WHEN CAN GOVERNMENT VENTURE CAPITAL FUNDS BRIDGE THE EQUITY GAP?

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Abstract

Several papers find that government venture capital funds do not add (much) value to their investees, underperform their private peers, or crowd out private investment. However, a major objective of public initiatives in the market for start-up financing is to "bridge the equity gap". This paper addresses the conditions under which government venture capital funds may fulfill this mission in a best possible way. Our data reveals that the competitiveness of a region where a government venture capital fund is located strongly affects its success. Furthermore, potential collusion and regulatory capture detriment the success likelihood of GVC backed start-ups. Nevertheless, the preferable and most simple method to accomplish the mission is if GVC funds gain particular investee-industry experience and learn from their private peers in syndicated transactions.

Keywords: Governmental Venture Capital, Experience, Regional Characteristics

JEL Codes: G24, G38.

1 Introduction

Government venture capital (GVC) is a form of public intervention that has recently spurred considerable academic debate. GVC initiatives include the creation of venture capital funds (GVCs) which are financed and managed by government-affiliated agencies and aim at supporting entrepreneurial start-ups through the injection of financial resources. One of the most important rationales for this policy intervention is the existence of the so called "equity gap". As commercial banks shy away from the high risk and uncertainty linked with investing in young entrepreneurial ventures, the latter have often difficulties in collecting the required capital develop their businesses. Private venture capital funds (PVC or for funds PVCs) are potentially well-suited to provide seed- and growth-financing for entrepreneurial ventures (Hellmann and Puri 2000; Kortum and Lerner 2000). However, PVCs invest only in a very limited number of the most promising companies. Moreover, there are some characteristics that are unappealing to PVC, such as a venture being in a very early stage of development (Bertoni et al. 2015; Lockett et al. 2002; Mason and Harrison 1997; Murray and Lott 1995), operating in economically lagging regions (Harrison and Mason 1992; Sunley et al. 2005), or in industries with very long time to market (Bertoni et al. 2015). Such ventures may suffer from the equity gap, and their development and growth is constrained by a lack of risk capital.

Addressing this market failure is a natural move by government authorities (Brander et al. 2015). GVCs initiatives can tackle it by directly investing in entrepreneurial ventures that are subject to the equity gap, alone or in syndication with PVC.

Empirical evidence on the impact of GVC on the portfolio companies is mixed. Some papers find along a series of performance measures that GVCs do not "add value", at least if they invest alone. Stand-alone investments by GVC funds have no significant impact on

portfolio companies in terms of sales and employee growth (Grilli and Murtinu 2014, 2015) and patenting activity (Bertoni and Tykvovà 2015) and even a negative impact in terms of efficiency (Alperovych et al. 2015). Solo GVC investments also underperform PVC activities in terms of the probability of a successful exit via IPO or Trade Sale (Cumming et al. 2014; Kovner and Lerner 2015).

However, other papers suggest that GVC can be beneficial. First, syndication among GVCs and PVCs has a positive impact on the ventures' exit performance (Cumming et al. 2014; Kovner and Lerner 2015), sales growth (Grilli and Murtinu 2015) and patenting activity (Bertoni and Tykvovà 2015). Second, GVC may just add value by backing companies until the next round of (private) financing. Lerner (1999) predicts that the investment of a GVC may increase the probability of the investee to receive PVC, thanks to a certification effect. Third, GVC is not a homogeneous phenomenon: GVC programs have different geographical scopes (Munari and Toschi 2014), objectives (Bertoni and Tykvovà 2015) and structures (Buzzacchi et al. 2013). This heterogeneity is likely to have an impact on the effectiveness of GVC itself.

In this paper, we aim at contributing to this stream of research by determining the conditions under which the GVCs can help their portfolio companies in their development. In particular, while the literature has put forward different possible explanations for the underperformance of GVC, it has offered virtually no empirical evidence on the validity of these explanations. We provide evidence regarding three major arguments that have been raised to explain the underperformance of GVC.

The first argument is that GVC programs are often motivated by policy objectives of job creation and economic growth in specific regions (Bertoni and Tykvovà 2015; Kovner and Lerner 2015). GVC often focuses on economically lagging regions that offer limited

opportunities to portfolio companies and scarce attractiveness for PVC investors. Recent evidence witnesses that the effectiveness of GVC programs highly depends on the economic characteristics of the regions in which these programs are deployed (Munari and Toschi 2014). It is therefore not unlikely that the "underperformance" of GVCs is merely due to the poor economic setting of the regions in which they are located. This is strongly supported by our data.

The second argument is that government interventions may be subject to collusion and regulatory capture (Lerner 1999). These phenomena can create distortions in the allocation of public funds, as politicians may favor companies to which they are politically or personally connected, with the aim of benefitting themselves rather than fulfilling their stated goals (Becker 1983; Peltzman 1976). If GVCs are more inclined to invest in companies to which they are connected, regardless of their growth prospects, then it is possible that regulatory capture explains part of the underperformance of GVC investments. Our paper also provides evidence for this notion.

The third argument is that there is skepticism with respect to GVC managers' skills and investment experience to support and monitor entrepreneurial companies (Leleux and Surlemont 2003; Lerner 2002). However, research finds that by accumulating experience, PVCs become better at selecting portfolio companies and at adding value (Sørensen 2007). Clarysse et al. (2013) show that PVCs learn from both their own experience and from that of their co-investors. It seems plausible to assume that GVCs are subject to the same learning processes, especially considering that many of the GVC initiatives date back to 80s, and that they very often interact with PVC funds. This is another important finding of our paper.

We evaluate the impact of local development, political influence and business experience on the success of GVCs using a sample of 1230 investments made by 72 GVCs

operating in 16 European countries. The data is retrieved from ThomsonOne. We find that GVC investments in companies located in economically lagging regions are less successful in terms of receiving subsequent funding by PVCs or exiting. Further, GVCs which exclusively source their investments locally also perform worse. This effect is stronger if they are located in countries with higher perceived corruption. We interpret this result as evidence that collusion and regulatory capture actually affect GVC performance. Finally, if a GVC fund invests alone it is less likely to bring the investment to success compared to a syndicated investment with a PVC. However, GVCs with built-up industry specific experience and those which co-invested with PVCs are more likely to bring their investments to success when subsequently investing alone. This result is an evidence of a learning process of GVCs.

The remainder of the paper is organized as follows. Section 2 presents the data and methods. Section 3 presents the results of the main analysis, while additional evidence and robustness checks are presented in Section 4. Finally, we conclude and discuss some further extensions in section 5.

2 Measures and data

2.1 *Measures*

GVC investment success: We measure the success of GVC as the occurrence of a later stage PVC funding (see Cumming et al. 2014; Guerini and Quas 2015; Lerner 2002 for a similar approach). The dependent variable is therefore "Additional PVC", a dummy variable equal to 1 if the focal GVC investment resulted in in an additional PVC investment, and 0 otherwise. Our argument for using this measure of success is that by injecting financial resources, GVCs can contribute to the development of the venture by avoiding its premature bankruptcy and preparing it for the next round of financing by a PVC. Empirical evidence regarding this alleged ability of GVC to bridge the equity gap and support target companies

till a private investor kicks in is scarce. A number of papers have focused on whether GVC investments have increased or crowded out the aggregate pool of PVC investments, finding mixed evidence (Armour and Cumming 2006; Brander et al. 2015; Cumming and Macintosh 2006; del-Palacio et al. 2012; Jeng and Wells 2000; Leleux and Surlemont 2003). At the company level, Guerini and Quas (2015) find that GVC-backed companies are more likely to receive PVC than their peers, evidence also consistent with Lerner (1999, 2002) assumptions.

Local development: The literature suggests that the GVC that invest in underdeveloped regions are less likely to be successful (Kovner and Lerner 2015). We test this idea by including the level of local development in the region in which the target company is located. Our measure for the local development is the "Regional competitiveness", and index computed by the European Commission in 2013 (Annoni and Dijkstra 2013) at regional (i.e., NUTS2) level. The index is built on several measures that aim at considering the development, efficiency and innovation of each European region. Although these measures are not time varying, we believe there is a substantial degree of serial correlation in the regional development across the years. As robustness checks, we substitute the RCI with other measures of local development, such as the GDP per capita, and of local innovation, such as the percentage of human resources involved in science and technology. These measures, which are time varying, were collected at NUTS2 level from Eurostat.[1]

Room for political influences: Testing whether GVCs behavior is affected by political influences is not trivial. We use therefor an indirect approach, for which we show some robustness checks. There are reasons to believe that the geographic proximity between the GVC investor and the entrepreneur would facilitate collusion between parties. In fact, "as geographical proximity makes it easier for companies to collaborate in research and

[1] Results relative to these variables are similar to those presented here, and available from the authors upon request.

innovation, so it makes it easier for companies or other agencies to collude in their supply of a critical input" (Swann 2009, page 160). GVC investors are more likely to collude with entrepreneurs that are in their own personal networks, such as friends, previous fellow students or co-workers. The geographic proximity between GVCs and those entrepreneurs would make the creation of these social relationships more likely (Liben-Nowell et al. 2005). Therefore, when the GVCs and the entrepreneur are located nearby, we expect that collusion is more likely to influence the selection process of GVCs. We measure the proximity between the GVC investor and the entrepreneur with the dummy variable "Local deal", which is equal to 1 if the GVC investor is located in the same geographical region (NUTS2 code) as the target company. We do not think that all investments located locally are equally potentially subject to collusion. We expect that GVCs located in countries in which regulatory capture is more likely are more prone to collude with entrepreneurs. Following a common approach in the literature, we proxy the room for regulatory capture with the nationwide measure of corruption (Dal Bó and Rossi 2007; Dal Bó 2006). We use the Corruption Perceptions Index, measured by Transparency International since 1995. The index assumes higher values for lower levels of perceived corruption. In order to improve interpretability, we switch the sign of the corruption perceptions index and generate the variable "Corruption", which assumes higher values for higher levels of corruption. We expect that locally sourced GVC investments perform worst because of collusion in the selection process, and that this result is even stronger in more corrupted countries. To test this assumption, we interact "Local deal" with "Corruption" and expect a negative sign. Literature suggests that influence in the form of campaign contributions is an alternative measure of regulatory capture (Dal Bó 2006; de Figueiredo and Edwards 2007). We therefore retrieved from the International Monetary Fund database information on whether in a certain country there is a limit on the amount a donor can contribute to a candidate of a political party. This information is stored in the dummy

variable "No limit on contributions to candidates", equal to 1 if there is no limit. This variable is used as a robustness check for our main proxy for regulatory capture, i.e. "Corruption".

GVC learning: We aim at testing whether GVC is able to learn from their experience, and if this in turn has a positive effect on GVC investments success. To measure GVC experience, we rely on the full investment history of the focal GVC investor, up to the year before the focal investment. We develop different measures for the general experience of GVCs, taking inspirations from measures developed by Hochberg et al. (2007) and Gompers et al. (2008) to measure the experience of PVCs. "Years of experience" is the number of years since the first investment ever made by the focal GVC investor. "Total deal experience" is the number of investment rounds in which the focal GVC investor participated before the investment in question. "Industry experience" is the number of times the focal GVC investor invested in the industry of the focal company in the past. To test whether GVC can learn from syndicating with PVC investors we compute GVCs' "Syndication experience" as the number of investments in which the focal GVC investor syndicated with a PVC investor in the past.

Control variables: We control for "Syndicates", a dummy equal to one for the investment originated by a syndicate of GVC and PVC. We expect syndicated deals to perform better than GVC solo-investments, as shown by extant literature on a number of performance measures (Bertoni and Tykvovà 2015; Cumming et al. 2014; Grilli and Murtinu 2015; Kovner and Lerner 2015). In some specifications, we also control for the liquidity of the exit market. We proxy it with the variable "Exit opportunities", equal to the average of the number of IPOs per year within three years after the focal investment (the number of IPOs in

the next three years divided by three). Lastly, our model includes a set of control variables, such as the age of the GVC-backed company in logarithms ("Log of company age") and industry and period fixed effects.

2.2 *Dataset*

The empirical analysis is based on a sample of investments originated by GVC, i.e. investments in which a GVC was present in the first round received by the target company.

In order to create our database, we first identify a list of GVC investors operating in Europe relying on Thomson One. As we are aware of the limits of this database, and in particular on the tendency to mischaracterize captive investors (e.g., Bertoni et al. 2015; Da Gbadji et al. 2015; Ivanov and Xie 2010), we cross-checked our list with Bureau Van Dijk Zephyr and with the VICO database (www.vicoproject.org). We identified 93 GVC investors, whose parent company is a European governmental body. We then downloaded from ThomsonOne the full investment history of all GVC investors and of all companies that ever received a GVC financing.[2] After excluding companies operating in finance or real estate, we obtain a sample of 2,142 companies that received 4,724 investment rounds, of which 2,912 by 92 GVCs and the rest by PVCs. These investments took place between 1979 and 2014. We use this information to measures the GVC experience.

To isolate investments originated by GVC, we focus on first rounds of investments ever received by our sample companies in which a GVC was present. Guerini and Quas (2015) show that the receipt of GVC increases companies chances to receive PVC in the three years after the investment and after three years the effect fades away. We therefore exclude investments that took place after 2011 to allow for at least a 3 years window to

[2] In order to check the completeness of our data, we manually looked at GVC investors in Zephyr and downloaded the full investment history of all GVC-backed companies. Aggregated statistics on the number of investments and the success of the investments were comparable between the two databases.

observe whether the investment resulted in an additional round of PVC financing. After dropping observations with missing data and companies located in extra European countries, we end up with 72 GVCs investing in 1230 investments in 1208 companies and carried out between 1995 and 2011. This is our final sample of investments originated by GVC.

For this sample we have information on the company characteristics in terms of name, location, industry of operation, foundation year, status (listed, acquired or liquidated, if any of those events took place before 2015) and full investment history; and on the GVC investors' characteristics, including name, nature of the parent company, foundation year, full investment history and location. Data was cross checked with Bureau Van Dijk Orbis and Zephyr and missing data were filled relying on the websites of the companies and of GVC investors.

Table 1 shows the distribution of GVC investors according to country, first investment period and nature of the parent company[3] , while Table 2 shows the distribution of GVC investments according to industry, country, founding period of the target company and year of the investment. Our sample includes 635 investments (51.63%) originated by GVC alone, and 595 investments (48.37%) originated by a syndicate of PVC and GVC. The distribution by age of the portfolio company at the time of the investment shows that the vast majority of companies were very young at the time of the first investment. In particular, 25% of sample companies were younger than 1 year at the time of the investment, and 75% were younger than 5 years. Nevertheless, the sample also includes GVC investments in older companies. In those cases, GVC's rational is evidently not to bridge an equity gap, but

[3] The full list of GVC investors included in our sample can be found in the Appendix in Table A1.

possibly to sustain companies that contribute substantially to the employment in a particular region.[4]

[Insert Table 1: Distribution of GVC investors by country, first investment period and type of parent company.]

[Insert Table 2: Distribution of GVC investments by investment period, age at the time of the investment country and industry of the target company]

Variables are summarized in Table 3 and a correlation matrix is shown in Table 4.

With respect to our dependent variable, out of the 1230 investments originated by GVCs, 390 investments (31.71%) achieve subsequent PVC investment. For companies that received their first round financing exclusively from a GVC, *AdditionalPVC* is equal to 1 a PVC fund provides subsequent financing. This happens in 122 cases, i.e. 19.21% of the 635 GVC solo investments. For companies that received a GVC/PVC-syndicated first round investment, *AdditionalPVC* is equal to 1 if another PVC fund provides subsequent expansion financing. This is the case for 268 investments, i.e. 45.04% of the 595 syndicates.

[Insert Table 3: Summary statistics]

[Insert Table 4: Correlation matrix]

3 Determinants of GVC investments' success in bridging the equity gap

Table 5 provides the first results on the determinants of GVC investments' success factors in terms of bridging the equity gap. Columns I to VIII present Probit-regressions on our complete sample of 1230 investments. The dependent variable is our proxy of a successful transaction "Additional PVC". Model I regresses the dependent variable on the "Regional competitiveness" without additional controls. We find a statistically and

[4] Results are robust when we exclude companies older than 5 years (see Table A3 in the Appendix).

economically strong effect of the location of the investee firm with respect to the likelihood of reaching an additional financing round. A one-standard deviation increase in the level of the regional competitiveness enhances the likelihood of receiving future funding by 8.9% points for the average start-up transaction. More intuitively, the propensity of receiving future additional funding in Greater London is by 32.16% (points) higher than in Andalucía (Southern Spain), only due to the difference in the local development.

In column II we add industry and time fixed affects and "log of company age". We find that a company which is one year older than the average investee at the seed-funding round has a 3.6% lower likelihood of receiving subsequent outside financing.

In columns III to IV we stepwise add the dummy variable equal to 1 if the deal is syndicated ("Syndicates") and the dummy variable equal to 1 if the deal is sourced locally ("Local deal"). Column III suggests that syndicated transactions have a 21.5% higher likelihood to receive expansion financing. Column IV reveals that locally sourced deals have a 5.2% lower probability than the average seed-investment.

In column V, we add our proxy of corruption to the regressions but have to drop "Regional competitiveness" at the same time because it is strongly negatively correlated with "Corruption" (more competitive regions are located in countries with less perceived corruption), as revealed by the correlation matrix (Table 4). Evidently, corruption harms the progress in the investment cycle. All else equal, a seed-financed venture in Poland has a 18.7% smaller likelihood to receive expansion capital than a venture located in Denmark, only due to different levels of perceived corruption.

Column VI presents a regression where we add an interaction term between the level of corruption and the fact that a deal has been sourced locally by a GVC. This interaction

term is highly statistically and economically significant.[5] It evidences that the level of corruption in a particular country is a stronger inhibitor of success if GVCs play local. Using the Norton et al. (2004) procedure to quantify the magnitude of the interaction effect, we find that if the deals are sourced locally, a standard deviation increase in perceived corruption decreases the probability of subsequent funding by 6.3%.

In columns VII and VIII we repeat the previous analyses using an alternative measure of corruption which allows the inclusion of the Regional Competitiveness Index again. Our variable "No limit on contributions to candidates" (from the IMF) serves as alternative corruption measure but correlates moderately (0.28) with the regional competitiveness index. This way, we can reveal in column VIII that the joint effect of higher possibility of collusion in locally sourced transactions remains even after controlling for the competitiveness of the location of the investee firm.

[Insert Table 5: Determinants of GVC investments' success]

4 Additional evidence and robustness checks

4.1 *Are GVCs good screeners?*

In the above analyses, we do not differentiate between syndicated transactions and solo-investments by GVCs. GVCs could free ride on deal sourcing and screening abilities of PVCs in syndicated deals. Alternatively, it may be the PVC fund that free-rides on the GVC fund. In fact, the commitment of a government affiliated investor could signal a certain quality to a private sponsor (Lerner 1999) and convince him to participate in the deal. Additionally, the contribution of the GVC fund lowers the required exposure for the PVC

[5] The inclusion of the corruption measure and its interaction with locally sourced transactions may lead to multicollinearity problems that could bias the coefficients. In fact, we notice a jump in the coefficient of the local dummy between models V and VI. In order to deal with this problem, we adopted the residual centering procedure described in Lance (1988), more recently used e.g. by Tiwana (2008). This procedure and the results are described in the Appendix, in Table A2.

fund and could thus facilitate its investment. Hence, syndicated transactions may bias the results on the success factors of government affiliated venture capital funds.

We address this potential bias with a reduced sample where we discard all syndicated transactions, and where the government affiliated sponsor is therefore the single seed investor. That rules out any effect of free riding be it on the government's role as a risk taker or the private investor's role as a superior screener. Moreover, this analysis allows creating evidence on the deal sourcing and screening abilities of government affiliated investors.

As a result of excluding syndicated deals, we receive a reduced data set of transactions which are exclusively originated by GVCs. As shown in in Table 6, the number of observations drops to 635. However, the results remain stable compared to the previous table. The "Regional competitiveness" has significant positive coefficients throughout the analyses. Company age and local transactions have negative parameters (specifications II and III). Corruption decreases the probability of deal success (specification IV) but is driven by locally sourced deals (specification V and VII).

From column VIII onward we include measures for the GVCs' experience in the regressions. We could argue that the ability of successful deal sourcing can improve over time with learning effects and experience that GVCs gain. We differentiate the number of years of experience since the first investment of a particular GVC, "Years of experience" (specification VIII). The second one is the number of transactions this GVC was involved in prior to the focal investment, "Total deal experience" (specification IX). The third measure addresses the experience of a GVC in the particular industry of the focal deal, "Industry experience" (specification X). The fourth measure considers the experience the GVC gained from syndications with PVCs, "Syndication experience" (specification XI). From specifications VIII and IX we find that overall experience, measured in both years and

number of previous transactions, does not affect the ability of GVCs to successfully source deals. Only the experience gained in particular industries and from working together with PVCs helps improving the success likelihood of GVC originated deals.

[Insert Table 6: Determinants of solo GVC investments' success]

4.2 *Additional evidence*

In addition to the cross-sectional Probit-models we analyse the joint effect of the likelihood for a successful transaction and the time to the event using a Cox (1972) model. This is a semi-parametric event-history-type model that has been used in the VC context (Bertoni and Groh 2014; Chang 2004; Giot and Schwienbacher 2007; Guerini and Quas 2015). The model provides an indication for receiving second round outside financing, based on the hazard rates, i.e., probabilities that an event occurs at a certain time contingent that it has not happened before. In our setting, the elapsed time between the seed and the subsequent financing round is the determinant of the hazard rate. If a particular investee never received subsequent funding, we refer to the elapsed time between the seed transaction and 2014 (our cut-off year). The successful event "Additional PVC" happens, on average, 1.84 years after the seed round. Table 7 presents the results of the Cox regressions and reveals that, in general, all our findings hold. However, some parameter estimates have higher standard errors and therefore lower significance levels than in the Probit models. In Panel A of Table 7 we include the full sample, including syndicated transaction. In Panel B we focus on transactions sourced by the GVCs only (i.e. excluding syndicated deals). Panel B also confirms our results on the experience that GVCs should gain for successful deal making.

[Insert Table 7: Cox (1972) regressions]

4.3 *Determinants of GVC investments' successful exit*

So far, we defined receiving additional outside funding from a private venture capital investor as criterion for a successful transaction originated by a GVC. Our argument follows the rationale that the GVC fulfilled its principle economic role to bridge the equity gap in these cases. However, one could argue that receiving additional funding is finally not a success criterion but only a milestone for a start-up to reach maturity. This maturity is eventually only gained if the sponsors exit the venture. Therefore, we consider whether the target company was eventually listed or acquired as the alternative success factor. This indicator is a common measure of success for a venture capital transaction (Armour and Cumming 2006; Barry et al. 1990) and is used in the GVC setting by Cumming et al. (2014) and Guerini and Quas (2015). The literature shows that the publicly affiliated investors in an entrepreneurial venture do not have an impact on its later listing or acquisition. However, we do not differentiate between ventures that receive public and those that receive private venture capital as our sample exclusively includes GVC backed start-ups. Hence, for this subset of VC backed companies we can analyze the conditions under which the likelihood of becoming listed or acquired increases. We generate the dummy "IPO or M&A", equal to 1 if the start-up becomes finally listed or acquired in a trade sale or secondary transaction. 232 companies of our sample (18.86%) had this fate. We use this dummy variable as the success measure in Probit regressions and expand the set of control variables by our proxy for the liquidity of the exit market, "Exit opportunities".

[Table 8: Determinants of the IPO and M&A of the target company of GVC investments]

Table 8 reveals the importance of the regional competitiveness and of syndication (consistent with Cumming et al., 2014), as shown before. Corruption leads to a decrease in the probability of a successful exit, and this is driven by the GVC investments being sourced locally. The parameter of the age of the venture changes its sign compared to the previous

results. This is intuitive because successful ventures require additional funding (the success measure used before) early but still need time to reach maturity.

5 Discussion

The motivation of governments to be an actor in the entrepreneurial finance market and to facilitate access to finance for young ventures is complex. Policy makers have an interest to spur innovation, create employment and wealth, to receive tax revenues and social contributions, to support less developed regions and infrastructures but also not to crowd out private investment activity or to take inappropriate risks in start-up financing structures. A famous argument of supporters of government intervention in the entrepreneurial finance market is the concept to "bridge the equity gap" in terms of timing and risk taking until a start-up company becomes "interesting" for a private investor. Private seed-financing investors might be insufficiently rewarded on average in terms of the unforeseeable project risk compared to the required exposure and the expected proceeds and time to exit. Indeed, if there is an equity gap for young ventures, then the government could step in and bridge this gap to preserve competitiveness and innovation capacity of a country's industry.

We do not contribute to the question if the equity gap exists. Rather, we reveal the conditions under which public investors pursue their mission (filling the equity gap) in a best possible way. The likelihood for a GVC-backed start-up to receive a second round financing – which is equivalent to bridge a potential equity gap – is higher and the time until this financing round is shorter if the young venture is located in an innovative and competitive cluster, if the public investor steps in early and if the investor is not exposed to nepotism, characterized by a local investment focus and higher levels of locally perceived corruption.

Public money can be used as a cushion to incentivize private investment in risky assets as in early stage financing (Cressy 2002). This situation can be seen as a free riding by

PVCs on GVCs. This problem might also exist in our sample of transactions and affect our results. Only the most promising ventures could attract private investors and these latter provide seed financing contingent on the contribution of a government investor who bears a larger exposure and risk. In this case, the role of the government would not be to bridge an equity gap over the development period of a venture from being a start-up until it qualifies for a private investment. Rather "bridging the gap" would imply lowering the risk of the private venture capital firm. One may argue that because of this, our rates of successful transactions (in terms of receiving second round financing or an eventual exit) might be biased due to a collection of more promising ventures and disproportional risk taking in our sample. In this setting observing the ex-ante intent to free ride by PVC investors would have been a perfect solution to this problem but this is obviously impossible. If free riding problem is indeed present then we should observe deals that involve both parties only at all times. Our findings on the proportion of syndicated vs. solo deals point against this conjecture. Following the same logic, private venture capital firms should use securities that allow disproportionate risk sharing (e.g., preferred securities) whenever they co-invest with the GVC funds, which also seems unlikely. Finally, even if the free-riding problem does exist, it does not necessarily entail a bias in our estimates of the effects of local economic conditions, corruption, and GVC experience as all of these variables are exogenous to the intent to free ride by PVC.[6]

Alternatively, one could also argue that free riding exists in the opposite direction: the public investor free rides on the selection capabilities of a private venture capital firm. In this setting, the government affiliated fund may take a passive role but benefits from the activity of the lead investor who supports the venture and solicits second round financing or prepares the exit. This could improve the reporting of the government fund to its superior

[6] Note that the greater the experience of the GVC investor is, the lower presumably should be the likelihood of a free riding by a PVC.

administrator but would not necessarily mean that the fund bridges an equity gap. Moreover, this could potentially lead to a situation where a GVC funds displace of (crowds out) another PVC fund. We address this potential bias with a reduced sample where we discard all syndicated transactions, and where the government affiliated sponsor is therefore the single seed investor. That rules out any effect of free riding be it on the government's role as a risk taker or the private investor's role as a superior screener. We receive virtually the same result for the reduced sample where all transactions must have been screened and performed by the government affiliated investor exclusively. We interpret the result on the reduced (non-syndicated) sample as government funds being able to select young ventures which will eventually attract private venture capital funds after further development. This evidences that government sponsored venture capital funds are able to bridge a gap from the seed to a follow-on financing state of start-up firms.

On the reduced sample we can further show that the screening and deal making ability of public investors improves with their industry experience and with the experience gained in transactions syndicated with private venture capital funds. We conclude that publicly sponsored venture capital firms can learn from their private competitors or colleagues via syndications. They should be located in competitive regional clusters, not exposed to a threat of local nepotism and invest early in the life cycle of young ventures.

This paper also raises some interesting questions for the future research agenda. For example, the extent to which PVC investors chose to form syndicates with GVC or another PVC partner could shed more light on the free riding issue raised above. Similarly, one can investigate the choice of securities in this kind of mixed syndicates to understand whether PVC extract any additional rent from GVC institutions.

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Tables

Table 1: Distribution of GVC investors by country, first investment period and type of parent company.

GVC country	N	%	**GVC first investment**	N	%
Austria	4	5.56	Before 1991	6	8.33
Belgium	6	8.33	1991-1993	3	4.17
Denmark	2	2.78	1994-1996	4	5.56
Estonia	1	1.39	1997-1999	8	11.11
Finland	1	1.39	2000-2002	18	25.00
France	5	6.94	2003-2005	19	26.39
Germany	5	6.94	2006-2008	8	11.11
Ireland	3	4.17	2009-2011	6	8.33
Italy	3	4.17	*Total*	*72*	*100.00*
Netherlands	2	2.78			
Norway	1	1.39			
Poland	1	1.39			
Portugal	1	1.39			
Spain	6	8.33	**GVC parent company**	N	%
Sweden	7	9.72	University	19	26.39
United Kingdom	24	33.33	Government	53	73.61
Total	*72*	*100.00*	*Total*	*72*	*100*

Table 2: Distribution of GVC investments by investment period, age at the time of the investment country and industry of the target company

Investment year	N	%	**Age at the time of the investment**	N	%
1995	4	0.33	0 years	293	23.82
1996-1997	14	1.14	1 year	233	18.94
1998-1999	32	2.60	2-3 years	280	22.76
2000-2001	92	7.48	4-5 years	136	11.06
2002-2003	150	12.20	6-8 years	89	7.24
2004-2005	237	19.27	9-10 years	16	1.30
2006-2007	195	15.85	11-15 years	54	4.39
2008-2009	226	18.37	16-20 years	28	2.28
2010-2011	280	22.76	more than 20 years	91	7.40
Total	*1230*	*100*	*Total*	*1220*	*100*

Company industry	N	%	**Company country**	N	%
Construction and Mining	63	5.12	Austria	22	1.79
Chemical products	54	4.39	Belgium	74	6.02
Electric and Electronica	165	13.41	Denmark	94	7.64
Instruments	94	7.64	Estonia	11	0.89
Machineries	51	4.15	Finland	76	6.18
Pharmaceuticals	63	5.12	France	62	5.04
Other manufacturing	111	9.02	Germany	230	18.70
Computer related services	235	19.11	Ireland	70	5.69
Engineering and R&D services	135	10.98	Italy	36	2.93
Trade	48	3.90	Netherlands	62	5.04
Public Utilities	49	3.98	Poland	13	1.06
Other business services	92	7.48	Portugal	107	8.70
Other Services	70	5.69	Spain	66	5.37
			Sweden	127	10.33
			United Kingdom	180	14.63
Total	*1230*	*100.00*	*Total*	*1230*	*100.00*

Presence of a PVC	N	%
Yes (Syndicated investment)	595	48.37
No (GVC solo investment)	635	51.63
Total	*1230*	*100.00*

Table 3: Summary statistics

Variable	N	Mean	Median	Std. Dev.	Min	Max
Additional PVC	1230	0.317	0.000	0.466	0.000	1.000
Regional competitiveness	1230	0.462	0.522	0.519	-0.858	1.192
Local deal	1230	0.456	0.000	0.498	0.000	1.000
Corruption	1230	-7.878	-7.900	1.246	-9.700	-3.400
No limit on contribution to candidates	1230	0.672	1.000	0.470	0.000	1.000
Years of experience	1230	7.483	6.000	6.723	0.000	33.000
Total deal experience	1230	47.901	22.000	61.194	0.000	264.000
Industry experience	1230	6.202	2.000	10.911	0.000	67.000
Syndication experience	1230	22.794	8.000	32.724	0.000	141.000
Log of company age	1230	1.242	1.099	1.043	0.000	4.779
Syndicates	1230	0.484	0.000	0.500	0.000	1.000
Exit opportunities	1230	26.213	15.000	35.077	0.000	242.000

Table 4: Correlation matrix

The correlation matrix is based on 1230 observations.

	Variable	1	2	3	4	5	6	7	8	9	10	11
1	Additional PVC	1.00										
2	Regional competitiveness	0.18	1.00									
3	Local deal	-0.06	0.11	1.00								
4	Corruption	-0.16	-0.61	-0.05	1.00							
5	No limit on contribution to candidates	0.08	0.28	-0.13	-0.28	1.00						
6	Years of experience	-0.07	0.01	-0.01	-0.17	-0.14	1.00					
7	Total deal experience	-0.03	0.00	-0.10	-0.06	-0.10	0.31	1.00				
8	Industry experience	0.03	-0.01	-0.07	-0.03	-0.06	0.15	0.65	1.00			
9	Syndication experience	0.07	0.18	-0.11	-0.21	0.09	0.14	0.81	0.64	1.00		
10	Log of company age	-0.15	-0.11	0.05	0.16	-0.11	0.11	-0.09	-0.06	-0.12	1.00	
11	Syndicates	0.28	0.14	-0.04	-0.13	0.03	-0.01	0.06	0.05	0.22	-0.05	1.00
12	Exit opportunities	0.07	0.05	-0.10	0.03	0.26	-0.25	-0.26	-0.16	-0.14	-0.11	0.08

Table 5: Determinants of GVC investments' success in bridging the equity gap

The table reports the coefficients and robust standard errors (in brackets) of Probit regressions of our dependent variable "Additional PVC" on different sets of independent variables and controls. Significance levels are denoted as: * p<0.10; ** p<0.05; *** p<0.01.

	I	II	III	IV	V	VI	VII	VIII
Regional competitiveness	0.499 ***	0.371 ***	0.343 ***	0.375 ***			0.381 ***	0.364 ***
	(0.070)	(0.080)	(0.082)	(0.085)			(0.088)	(0.089)
Log of company age		-0.170 ***	-0.177 ***	-0.168 ***	-0.171 ***	-0.174 ***	-0.168 ***	-0.169 ***
		(0.040)	(0.042)	(0.042)	(0.043)	(0.043)	(0.042)	(0.042)
Syndicates			0.717 ***	0.718 ***	0.716 ***	0.724 ***	0.717 ***	0.707 ***
			(0.087)	(0.087)	(0.087)	(0.088)	(0.088)	(0.088)
Local deal				-0.172 **	-0.137 *	-1.573 ***	-0.176 **	0.062
				(0.084)	(0.082)	(0.556)	(0.084)	(0.154)
Corruption					-0.110 ***	-0.028		
					(0.035)	(0.046)		
Local deal * Corruption						-0.178 ***		
						(0.068)		
No limit on contribution to candidates							-0.019	0.167
							(0.094)	(0.137)
Local deal * No limit on contributions to candidates								-0.347 *
								(0.184)
Industry fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	1230	1230	1230	1230	1230	1230	1230	1230
Pseudo R^2	0.028	0.107	0.153	0.156	0.150	0.154	0.156	0.158
Log pseudolikelihood	-746.91	-686.26	-650.69	-648.59	-653.06	-650.17	-648.57	-646.77
Chi^2	50.83 ***	130.41 ***	184.40 ***	187.18 ***	178.94 ***	176.21 ***	189.03 ***	197.54 ***

Table 6: Determinants of solo GVC investments' success in bridging the equity gap

The table reports the coefficients and robust standard errors (in brackets) of Probit regressions of our dependent variable "Additional PVC" on different sets of independent variables and controls. The sample includes exclusively transactions which are sourced by GVCs (without syndicated investments from PVCs). Significance levels are denoted as: * p<0.10; ** p<0.05; *** p<0.01.

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Regional competitiveness	0.470 ***	0.327 ***	0.391 ***			0.429 ***	0.379 ***	0.384 ***	0.405 ***	0.421 ***	0.354 ***
	(0.096)	(0.111)	(0.119)			(0.122)	(0.122)	(0.119)	(0.118)	(0.119)	(0.122)
Log of company age		-0.143 ***	-0.134 **	-0.123 **	-0.124 **	-0.135 **	-0.137 **	-0.133 **	-0.130 **	-0.118 **	-0.116 **
		(0.055)	(0.055)	(0.056)	(0.056)	(0.055)	(0.055)	(0.055)	(0.055)	(0.055)	(0.056)
Local deal			-0.270 **	-0.227 *	-1.391 *	-0.280 **	0.173	-0.271 **	-0.267 **	-0.242 *	-0.233 *
			(0.129)	(0.124)	(0.720)	(0.129)	(0.238)	(0.130)	(0.129)	(0.131)	(0.132)
Corruption				-0.124 ***	-0.063						
				(0.043)	(0.057)						
Local deal * Corruption					-0.145 *						
					(0.087)						
No limit on contributions to candidates						-0.148	0.191				
						(0.139)	(0.206)				
Local deal * No limit on contributions to candidates							-0.667 **				
							(0.281)				
Years of experience								-0.011			
								(0.009)			
Total deal experience									0.001		
									(0.001)		
Industry experience										0.019 ***	
										(0.006)	
Syndication experience											0.006 **
											(0.002)
Industry fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	635	635	635	635	635	635	635	635	635	635	635
Pseudo R^2	0.030	0.128	0.135	0.131	0.135	0.137	0.146	0.137	0.135	0.149	0.143
Log pseudolikelihood	-301.285	-270.915	-268.783	-270.032	-268.904	-268.274	-265.376	-268.200	-268.656	-264.359	-266.357
Chi^2	24.002 ***	59.896 ***	63.676 ***	62.228 ***	59.345 ***	65.099 ***	80.585 ***	63.935 ***	64.756 ***	73.717 ***	68.679 ***

Table 7: Cox (1972) regressions

The table reports the estimated coefficients and, in brackets, the robust standard errors of Cox (1972) event history type models. The dependent variable is always "Additional PVC". The time to the event is defined by the number of days since the seed financing round. We use Efron's (1977) correction for ties. Significance levels are denoted as: * p < 0.10; ** p< 0.05; *** p<0.01.

Panel A	I	II	III	IV	V
Syndicated deals	Included	Included	Included	Included	Included
Regional competitiveness	0.498 ***			0.507 ***	0.490 ***
	(0.115)			(0.119)	(0.120)
Log of company age	-0.232 ***	-0.246 ***	-0.248 ***	-0.233 ***	-0.230 ***
	(0.056)	(0.057)	(0.057)	(0.056)	(0.056)
Syndicates	0.907 ***	0.913 ***	0.917 ***	0.906 ***	0.894 ***
	(0.120)	(0.120)	(0.120)	(0.120)	(0.121)
Local deal	-0.189 *	-0.148	-1.946 **	-0.194 *	0.007
	(0.106)	(0.104)	(0.783)	(0.107)	(0.209)
Corruption		-0.176 ***	-0.074		
		(0.047)	(0.064)		
Local deal * Corruption			-0.219 **		
			(0.095)		
No limit on contributions to candidates				-0.025	0.129
				(0.123)	(0.188)
Local deal * No limit on contributions to candidates					-0.282
					(0.247)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes
N of observations	1230	1230	1230	1230	1230
N of successes	390	390	390	390	390
Pseudo R^2	0.047	0.046	0.047	0.047	0.047
Log pseudolikelihood	-2555.56	-2558.32	-2556.01	-2555.54	-2554.85
Chi^2	207.095 ***	191.872 ***	192.331 ***	207.761 ***	212.812 ***

Table 7: Cox (1972) regressions (continues)

Panel B	VI	VII	VIII	IX	X	XI	XII
Syndicated deals	Excluded	Excluded	Excluded	Excluded	Excluded	Excluded	Excluded
Regional competitiveness	0.609 ***			0.694 ***	0.601 ***	0.622 ***	0.553 ***
	(0.185)			(0.195)	(0.198)	(0.190)	(0.193)
Log of company age	-0.240 ***	-0.232 ***	-0.228 **	-0.245 ***	-0.236 ***	-0.218 **	-0.221 **
	(0.088)	(0.090)	(0.090)	(0.088)	(0.086)	(0.089)	(0.089)
Local deal	-0.357 *	-0.272	-2.674 **	-0.381 *	0.219	-0.317	-0.315
	(0.196)	(0.188)	(1.268)	(0.196)	(0.372)	(0.200)	(0.201)
Corruption		-0.206 ***	-0.094				
		(0.070)	(0.086)				
Local deal * Corruption			-0.289 *				
			(0.149)				
No limit on contributions to candidates				-0.264	0.171		
				(0.209)	(0.319)		
Local deal * No limit on contributions to candidates					-0.870 **		
					(0.443)		
Industry experience						0.027 ***	
						(0.008)	
Syndication experience							0.008 **
							(0.004)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	635	635	635	635	635	635	635
N of successes	122	122	122	122	122	122	122
Pseudo R^2	0.058	0.057	0.059	0.059	0.062	0.063	0.061
Log pseudolikelihood	-724.18	-725.00	-723.27	-723.45	-721.24	-719.88	-721.66
Chi^2	66.572 ***	66.785 ***	62.633 ***	66.433 ***	79.109 ***	84.646 ***	73.034 ***

Table 8: Determinants of the IPO and M&A of the target company of GVC investments

The table reports the coefficients and robust standard errors (in brackets) of Probit regressions of the dependent variable "IPO or M&A" on different sets of independent variables and controls. Significance levels are denoted as: * p<0.10; ** p<0.05; *** p<0.01.

Panel A	I	II	III	IV	V	VI
Syndicated deals	Included	Included	Included	Excluded	Excluded	Excluded
Regional competitiveness	0.166 *			0.109		
	(0.088)			(0.118)		
Log of company Age	0.127 ***	0.133 ***	0.130 ***	0.133 ***	0.146 ***	0.142 ***
	(0.042)	(0.042)	(0.042)	(0.051)	(0.052)	(0.052)
Local deal	-0.073	-0.064	-1.104 *	-0.034	-0.036	-1.251 *
	(0.088)	(0.087)	(0.579)	(0.126)	(0.123)	(0.699)
Exit opportunities	0.001	0.002	0.002	0.002	0.002	0.002
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Syndicates	0.328 ***	0.318 ***	0.325 ***			
	(0.095)	(0.095)	(0.096)			
Corruption		-0.083 **	-0.024		-0.079	-0.011
		(0.039)	(0.054)		(0.050)	(0.067)
Local deal * Corruption			-0.130 *			-0.155 *
			(0.072)			(0.088)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	1230	1230	1230	635	635	635
Pseudo R^2	0.059	0.060	0.063	0.055	0.059	0.065
Log pseudolikelihood	-560.630	-559.77	-558.04	-261.201	-260.119	-258.51
Chi^2	67.890 ***	70.053 ***	76.271 ***	31.424 **	32.529 **	38.534 ***

Appendix

Table A1: List of GVC investors included in the sample

GVC Name		GVC Name	
Austria Wirtschaftsservice GmbH	AU	NV Industriebank Liof	NL
BABEG Kaerntner Betriebsansiedlungs und Beteiligungsg mbH	AU	Participatiemaatschappij Oost Nederland NV	NL
Steirische Wirtschaftsfoerderungs GmbH	AU	Investinor AS	NO
Tecnet Equity NOE Technologiebeteiligungs Invest GmbH	AU	Fundusz Gornoslaski SA	PL
Brussels I3 Fund NV	BE	Portugal Capital Ventures SGPS SA	PT
LRM NV	BE	Almi Innovationsbron AB	SE
NIVELINVEST SA	BE	Fouriertransform AB	SE
Sev Asset Management	BE	GU Holding AB	SE
Sopartec SA	BE	Industrifonden Stift	SE
Srib	BE	KTH Chalmers Capital KB	SE
Bm H Beteiligungs Managementgesellschaft Hessen mbH	DE	Lund University	SE
High Tech Grunderfonds Management GmbH	DE	Swedfund International AB	SE
Life Science Fonds Esslingen Verwaltungs GmbH	DE	Birmingham Venture Capital Ltd	UK
MBG Baden-Wuerttemberg GmbH	DE	Business Growth Fund PLC	UK
Mittelstaendische Beteiligungsgesellschaft Berlin	DE	Cardiff University	UK
DTU Symbion Innovation A/S	DK	CDC Group PLC	UK
VAEKSTFONDEN	DK	EBRD	UK
Estonian Development Fund	EE	Highland Venture Capital	UK
COFIDES SA	ES	Imperial Innovations Group PLC	UK
Empresa Nacional de Innovacion SA	ES	Invest Northern Ireland	UK
Extremadura Avante SL	ES	IP Group PLC	UK
Finaves I SA	ES	Isis Innovation Ltd	UK
Inversion y Gestion de Capital de Riesgo de Andalucia SAU	ES	Javelin Ventures Ltd	UK
Unirisco Galicia SCR SA	ES	Manchester Technology Fund Ltd	UK
Suomen Teollisuussijoitus Oy	FI	NESTA	UK
BPI-Groupe EPIC	FR	Partnerships Uk PLC	UK
Cea Investissement SA	FR	Plurion Ltd	UK
EPICEA(SIPAREX)	FR	Qinetiq Ventures Ltd	UK
ISIS Developpement	FR	Qubis Ltd	UK
SACDE	FR	Scottish Enterprise Board	UK
Enterprise Ireland	IE	Scottish Enterprise Glasgow	UK
Millennium Capital Ltd	IE	Sussex Place Ventures Ltd	UK
Western Development Commission	IE	University Of Cambridge Challenge Fund	UK
Friulia SpA	IT	Uutech Ltd	UK
Finlombarda SGR SpA	IT	Viking Fund	UK
Fondo Italiano d Investimento SGR SpA	IT	Welsh Development Agency	UK

Table A2: Determinants of a GVC success in bridging the equity gap - residual centering procedure

The residual centering procedure (Lance, 1988) consists in two stages. First, the interaction term is regressed on its component parts. Second, the predicted residual is used instead of the interaction term in the regression equation. This approach reduces multicollinearity between the interaction term and main effects. The procedure is only available for OLS models and we therefore use this model. The table reports the coefficients and the robust standard errors (in brackets) of the second step OLS regressions. The dependent variable is "Additional PVC" as before. Significance levels are denoted as: * p < 0.10; ** p< 0.05; *** p<0.01.

	I	II	III
Log of company age	-0.045 ***	-0.047 ***	-0.047 ***
	(0.011)	(0.011)	(0.011)
Syndicates	0.231 ***	0.232 ***	0.232 ***
	(0.027)	(0.027)	(0.027)
Local deal	-0.043 *	-0.370 ***	-0.047 *
	(0.025)	(0.126)	(0.025)
Corruption	-0.026 ***	-0.006	-0.031 ***
	(0.009)	(0.012)	(0.009)
Local deal* Corruption		-0.042 **	
		(0.016)	
Residuals of Local deal * Corruption			-0.042 **
			(0.016)
Industry fixed effects	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes
Constant	Yes	Yes	Yes
N of observations	1230	1230	1230
R^2	0.166	0.169	0.169
Log pseudolikelihood	-692.759	-690.524	-690.524
F	17.09 ***	16.30 ***	16.30 ***
Average VIF	10.45	20.98	10.20

Table A3: Determinants of a GVC success in bridging the equity gap – Companies younger than 5 years

The table reports the coefficients and robust standard errors (in brackets) of Probit regressions of our dependent variable "Additional PVC" on different sets of independent variables and controls. Only companies 5 years old or younger are included in the analysis. Significance levels are denoted as: * p<0.10; ** p<0.05; *** p<0.01.

	I	II	III	IV	V	VI
Regional competitiveness	0.483 ***	0.397 ***	0.370 ***	0.398 ***		
	(0.084)	(0.095)	(0.098)	(0.100)		
Log of company age		-0.051	-0.124	-0.109	-0.141 *	-0.141 *
		(0.073)	(0.077)	(0.077)	(0.078)	(0.078)
Syndicates			0.714 ***	0.712 ***	0.726 ***	0.738 ***
			(0.098)	(0.098)	(0.098)	(0.099)
Local deal				-0.160 *	-0.128	-1.843 ***
				(0.094)	(0.093)	(0.692)
Corruption					-0.121 ***	-0.020
					(0.042)	(0.056)
Local deal * corruption						-0.211 **
						(0.084)
No limit on contributions to candidates						
Local deal * No limit on contributions to candidates						
Industry fixed effects	No	Yes	Yes	Yes	Yes	Yes
Time fixed effects	No	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
N of observations	942	942	942	942	942	942
Pseudo R^2	0.023	0.102	0.147	0.150	0.144	0.148
Log pseudolikelihood	-601.047	-552.565	-524.702	-523.266	-527.082	-524.469
Chi^2	33.184 ***	101.495 ***	153.094 ***	154.423 ***	150.915 ***	148.207 ***