\chi^2 = 0.0000$

Table 19.

Rotated factor loadings (orthogonal varimax, Kaiser off) for formal institutions indicators.

Variable	Factor 1	Uniqueness
Governmental Effectiveness	0.9541	0.0897
Rule of Law	0.9666	0.0656
Political Stability	0.6987	0.5119
Voice and Accountability	0.9425	0.1118
Regulatory Quality	0.9013	0.1877
Control of Corruption	0.9686	0.0618

(Blanks represent $\text{abs}(\text{loading}) < .5$)

3.7. Appendix B: Alternative country classification check

Table 20.

Determinants of venture capital activity on a country level (unbalanced panel data, 1997-2015), with the control variable related to the general country classification based on the varieties of capitalism (P. A. Hall and Soskice 2001).

Dependent variable	VC Activity
<i>Social Capital</i>	0.005 (0.508)
<i>FI Index</i>	0.020 *** (0.003)
<i>Employment Protection</i>	-0.000 (0.374)
<i>Taxations</i>	-0.001 * (0.078)
<i>Investor Protection</i>	0.017 *** (0.003)
<i>IPO Volume</i>	0.817 (0.124)
<i>M&A Volume</i>	0.339 *** (0.002)
<i>GDP Growth</i>	0.004 *** (0.007)
<i>Inflation</i>	0.001 (0.301)
<i>Technological Opportunity</i>	-0.000 *** (0.002)
<i>Internet Bubble</i>	0.044 *** (0.001)
<i>Financial Crisis</i>	-0.044 *** (0.000)
<i>Liberal Market Economy</i>	-0.037 (0.106)
<i>Coordinated Market Economy</i>	-0.013 (0.554)
<i>Constant</i>	-0.052 (0.180)
Observations	318
No. of countries	18
Wald chi2	604.31
Prob > chi2	0.000

Notes: Errors (in parenthesis) are clustered with respect to country ID; * p<0.1, ** p<0.05, *** p<0.01.

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