Public Entrepreneurial Finance around the Globe

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This paper examines how government funding programs geared towards early-stage companies interact with private capital markets. Using hand-collected data on 755 government programs worldwide, we find that governments' allocations to such funding programs in the past decade have been comparable to global venture capital disbursements. Government programs were more frequent in periods with more private venture activity, a relationship that was stronger in nations with better public governance. The programs' structures often relied on the local private sector. The private sector's involvement was greater when government programs targeted earlier stage companies and when rankings of government effectiveness were higher. These findings suggest complementarity between public and private entrepreneurial finance.

1. Introduction

Over the past 75 years, private venture capital funds have emerged to finance entrepreneurial firms, a market prone to failures due to information problems and intangible assets (Hall and Lerner 2010, Kaplan and Stromberg 2003). However, the fundraising and investment activity of venture capitalists themselves face significant volatility and cyclicality, in part, due to fluctuations in public stock markets (Gompers et al. 2008, Howell et al. 2020). Authors from Nelson (1959) and Arrow (1962), on the one hand, to Gruber and Johnson (2019), on the other, have proposed public funding programs as a solution to the ensuing gaps in private capital. This paper seeks to assess whether government funding programs geared towards early-stage companies mitigate funding gaps that arise from the cyclicality of the venture industry. Put differently, do government funding programs substitute for private capital when the latter declines?

The importance of this analysis stems from the increasing centrality of entrepreneurial finance initiatives in public economic development strategies. Over the last decade, these programs reached a scale similar to the global venture capital industry. Between 2010 and 2019, national governments' entrepreneurial finance programs around the world had on average a cumulative annual budget of $156 billion, as opposed to an average of $153 billion of global disbursements of traditional venture funds.[2]

Understanding how public and private entrepreneurial capital interact was challenging due to data limitations. Earlier academic and practitioner literature has provided scanty documentation of the universe of government funding programs geared toward entrepreneurial companies. In this paper, we addressed this gap by taking a broad view across nations and over time, in an attempt to characterize the universe of national governments' entrepreneurial finance programs.

This approach diverged from that in much of the earlier literature, which looked in depth at the design of a single program and exploited a discontinuity in program design (Bronzini and Iachini 2014, Howell 2017, Le and Jaffe 2017, Myers and Lanahan 2020, Santoleri et al. 2020, and many others). This standard approach had the benefit of allowing a well-identified look at a program's efficacy at promoting innovation and/or commercialization but shed limited light on the interplay of public and private entrepreneurial finance, particularly in relation to program initiation and design.[3] Our approach allowed us to examine the broader relationship between public and private entrepreneurial finance.

We used a hand-collected novel data set on nation-wide entrepreneurial finance policies around the world active between 1995 and 2019 (755 programs in 66 countries). We limited our analysis, as discussed in depth below, to programs at the national level with a focus on financing domestic entrepreneurial firms or intermediaries that fund them. We built as comprehensive a dataset as

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[2] These estimates are based on our sample, as described below. If we exclude the 42% of public entrepreneurial finance programs that are debt oriented, the total average expenditure still exceeds $90 billion annually. See Appendix A for a discussion of the methodology behind these comparisons.

[3] This paper was also related to efforts to understand the tradeoff between multiple programs in a single nation, such as Kisseleva (2020) and Pless (2020).

possible of these programs and their features to explore the relationship between public entrepreneurial finance initiatives and local private markets.

Our evidence strongly rejected the substitution hypothesis, in which government funding of early-stage companies increased when private funding dried up. Instead, we found more private venture activity was associated with subsequent government entrepreneurial finance: the two sources of capital were positively correlated. These patterns held when examining nations in the cross-section. When using panel data, we saw not just a positive correlation, but that public policies followed the private money. Increases in venture capital activity in a given industry were followed by subsequent government funding programs that targeted those industries as well.

What could explain this positive association between public and private entrepreneurial finance? The penultimate section of the paper explored a number of alternative mechanisms that might have driven these results. We argue that the evidence was most consistent with what we termed the *Complementarity* hypothesis: public entrepreneurial finance might have been more effective when private sector financing was also present. Private financiers' compensation has been strongly tied to the success of their investments, and they have developed careful approaches to identify promising firms and provide effective governance and/or informal mentoring. These steps might have been difficult to replicate for public sector bureaucrats. Similarly, political considerations may have made it difficult for government officials to terminate failed businesses. The presence of private sector actors might have increased the effectiveness of public programs.

To better understand the mechanisms behind the positive correlation between governments' funding programs and local private capital further, we also examined the structure of these programs. Consistent with the hypothesis that the complementarity mitigated investment frictions, we found three ways in which government programs frequently relied on private capital markets: the involvement of private sector actors in investment screening, the funding of intermediaries rather than companies directly, and capital matching requirements. Moreover, government programs were more likely to rely on private capital markets when targeting earlier stage companies, where information asymmetries may be greater.

Consistent with the interpretation that government reliance on the private sector alleviated the information and incentive problems that the public sector may encounter, we found that the positive correlation between private and public activities was more pronounced when governments were more effective. To show this, we used a wide variety of metrics compiled by the World Bank. Moreover, more effective governments were more likely to structure their funding programs with greater private sector involvement. These findings were consistent with the suggestions of Acemoglu and Robinson (2013) that highly effective governments foresee and address information and incentive problems that public programs encounter. In this setting, by collaborating with private financiers of entrepreneurial firms, the public bodies may be able to head off problems proactively.

We also found consistent evidence when we looked at the impact of neighboring programs. Nations whose neighbors initiated public entrepreneurial finance programs were more likely to do so themselves. More interestingly, the evidence was consistent with knowledge spillovers

regarding effective program design: countries with neighboring programs were likely to display a strong correlation between public and private funding.

We also considered alternative interpretations of the results. The first, which we referred to as *Trend Chasing,* was the possibility that the positive correlation between private capital markets and public government programs was driven by both sets of actors pursuing investments perceived as promising attractive private returns. However, this interpretation was inconsistent with the strong ties between public and private entrepreneurial finance. Government programs' structure frequently relied on private capital markets through the involvement of private sector actors. Moreover, more effective governments were more likely to deploy their public funding in a manner that was both highly correlated with private funding, and more likely to rely on private capital markets. If governments were simply engaged in trend-chasing, we would not expect to find these patterns in the data.

A second alternative interpretation for the timing of public government programs may relate to *Rent Extraction.* The literature has suggested that financing programs of rent-extracting governments have had a pro-cyclical bias, in order to appropriate the abundant revenues during booms for the benefit of special interests (Alesina, Campante, and Tabellini 2008, Ilzetzki 2007). Such forces could thus explain the positive correlation we found between private capital markets and government funding programs. However, in contrast to the literature mentioned above, we found that the positive correlation between public and private sources of capital was greater among countries with stronger institutions: i.e., countries with more effective governments (a measure strongly inversely correlated with the level of corruption).

Ultimately, the complementarity between public and private entrepreneurial finance seemed to be mostly consistent with the hypothesis that such complementarity enables mitigating frictions that arise in the deployment of capital to early-stage firms.

The plan of this paper is as follows. Section 2 describes the creation of the data set. Section 3 presents some stylized facts about these programs. The results regarding the positive correlation between public and private entrepreneurial finance are presented in Section 4. Section 5 examines program design. The mechanisms behind the results are discussed in Section 6. The final section concludes the paper.

2. Creating the Data Set

2.1. Defining the included programs

This paper examined a broad panel of nations in the spirit of the law-and-finance literature (and in the specific context of innovation policy, Bloom, Griffith, and van Reenen 2003). The first step was the identification of the public entrepreneurial finance programs. A guiding principle was to focus on national programs that involved the provision of capital to entrepreneurs. We also included the many entrepreneurial finance programs that engaged venture capitalists, angel funds, and banks.

These seemingly straightforward criteria, however, required extensive refinement. In Appendix 1, we provided examples of policies that were included and deleted. The key principles that motivated our decisions were as follows:

- Domestic focus: We dropped policies focused specifically on other markets and not on the country in which they were initiated. For instance, we dropped the programs of a number of wealthy nations that were aimed towards promoting entrepreneurship in emerging economies.

- Financial orientation: We wished to focus on programs that involved the financing of entrepreneurs. Thus, we kept policies supporting innovation centers so long as the innovation center itself offered financing of entrepreneurial firms, but not if the emphasis was solely on training, mentoring, or similar activities. Similarly, we kept policies that involved special economic zones, so long as the program involved the financing of entrepreneurial firms.

- Nation-level policies: Because we focused our analysis on the national level, we dropped programs run by international bodies such as the European Union. We kept policies that were joint efforts between a national government and an international body, as long as the participation of the international body was only for funding purposes and the policy itself was run by a national government. We also dropped policies organized by states, provinces, and municipalities. Our decision to do so was driven not by a lack of interest in or significance of these programs, but because of the difficulty in getting systematic data on these efforts.

- Appropriate program level: Governments were inconsistent about how programs were defined. These situations were quite idiosyncratic and could be quite complex. In general, we adjusted the definition of what constituted a program in one of three cases. Below are three commonly encountered situations, and how and why we modified the definition of the programs:

  o In some cases, there were "umbrella" policies that encompassed a number of clearly distinct programs with different types of financing provided and/or firms targeted. In many cases, the branding of the umbrella programs changed over time, even as the underlying programs remained constant: for instance, a new administration might announce an initiative, which essentially was a repackaging of already-existing programs. In these cases, we split the umbrella policies up into their clearly defined subprograms.
  o In some cases, policies were announced as separate programs, even though they had the same structure. For instance, in some cases, a government would launch three separate financing programs with identical features, but targeted at three different industries. In these cases, we classified these as a single program and aggregated the budget information. While such a reclassification reduced the number of reported programs, it did not affect most of the analyses using weighted totals.

o In policies where there was a clear primary financing type but some additional capital provided (e.g., an equity financing program with a small loan component appended), we code the policy according to the primary financing type.

Sometimes programs changed design or scale over time. We addressed these shifts as follows. If the program design changed radically, we created a second entry with a note that it was a restructured version of the original program. If there were only minor modifications, we used the characteristics as of the end of 2019.

2.2.   Identifying and coding the programs

We now describe the process by which we identified and coded the programs. To do this, we first created as comprehensive a list of programs to research as possible.

One concern with the coding was those policies that had terminated might be difficult to observe: they were less likely to be included on current government web sites and other directories. We sought to avoid such truncation bias by identifying programs using contemporaneous sources to as great an extent as possible.

In particular, we used 190 sources on public entrepreneurial finance programs published between 1998 and 2020. These documents were prepared by international bodies (e.g., the Organisation for Economic Cooperation and Development), national governments, and academics. They summarized relevant policies on a national, regional, or international basis, often providing information on their design. Table A-1 in the Internet Appendix summarized the sources used; Appendix 2 provides more details on the criteria used for the selection process.

Many of these directories listed web sites for these programs, which were either still active or available through the Internet Archive (www.archive.org). The information that we obtained from these web sites caused us to revise the program list in some cases. For instance, we discovered that some of the listed programs were either duplicates of other programs, umbrella designations that encompassed multiple programs, or other problematic cases. In some cases, we also discovered additional programs, which were either not included in the published sources or conflated with another program. Table A-2 described how we created the final sample of 755 programs.

We gathered information on the features of these programs from multiple sources. Many of the reports summarizing the programs had information on the key aspects of these features. In addition, many existing (and terminated) programs had extensive information online on program design, in current or archived sites. Appendix 3 provided definitions of the coded policy-level variables.

Of the measures that we coded, the treatment of annual budgets was particularly challenging. We sought to capture the annual budget flow of the program in US dollars. We used, wherever possible, the amount actually disbursed, not the original appropriation or budget request. In some cases, the flow varied from year to year. The quality of the budget information was generally higher in later years, so we used the average of the most recent three years of the program, if possible. If available budget information was a cumulative amount over a longer period, we took

the annual average. Using the recent flows was imperfect for two reasons: in some cases, programs increased in size over time, so this approach may have overstated program size. (Though, as noted above, we sought to address substantial breaks in program design by treating these as two separate programs.) In other cases, equity and debt programs had an evergreen feature, where capital returned from original investments was "recycled" in new deals. In these cases, the budget amounts may understate the economic importance of mature programs.

2.3. Characterizing the countries

We characterized the countries using measures that were similar to those in Bernstein, Dev, and Lerner (2020). We first had a number of explanatory variables that characterized the countries in general. We obtained annual data on population (in millions) and GDP (in billions of 2010 US dollars) from the Economist Intelligence Unit database. In some cases, these data were missing, so we supplemented this source with data from the *CIA Factbook*, United Nations databases, and the government website of the respective countries. Appendix 4 provided definitions of the country-level variables.

In our analysis, we also explored how entrepreneurial finance was associated with the quality of government. To assess government quality, we used two measures compiled by the World Bank's Worldwide Governance Indicators project: their measures of the effectiveness of government and the rule of law. These aggregate indicators combined the views of a large number of corporate, individual citizen, and expert survey respondents in developed and developing countries, and were based on over 30 individual data sources produced by a variety of survey institutes, think tanks, non-governmental organizations, international organizations, and private sector firms. The data series dated back to 1996. Since these series were initially produced biannually, when data were missing in a given year, we used the information in the immediately subsequent year,

In addition, we used two measures that were more business focused: the World Bank's ease of doing business score (which measured an economy's performance with respect to a measure of regulatory best practice across 41 indicators that the Doing Business project compiles) and the sub-score for enforcing contracts, which we felt to be particularly relevant for entrepreneurial finance. These measures were compiled annually since 2004; for observations prior to this year, we used the score for 2004.

We also gathered three metrics that we measured entrepreneurial and innovative activity. First, we gathered country-level venture capital investment data from two sources.

The initial source of information was various national and regional associations. These organizations routinely gather data on venture capital investments that should be of high quality due to their close ties to members. Unfortunately, these data had two substantial limitations. First, in much of the world, these associations were quite new and only recently began tracking venture investments. Second, not all groups used the same methodologies.

Consequentially, we also used Refinitiv VentureXpert data (other databases had limited global coverage, especially in the 1990s). The data included 342,832 transactions with an average of 2.16 investors per deal. We removed transactions with missing total investment values, or transactions

classified as Buyout, Fund of Funds, Generalist Private Equity, Mezzanine, Other Investor (Non-Private Equity), Other Private Equity, and Real Estate. Our final deal count was 204,446 transactions. We summed the venture capital investment by country and year. Of 6,150 country-year observations between 1990 and 2019, 4,150 had no data from either source, in which case we assumed there were no venture capital investments. Table A-3 summarizes the methodology.

Second, we gathered the total number of patent applications filed annually by the country of residence of the applicant from the World Intellectual Property Organization's (WIPO) Intellectual Property (IP) Statistics database. The WIPO patent application counts included both local filings in the home nation, as well as international filings made either directly or via regional patent offices and the WIPO-administered Patent Cooperation Treaty (PCT) system.

Finally, we totaled the number and dollar volume of initial public offering (IPO) activity. We obtained our IPO data from the Bloomberg, Capital IQ, and SDC Platinum databases. The procedure mirrored that in Bernstein, Dev, and Lerner (2020). We sought to replicate the IPO samples typically used in the finance literature. Table A-4 provides more details. We assigned IPOs to countries by the nation where the company was headquartered.

3. *Stylized Facts about Government Funding Programs of Entrepreneurial Ventures*

We thus assembled a hand-collected data of government funding programs of entrepreneurial ventures around the world. Given the novelty of the data, and the limited information available in the literature about the extent and structure of these programs, in this section we describe several stylized facts that also guide our main analysis in Section 4 below.

Stylized Fact 1: Government funding programs have become increasingly more prevalent, and today are common around the globe.

As illustrated in Table 1, our data covered 755 government funding programs in 66 countries around the world active between 1995 and 2019. On average, governments spent $1.85 billion per year (conditional on having at least one policy at that time). On average, a given country has 11.4 such policies, and the average funding program lasting 11 years.

The tendency to rely on such government funding program was geographically dispersed, and not just a developed countries phenomenon. For example, Figure 1 illustrates the total number of policies around the world. Countries that had a significant number of different countries include Canada, Germany, and the Netherlands, but also Turkey and a number of Eastern European nations. Figure 2 presented the annual budget in these nations, and Figure 3 captured spending relative to GDP. While Figure 2 illustrated a strong correlation with the size of the nations (such as in the case of Brazil, China, Russia, and the U.S), Figure 3 revealed that a few smaller nations spend significantly on such entrepreneurial funding programs. Canada, China, France, Germany, and Indonesia were in the highest category in both Figures 2 and 3.[4] Finally, Figure 4 explored the

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[4] The reader may be surprised by the inclusion of Algeria among the top nations. Algeria's ranking was driven by the programs for young entrepreneurs run by the Agence Nationale de Soutien à l'Emploi des Jeunes (ANSEJ), which was characterized by BTI as "a massive public investment"

stability of these programs, in terms of their length. But overall, it is evident that the use of such programs is widely spread, across countries around the world.

It is also interesting to note that the importance of these government programs increased over time. Figure 5 illustrated the annual aggregate budgets allocated for government funding programs of entrepreneurial ventures. The figure illustrates the steady and significant increase in global government spending over time, from roughly $50 billion in 1995 to more than $170 billion in 2019.

Stylized Fact 2: The aggregate budget of government funding programs is comparable to the global venture capital market.

It is also interesting to note the aggregate importance of these programs, when compared to the global venture capital market. As illustrated in Figure 5, over the last decade, the average cumulative annual budget of such government funding programs around the world was $156 billion. In contrast, global annual disbursements of traditional venture funds around the world were on average $153 billion, as tabulated by CrunchBase's *Global VC Reports*.[5]

Stylized Fact 3: Governments rely on a host of different financial instruments.

Panel A of Table 2 illustrated the different types of financial instruments employed by governments. The most prevalent type of government instrument was grants, accounting for 43.8% of all programs, as noted in column 1. The second most popular financing form was equity funding, accounting for 18.2%. But governments utilize a host of other types of financial instruments, ranging from credit guarantees and loans to innovation vouchers to tax credits. It is interesting to note that when accounting for the size of the programs, as illustrated in column 2, tax credits and government loans were more significant, partially because they tended to be utilized by later-stage and larger companies.

Stylized Fact 4: Government funding programs often involve private capital markets.

Government funding programs often relied on private capital investors. Panel B of Table 2 showed that the involvement comes in various forms. Column 1 illustrated that the involvement of private investors in the investment committee occurs in 359% of the government funding programs. However, the most popular form of reliance on private investors was through the matching requirements, in which government funding was conditional on the ability of firms to raise matching capital from the private sector. Such requirement existed in 43% of the government programs.

(https://www.bti-project.org/en/reports/country-report-DZA-2020.html). For more details on the program, see https://www.imf.org/external/pubs/ft/scr/2014/cr14161.pdf.

[5] https://news.crunchbase.com/news/the-q4-eoy-2019-global-vc-report-a-strong-end-to-a-good-but-not-fantastic-year/ and earlier years.

Quite remarkably, in 85.3% of all government funding programs, private investors were involved. The particular design of government funding programs of entrepreneurial ventures is central to our analyses below.

Stylized Fact 5: Government funding programs often target specific industries and company stages.

Panel C and D of Table 2 highlighted the industries and company stages targeted by programs. In our coding, we allowed programs to highlight multiple categories. In terms of the number of programs, programs focusing on the life sciences and technology firms was most common, as well as focusing on early-stage firms. We also tabulate categories that were excluded from coverage in Panel D. Here, agricultural, financial services, and sin industries were the most frequently explicitly excluded.

4. *The Correlation between Private and Public Activity*

We first examined the relationship between national characteristics and the decision to begin these programs. In particular, we focused on whether, as delineated in the introduction, these programs were positively or negatively correlated with private entrepreneurial finance.

Table 3 provided a breakdown of nations along various dimensions, comparing the number of policies active between 1995 and 2019. The number of active programs was highly related to national characteristics. In particular, nations with larger populations, wealthier countries, those with more patenting and venture capital activity, those with greater credit availability and investor protection, and with more public market and IPO activity were more likely to have such programs. These tabulations were corroborated by Figure 6, a bin-scatter plot showing a strong linear relationship between the volume of venture capital investment in 1994 and the dollar-weighted number of active programs in 2019. Of course, the interpretation of these univariate comparisons must be cautious.

Thus, we turned to an econometric approach. Table 4 looked in the cross-section at the decision to begin programs. Each nation was an observation. The dependent variable, *NewGovPolicies$_c$*, was the dollar-weighted number of programs begun in country c between 1995 and 2019. We included the population, the GDP (in the second specification), and the weighted number of active programs active in each nation in 1994 as controls. The key independent variable of interest was an indicator if the country was in the top quartile of VC activity in 1994:

$$\text{NewGovPolicies}_c = \beta \text{ x PrivateVC}_c + \delta \text{ x X}_{c,t} + \varepsilon_{c,t} \quad (1)$$

Through the paper, we used robust standard errors in the cross-sectional regressions; in the regressions with panel data or multiple observations for each country, we employed robust standard errors clustered at the country level.

The regressions demonstrated the pattern seen already in Table 3: that larger countries, as measured with the population in 1994, were more likely to initiate substantial public entrepreneurial finance programs. It also contained a more interesting result. Even after controlling for size, nations that were already in the top quartile of venture capital activity in 1994 were more

likely to establish these programs. Being in the top quartile of venture capital activity increased the weighted number of policies by roughly four times. The results in Table 4 suggested that public programs may have been positively correlated with private sector activity. Our interpretation was cautious, though, as the geography of venture activity was far from exogenously determined (e.g., Jeng and Wells 2001).

Table 5 also looked at this question, now exploiting the panel nature of the data. The dependent variable, *ActiveGovPolicies$_{c,t,}$* was the number of active policies in each country-year between 1995 and 2019. We included fixed effects for each nation, to control for unobserved heterogeneity, and in some specifications, year fixed effects.

$$\text{ActiveGovPolicies}_{c,t} = \alpha_c + \alpha_t + \beta \times \text{PrivateVC}_{c,t-1} + \delta \times X_{c,t} + \varepsilon_{c,t} \quad (2)$$

Even after controlling for each nation, the coefficient β was significantly positive. Lagged venture activity was strongly associated with the presence of such policies. A one standard deviation increase in lagged VC investments led to a 60% increase in the number of active programs in a country.

These results naturally posed several concerns. One of these was that a small subset of programs might have driven the patterns. To address this concern, we divided the sample into three classes of programs (as in Table 2): those involving equity investment, those involving loans, mezzanine, and other debt-related instruments, and programs focused on grants (including those employing tax credits).

Table 6 presented the basic results in Table 4 for each class of the program. The key results continued to go through for each category of the program: larger nations with more prior venture activity were associated with more entrepreneurial finance programs of each type. Regardless of the type of the program, being a top VC nation translated to roughly a four-to-five times increase in new programs being introduced in the country.

Table 7 presented another robustness check. Some policies targeted particular industries, while others prohibited such investments. We focused on the eight industries most frequently mentioned in these provisions. These sectors were agriculture (including forestry, fishing, and fish farming), extractive (especially mining and oil-and-gas), financial (encompassing as well insurance and real estate), healthcare (including biotechnology, devices, and pharmaceuticals), industrials (such as aerospace, defense, machinery, industrial, and transport), sin (including alcohol, gambling, and sex-related firms), sustainability (especially cleantech and recycling), and technology (such as artificial intelligence, communications, electronics, and software). We identified annual venture investments in these country-industry-year triples based on four-digit Standard Industrial Classification codes. Table 2 highlighted that the most targeted industries were high technology, healthcare, and sustainability, with the addition of a few large programs targeting agriculture-related businesses.

We reported in Table 7 analyses akin to the spirit of those in Tables 4 and 5. Because the observations were at the country-industry or country-industry-year level, even in the cross-sectional analyses, we were able to use country and industry fixed effects.

In the first three regressions, we used *TargetedIndustry*, which denoted as one whether an industry was specifically targeted in a given period and zero otherwise, as a dependent variable. Again, we looked at whether a policy targeting that industry was introduced between 1995 and 2019 (in regression 1), or whether such a policy was active in those years (in regressions 2 and 3). More specifically, we estimated in regressions 2 and 3 at the industry-country-year level:

$$\text{TargetedIndustry}_{i,c\,t} = \alpha_i + \alpha_c + \alpha_t + \beta \times \text{PrivateVC}_{i,c,t-1} + \delta \times X_{c,t} + \varepsilon_{i,c,t} \quad (3)$$

In the fourth and fifth regressions, we repeated the analysis, now using the dollar volume of active government policies in a given country and year targeting a given industry.

Lagged venture activity in that industry (the coefficient β) had a powerful explanatory effect in the regressions, even after controlling for country, industry, and year fixed effects, as well as annual population and per capita GDP. These results supported the view of a complementarity between public entrepreneurial finance programs and private activity.

In the appendix, we explored additional robustness checks. Table A-5 re-estimated several tables without the venture activity measure, highlighting the impact of nation size. Table A-6 showed that the analyses were robust to the use of unweighted program counts. Table A-7 looked at Table 5, now divided into the three categories as in Table 6. The results were generally robust, though the standard errors were substantially nosier when programs were divided by type.

Finally, Appendix Table A-11 showed that over the long term, program initiations were associated with increased innovative activity at the national level. To help minimize the influence of year-to-year policy fluctuations, we employed long differences between the average level of 1990-1994 and 2015-2019 innovation activity in each country. The results showed that entrepreneurial finance policy initiations between 1995 and 2014 were associated with increases in both private venture capital and patenting levels. Though we approached the analysis in this table with caution, given the non-random decision to begin these efforts, the findings were again consistent with the complementarity of public and private entrepreneurial finance.

5. *The Design of Programs*

We next sought to understand how the design of programs differed across nations. As noted in the introduction, there were reasons to expect that the involvement of the private sector would be greater in better- or worse-governed nations. We also examined the impact of program focus. As highlighted in the introduction, these concerns were particularly acute in efforts to boost early-stage entrepreneurial finance, due to the substantial information asymmetries that surround these ventures.

Before we looked at these questions, however, we revisited the positive correlation between public and private entrepreneurial finance documented in Section 3. We asked whether the extent of these correlations differ with the quality of the governments.

Table 8 repeated the analysis in Table 5. Now we added a measure of the effectiveness of government and the rule of law in each nation, as well as these measures interacted with the volume of venture investment in the previous year. More specifically, we estimate:

$$\text{GovPolicies}_{c,t} = \alpha_c + \alpha_t + \beta_i \text{ x PrivateVC}_{c,t-1} + \beta_2 \text{ x GovEff}_{c,t-1} + \gamma \text{ x PrivateVC}_{c,t-1} \text{ x GovEff}_{c,t-1} + \delta \text{ x X}_{c,t} + \varepsilon_{c,t} \quad (4)$$

The coefficients on the government efficiency measures (β_2) were of little significance. Much of their impact was presumably subsumed in the country fixed effects. (While these scores changed over time, they tended to be quite stable). However, the coefficients on the interaction terms (γ) were highly positive. While the coefficient on lagged venture activity (β_i) continued to be positive, the only significant coefficients were the interaction between the venture measure and government quality. The positive relationship between high-quality public administration and public-private relationship suggested a positive view of the correlations documented in Section 3.

Figure 7 showed this relationship graphically: the relationship between government programs and private VC funding, split by high and low government effectiveness countries. The figure illustrated the heterogeneity in the relationship along this difference: the association was noticeably stronger for countries with more effective governments. We repeated the analysis in Table A-8, now using scores for the enforcement of contracts and the ease of doing business. The results with ease of doing business were similar; those with the contract enforcement score were much weaker (though directionally similar).

We found additional consistent evidence when we explored the influence of policy activity in neighboring nations. Policies in neighboring countries could matter due to be "policy diffusion," where initiatives in one nation were understood and emulated elsewhere. While this phenomenon has been extensively explored in political science (e.g., Volden, Ting, and Carpenter, 2009), it has received less scrutiny in economics. In this case, the experiences nearby might have led to a greater appreciation of the importance of private sector involvement and influenced program design as a consequence.

Table 9 looked at this phenomenon. We used panel data between 1995 and 2019 as before, using the weighted number of new venture policies active in a given year as the dependent variable. We used fixed effects as before, as well as controls for country size. We constructed the weighted average of active policies in neighboring nations in the prior year. To create these measures, we relied on CEPII data (http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp) to create a matrix that identified all neighboring countries for a given country. Merging it with our data allowed us to calculate for each country-year the total weighted number of policies active in all neighboring countries.

In the first and third regressions, we showed that the presence of neighbors with these policies was a strong driver of the initiation or continuation of these programs. A one standard deviation increase in active programs in neighboring countries was associated with 50-70% more active policies in the country. While lagged venture capital activity in the nation in question continued to be significantly positive, policy initiatives by neighbors were significantly associated with active policies.

In the second and fourth regressions, we explored the suggestion above: that the presence of nearby programs might have led to a greater appreciation of the complementarity between public and private entrepreneurial finance. Indeed, the interaction between lagged neighboring programs and private venture financing was strongly positive. In nations where neighbors undertook these programs, the public-private complementarity was greater.

We then turned to the specific ways in which programs interacted with the private sector. In particular, we examined three mechanisms (tabulated in Table 2) through which governments could so engage:

- The first of these was a matching fund requirement. In these cases, public investment was conditioned on raising capital from another source. Programs differed substantially on the match rate required and in the acceptable range of sources (e.g., whether funds raised from another public body were acceptable for a match). The essential motivation, though, was that the willingness of another investor provides a second, independent opinion for the public body.

- The second mechanism was the involvement of the private sector in the investment decision-making process. Often programs included one or more entrepreneurs or venture capitalists on the investment committee that allocated funds. Such members might bring a different perspective to these deliberations.

- A third approach was not to fund entrepreneurs directly, but rather to finance financial intermediaries, for instance, venture capital firms or angel groups, who could invest the funds according to their judgment (subject to various rules, such as restrictions on the industry and the geography of the financed firms). By removing the government from the financing decision, these programs sought to improve the quality of the decision-making and insulate the choices from political pressures.

Table 10 looked at the use of these provisions. The unit of observation in each regression was each public entrepreneurial finance program p introduced between 1995 and 2019. We employed a composite measure, $PrivateSector_p$, as the dependent variable, which was the sum of these three elements (each coded from zero to one). The table presented ordered logit and ordinary least squares (OLS) specifications (though the results were robust to others). In Panel A, we used the effectiveness of governance and rule of law scores in the year of the policy introduction as the key independent variables, as well as the natural logarithm of venture capital investment. We controlled for population and per capita GDP:

$$PrivateSector_p = \beta_i \times PrivateVC_{c,t-1} + \beta_2 \times GovEff_{c,t-1} + \delta \times X_{c,t} + \varepsilon_{c,t} \quad (5)$$

Panel A of Table 10 showed that nations with better public governance, whether measured through the effectiveness of government or rule of law score, were more likely to incorporate these elements. When designing these policies, these nations seemed to respond to concerns about investor protection, and adjusted the program design accordingly.

In Tables A-9 and A-10, we explored the robustness of these analyses. In Table A-9, we used instead the scores of the ability to enforce contracts and the ease of doing business. We found a

strong association between the private sector engagement provisions and these two scores. When we examined the individual program elements in A-10, the results were similar to Table 9, especially for the matching fund and intermediary finding comments.

A final suggestion in the introduction was that whatever the policy of the government, these protections should have been more common in programs with more informational asymmetries. We examined this, at least roughly, by repeating the analysis in Panel A of Table 10, now adding a dummy for programs with an early-stage focus, as well as an interaction with the measure of government quality. Panel B was consistent with this suggestion. Programs focusing on early-stage investments were more likely to have private sector involvement in these programs.

6. *Mechanisms*

The main contributions of our paper were two-fold. First, we shed light on the scale and design of government funding programs tailored to boost entrepreneurial activity around the world. Second, we explored how public entrepreneurial finance interacted with private capital markets. We found that government funding was positively correlated with the local availability of venture capital funding, a result that held both at the country and the industry level.

In this section, we considered three potential mechanisms that may have driven this complementarity. The evidence compiled above helped distinguish between the various explanations.

6.1 Trend Chasing

One possible interpretation of the positive correlation between private capital markets and public government programs was that both sets of actors were pursuing investments perceived as promising attractive private returns. Such a strategy could lead to crowding out, where firms that would have raised private capital instead receive the equivalent amount in subsidies (see Lach 2002 and Wallsten 2000, as well as Lerner 2009 for a more general discussion).

Such a scenario may be a consequence of the criteria by which many public firms were evaluated or structured. For instance, Wallsten (2000) suggested that in its first decades, the Small Business Innovation Research (SBIR) program in the US was largely evaluated through compilations of "success stories": accounts of companies that received public funding and then achieved success in the product and/or financial markets. As he noted, such schemes were problematic as they led program managers to focus on "measurable private returns and anecdotes, largely ignoring the difficult-to-estimate expected returns and spillovers." Such an evaluation scheme may have led program administrators to target sectors that were contemporaneously the focus of intense investor interest.

Meanwhile, many equity programs in the sample featured an "evergreen" structure, where program administrators could reinvest the proceeds from their investments. Obtaining additional capital for investments was frequently challenging. This program design may have again driven officials, eager to sustain their programs and their own positions, to select transactions promising the highest private returns.

However, this interpretation of the results was inconsistent with two findings documented above. First, government programs frequently relied on private capital markets through the involvement of private sector actors in investment screening, the funding of intermediaries rather than direct companies, and capital matching requirements. The frequent reliance of government programs on private capital markets suggested that the public funding was doing more than "chasing" private funding.

The second relevant set of findings related to where the correlations between private and public funding were the strongest. Under the trend chasing hypothesis, we might have expected that a wide range of governments would have followed local venture capital activities. Alternatively, if trend chasing was a manifestation of the "gaming" of evaluation criteria or program design, such behavior might have been especially common in settings where government effectiveness was lower. Instead, more effective governments were more likely to deploy their public funding in a manner that was highly correlated with private funding. Similarly, effective governments, whom we would expect to allocate capital more efficiently, were more likely to rely on private capital markets when structuring their funding programs.

6.2 Rent Extraction

Many government policies seek in principle to stabilize business cycle-fluctuations, such as lowering interest rates and easing credit constraints during economic downturns. We might have anticipated that public entrepreneurial finance programs would have displayed the same pattern. Instead, government programs geared to funding entrepreneurial ventures were pro-cyclical, positively correlated with the availability of venture capital funding.

A second explanation for this timing was rent-seeking. The literature has suggested that financing programs of rent-extracting governments have had a pro-cyclical bias, in order to appropriate the abundant revenues during booms for the benefit of special interests (Alesina, Campante, and Tabellini 2008, Ilzetzki 2007).[6] Public programs around the world to subsidize firms (Shleifer and Vishny 1998), and entrepreneurial entities specifically (Lerner 2009), have fallen prey to influence activities. Such forces could thus explain the positive correlation we found between private capital markets and government funding programs.

However, this channel was inconsistent with our findings. In contrast to the literature mentioned above, we found that the positive correlation between public and private sources of capital was greater among countries with stronger institutions: i.e., countries with more effective governments (a measure strongly inversely correlated with the level of corruption).

6.3 Mitigating Investment Frictions

The third potential channel was that government funding programs relied on private capital markets to mitigate potential frictions associated with the allocation of capital to early-stage

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[6] Similarly, Calderón, Duncan, and Schmidt-Hebbel (2012) argue that the ability of countries to adopt such counter-cyclical policies largely depends on countries' quality of institutions: countries with stronger institutions can more creditability commit to pursuing such cyclical policies.

ventures, therefore driving pro-cyclicality. There were several reasons for which private capital allocation may have been more efficient. First, private financiers' compensation was strongly tied to the success of their investments. Second, private investors developed careful approaches to identify promising firms and provide effective governance and informal mentoring (as documented, for instance, in Kaplan and Stromberg 2004 and Gompers et al. 2020). Replicating the level of compensation, and skillful due diligence and government may have been difficult for public sector bureaucrats. For instance, public officials might have found it hard to use the "soft information" that has been shown to be so important in the contractual arrangements of independent venture firms (Kaplan and Stromberg 2003).

We documented several findings consistent with this channel. First, as we discussed earlier, many funding programs relied on private investors to allocate capital. Moreover, more effective governments were more likely to rely on such investors when structuring these programs and responded more strongly to the local availability of venture capital when deploying funds. We also found that government programs that targeted earlier stage ventures, where information asymmetries were likely to be greater, were more likely to rely on private capital markets. Finally, the increased correlation between public and private funding in countries with neighboring programs was consistent with learning about effective program design.

This mechanism was consistent with Acemoglu and Robinson (2013), who argued that highly effective governments foresee and address information and incentive problems that public programs encounter. In our setting, by collaborating with private financiers of entrepreneurial firms, the public bodies may have been able to mitigate these problems proactively.

7. Conclusion

This paper examined government efforts to promote entrepreneurial finance, which collectively represented a source of financing rivaling independent venture funds. We examined 755 programs in 66 countries active between 1995 and 2019. These programs were more frequent in nations and periods with more private venture activity. The positive correlation between private and public activities was more pronounced when governments were more effective. When we looked at the interactions between government programs and private capital markets, we found that these mechanisms were more frequent when the government programs targeted earlier stage companies—where information asymmetries were likely greater—and the effectiveness of government was higher. Together, the results suggested a socially beneficial complementarity between the private and public sectors in this arena.

The analysis suggested a wide variety of questions for future research. Foremost among these was the need for better understanding of the mechanisms employed in these programs and their implications. These programs had a wide variety of provisions that lent themselves to theoretical and empirical economic analysis. Examples included the differing sharing rules in the equity programs (e.g., the capping of the return to the public sector, as was the case in the Israeli Yozma initiative and a number of subsequent programs) and the extent that governments attempted to use these programs to achieve multiple goals. For instance, the SBIR program simultaneously attempted to promote technological innovation, to use small businesses to meet Federal R&D needs, and to encourage diversity.

In short, despite the proliferation and size of public programs to promote entrepreneurial finance, many questions remain about their design and implementation. It is our hope that this analysis will encourage work on the open questions identified above, as well as related questions.

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Figure 1. The count of distinct entrepreneurial finance policies active between 1995 and 2019 inclusive by nation.
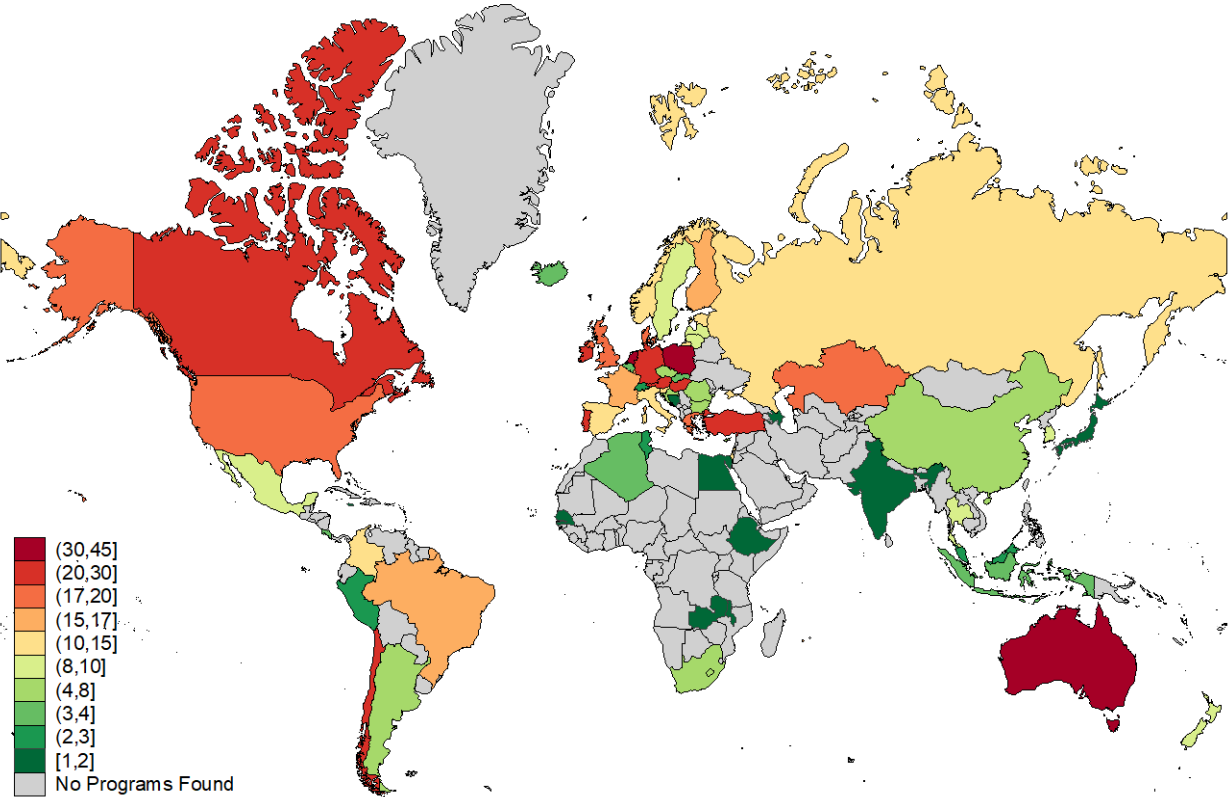
Figure 2. Average of annual budget (in billions of US dollars) of entrepreneurial finance policies active between 1995 and 2019 inclusive by nation.
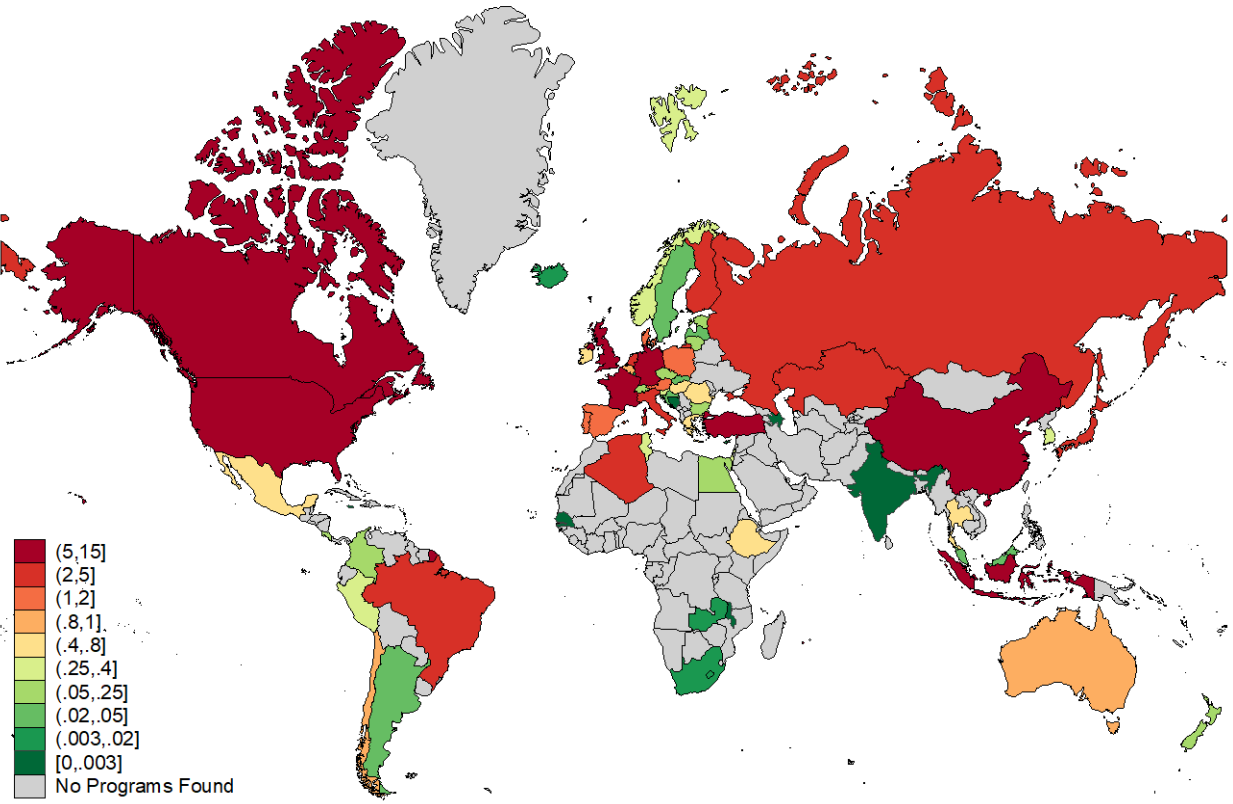
Figure 3. Average of annual budget/GDP (in percent) of entrepreneurial finance policies active between 1995 and 2019 inclusive by nation.

Legend:
- (.6,1.3]
- (.4,.6]
- (.2,.4]
- (.15,.2]
- (.09,.15]
- (.08,.09]
- (.03,.08]
- (.01,.03]
- (.002,.01]
- [0,.002]
- No Programs Found
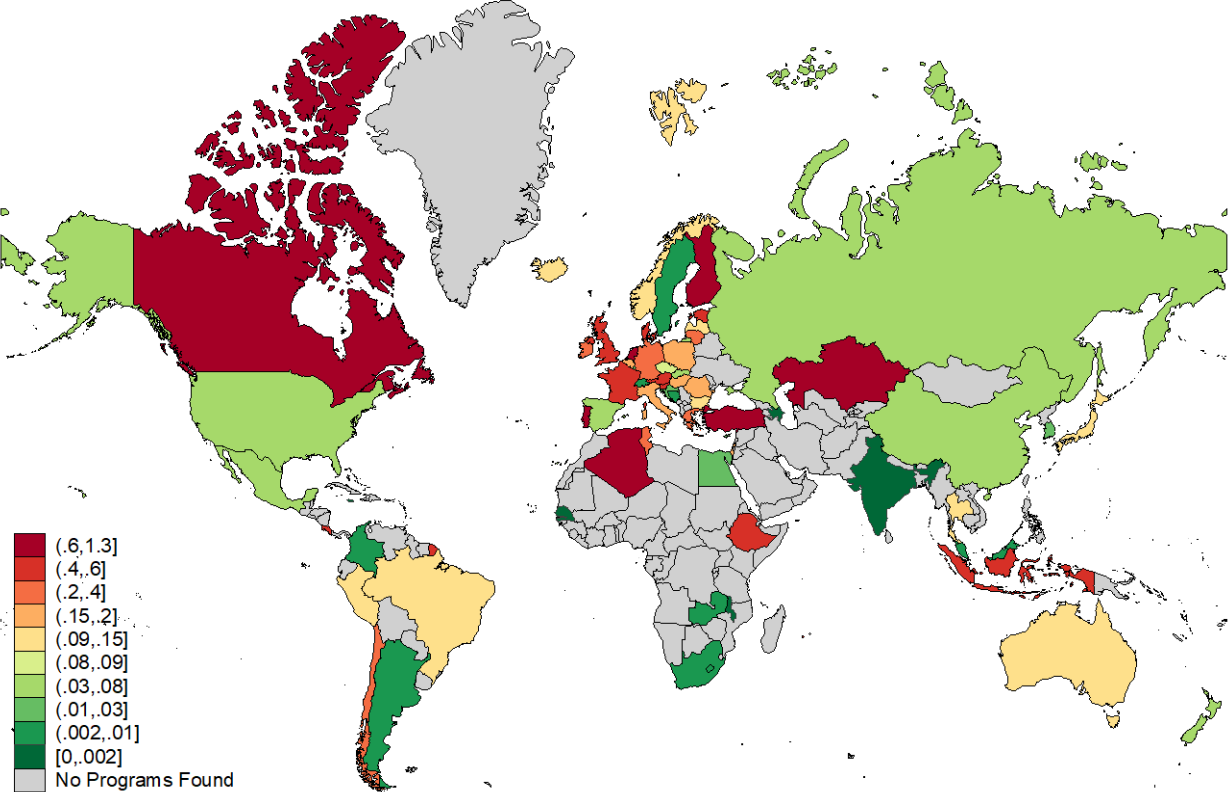
Figure 4. Average length (in years) of entrepreneurial finance policies active between 1995 and 2019 inclusive by nation.
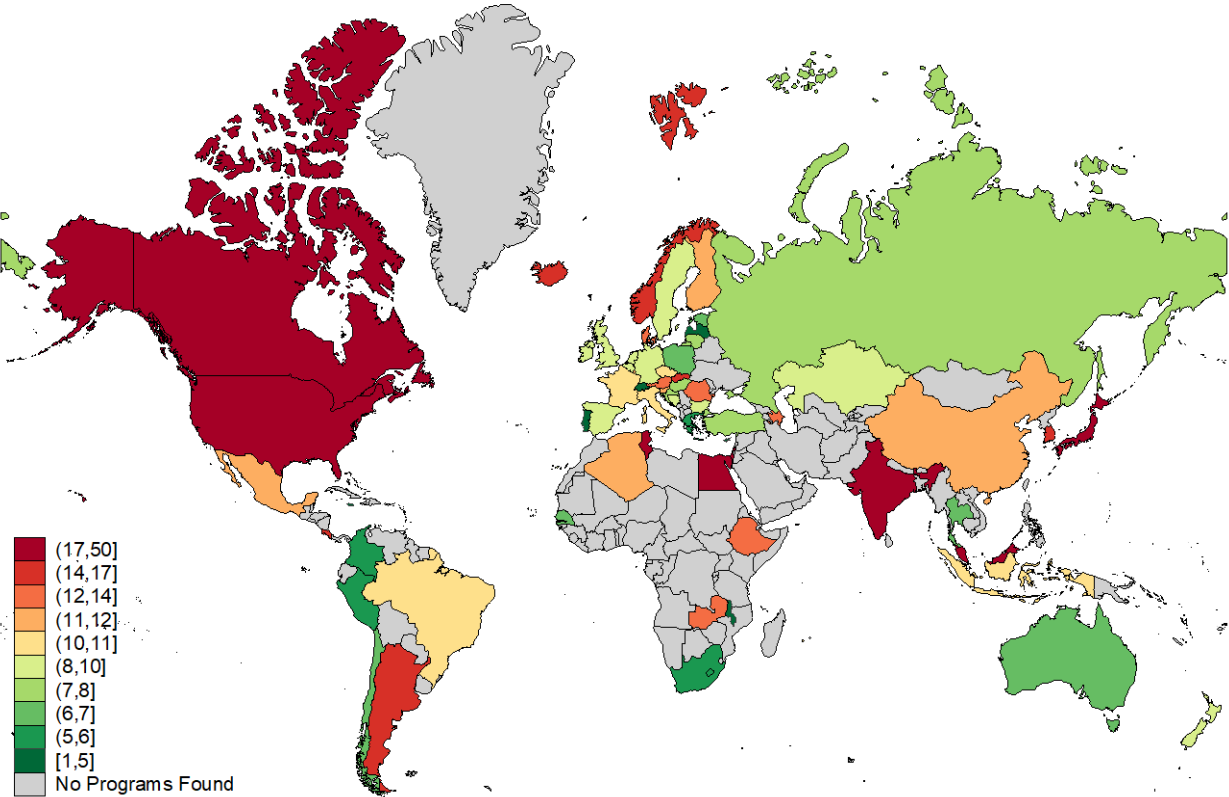
Figure 5. The figure indicates the aggregate spending on all active programs by year between 1995 to 2019.
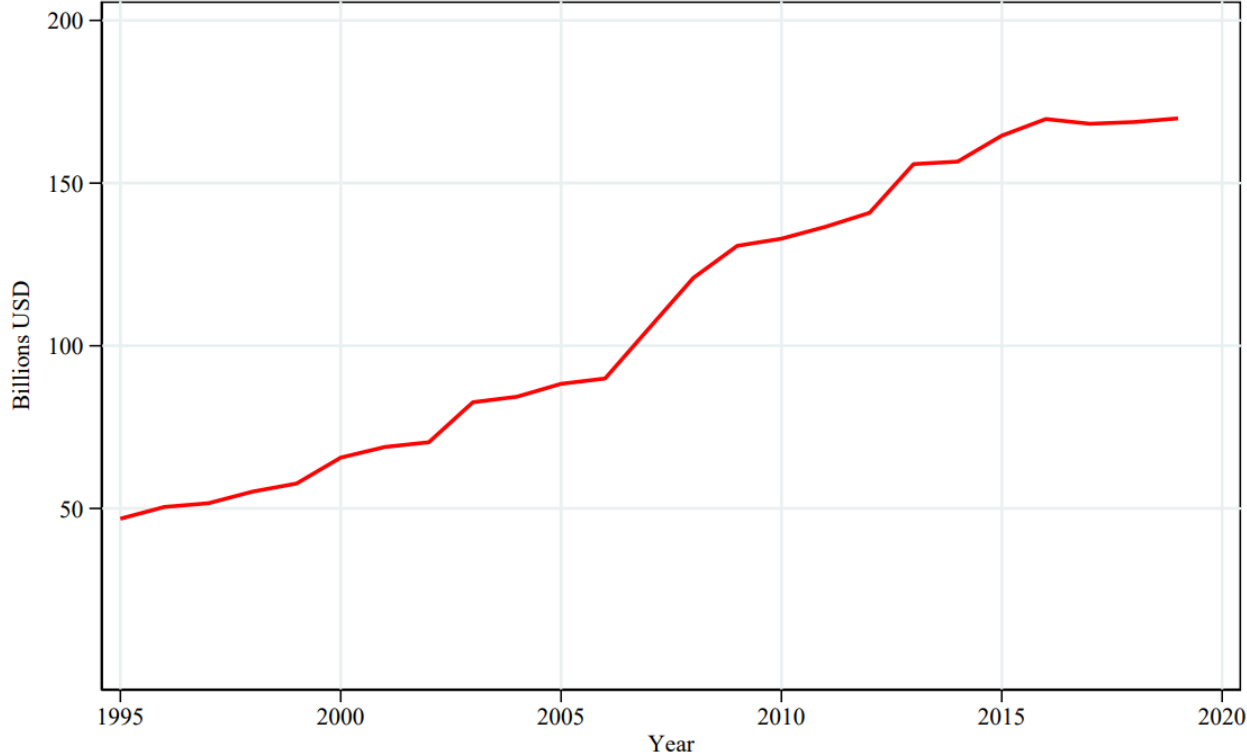
Figure 6. The bin-scatter plot depicts the average number of active policies in 2019. Initial ln (VC investment) is the natural logarithm of one plus a country's venture capital investment in 1994 (in millions of US dollars). Policy counts are weighted by the policy's annual budget.
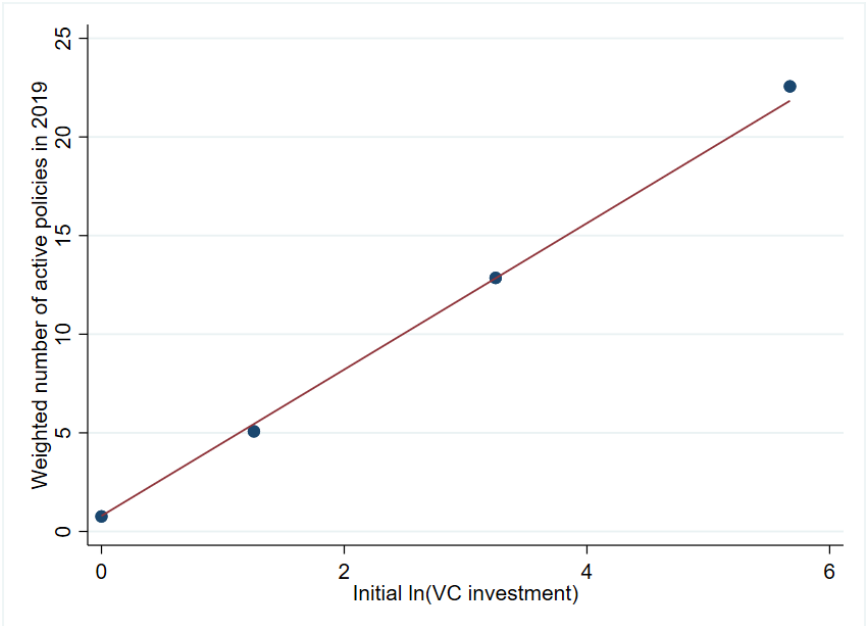
Figure 7. This figure is a binned scatter plot of the weighted count of active policies versus the natural logarithm of lagged VC activity split by government effectiveness, that is, above and below the median level of the government effectiveness measure. The binscatter controls for population and GDP per capita, and includes country and year fixed effects. Observations are at the country-year level from 1995 to 2019. The figure corresponds to the panel regressions of Table 8.
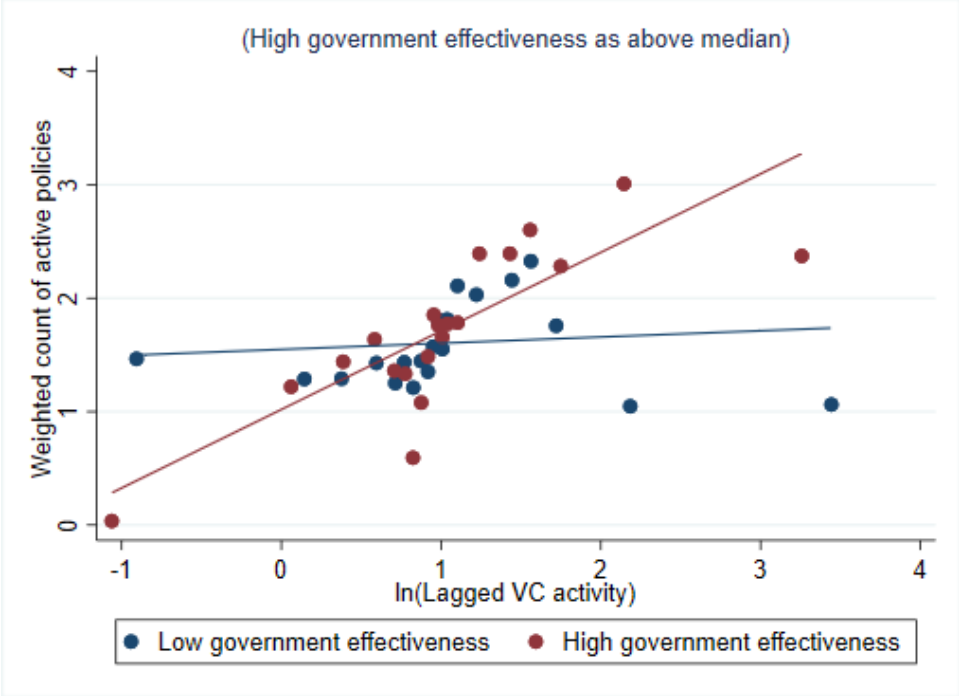
Table 1. Distribution of the budget and number of government entrepreneurial finance policies active between 1995 and 2019. Observations are at the country-year level. The table presents the sum of distinct policies active in this period, the count of years in which individual programs were active, and the annual national budgets, as well as measures of the distribution of these variables (total program as a share of GDP and policy age through time of termination or 2019). Distribution measures are computed only for the 66 nations with at least one active policy between 1995 and 2019.

	Sum	N	Mean	P10	Median	P90
Total Policy Count	755	66	11.4	1	9	23
Total Policy-Years	7,368	66	111.6	17	83.5	234
Average of Annual Budget (USD Billions)	122.10	66	1.85	0.002	0.34	8.54
Average of Annual Budget/GDP (%)		66	0.227	0.001	0.106	0.662
Average length of policies (years)		66	11.2	5	10.08	18

Table 2. Characteristics of programs initiated, 1995-2019.

	Program counts	Share of Budget-weighted programs
Panel A: Program type		
Debt		
Credit Guarantee	5.12%	11.59%
Loan	10.23%	22.90%
Mezzanine	1.75%	7.98%
Equity		
Business Angel	5.41%	1.89%
Equity	18.27%	6.87%
Grant		
Grant	43.86%	16.02%
Innovation voucher	5.85%	0.39%
Tax Credits	9.50%	32.37%
Panel B: Private sector involvement		
Role on Investment		
Committee	34.69%	21.22%
Funding Intermediaries	7.02%	12.58%
Matching Fund Requirement	43.63%	26.91%
Panel C: Industry Targeting		
Included industries		
Healthcare	10.67%	8.00%
Technologies	15.94%	11.89%
Industrials	8.19%	5.28%
Sustainability	9.21%	7.31%
Sin	0.15%	0.01%
Agriculture	5.99%	11.04%
Extractive	1.90%	0.33%
Financial	0.58%	0.31%
Excluded industries		
Healthcare	10.38%	7.37%
Technologies	7.02%	3.87%
Industrials	12.72%	7.40%
Sustainability	11.99%	8.04%
Sin	17.69%	11.13%
Agriculture	19.15%	9.54%
Extractive	16.96%	11.03%
Financial	18.57%	11.77%

Panel D: Stage and Alternative Objectives		
Stage focus		
Early-Stage/Seed	81.87%	92.84%
Venture	47.60%	71.96%
Growth	20.76%	40.40%
Additional stated objectives		
Diversity	0.90%	0.06%
Meeting government needs	0.20%	0.08%
Other goals	1.51%	0.52%

Table 3. Public entrepreneurial finance programs active between 1995 and 2019 and country characteristics.

		No. of countries	Policy count	Policy count (weighted)	Average no. of policies per country	Avg. no. of policies/ country (wtd.)
GDP	(Above)	102	675	550.47	6.62	5.40
	(Below)	102	80	16.53	0.78***	0.16***
Population		103	588	546.01	5.71	5.30
		102	167	20.99	1.64***	0.21***
Annual patent applications		41	487	430.07	11.88	10.49
		164	268	136.93	1.63***	0.83***
Annual VC funding		28	375	421.99	13.39	15.07
		177	380	145.01	2.15***	0.82***
Annual IPO Proceeds		45	579	495.38	12.87	11.01
		160	176	71.62	1.10***	0.45***
Domestic credit to private sector / GDP		64	535	449.92	8.36	7.03
		64	79	72.34	1.23***	1.13***
Stock market capitalization to GDP		50	459	356.96	9.18	7.14
		155	296	210.04	1.91***	1.36***
Protecting minority investor index		88	559	425.86	6.35	4.84
		99	196	141.14	1.98***	1.43**
Income Group		66	554	356.19	8.39	5.40
		128	201	210.81	1.57***	1.65***
Legal origin - Common law		66	270	139.85	4.09	2.12
Legal origin - Civil law		107	361	330.70	3.37	3.09

Notes: The table explores the differences in active program counts between 1995 and 2019 among countries above and below median levels of 10 country-level characteristics: gross domestic product, population, annual patent applications, annual venture capital funding, annual number of IPOs, annual IPO proceeds, domestic credit to private sector as a percentage of GDP, stock market capitalization to GDP, protection of minority investors and income group. The medians of all variables are taken over 1994 values with the exception of the protecting minority investor index, for which we use the earliest year available, 2006. The Protecting minority investor index ranges from a score of 0 to 100, from lowest to highest economy on this measure. Patent applications are the total applications filed by nationals. Income groups are low, lower-middle, upper-middle, and high. No. of countries denotes the number of countries above or below the median. Weighted policy counts are weighted by the annual budget of the policy. ***, **, and * (displayed in the second row of each measure) indicate the statistical significance of the difference in means between the above and below median samples at the 1%, 5%, and 10% levels, respectively.

Table 4. Cross-sectional analysis of weighted new venture policies. Observations consist of each country in the sample. The dependent value is the budget-weighted number of policies introduced between 1995 and 2019 in a given nation. The independent variables include the natural logarithm of population and per capita GDP in 1994, the budget-weighted number of policies active in 1994, and an indicator if the country was in the top quartile of VC activity in 1994. The standardized beta initial top VC nation indicator measures the percent change in the dependent variable relative to its mean with being a top VC nation.

	(1)	(2)
Initial top VC nation indicator	9.190***	8.562***
	(2.914)	(2.957)
Initial ln (Population)	0.605***	0.687***
	(0.208)	(0.214)
Initial ln (Per capita GDP)		0.334
		(0.288)
Initial weighted programs	0.0655	0.0498
	(0.224)	(0.227)
Constant	0.0285	-0.448
	(0.203)	(0.413)
Adjusted R^2	0.285	0.284
Std. beta Initial top VC nation indicator	437.5	407.6
Observations	205	204

Robust standard errors in parentheses
$^{*} p < 0.10, ^{**} p < 0.05, ^{***} p < 0.01$

Table 5. Panel analysis of active weighted venture policies. Observations are annual ones of each country in the sample between 1995 and 2019. The dependent value is the budget-weighted number of policies active in that year in a given nation. The independent variables include the natural logarithm of venture capital investment, population, and per capita GDP in the immediately prior year, and country and year fixed effects. The standardized beta ln(VC investments in prior years) measures the percent change in the dependent variable relative to its mean with one standard deviation increase in ln(VC investments in prior years).

	(1)	(2)	(3)	(4)
ln (VC investments in prior year)	0.628**	0.565**	0.511**	0.511**
	(0.245)	(0.228)	(0.232)	(0.232)
ln (Population)	0.516	-0.0168	-2.155*	-2.206*
	(0.394)	(0.450)	(1.150)	(1.137)
ln (Per capita GDP)		0.812**		-0.0802
		(0.337)		(0.279)
Constant	0.254	-0.566	3.331**	3.516**
	(0.585)	(0.830)	(1.385)	(1.460)
Adjusted R^2	0.781	0.784	0.789	0.789
Std. beta ln(VC investments in prior years)	77.71	69.85	63.22	63.16
Country FE	YES	YES	YES	YES
Year FE			YES	YES
Observations	5,125	5,112	5,125	5,112

Robust standard errors in parentheses; clustered at the country level
$^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 6. Cross-sectional analyses of weighted new venture policies, by policy type. Observations consist of each country in the sample. The dependent value is the budget-weighted number of policies introduced between 1995 and 2019 in a given nation. The independent variables include the natural logarithm of population and per capita GDP in 1994, the budget-weighted number of particular policies active in 1995, and an indicator if the country was in the top quartile of VC activity in 1994. Policies are divided by whether they are equity, debt, or grant in orientation. The standardized beta initial top VC nation indicator measures the percent change in the dependent variable relative to its mean with being a top VC nation.

	(1) Equity	(2) Grant	(3) Debt
Initial top VC nation indicator	0.847**	4.273**	4.608**
	(0.426)	(2.109)	(1.872)
Initial ln (Population)	0.019	0.379**	0.233**
	(0.020)	(0.176)	(0.110)
Initial weighted equity programs	-0.703		
	(0.870)		
Initial weighted grant programs		-0.122	
		(0.173)	
Initial weighted debt programs			-0.072
			(0.080)
Constant	0.050	-0.005	-0.010
	(0.031)	(0.167)	(0.104)
Adjusted R^2	0.081	0.154	0.158
Std. beta Initial top VC nation indicator	460.54	417.09	516.57
Observations	205	205	205

Robust standard errors in parentheses
$^{*} p < 0.10$, $^{**} p < 0.05$, $^{***} p < 0.01$

Table 7. Cross-sectional and panel analyses of industry-targeted new venture policies. Observations in column 1 consist of each country-industry in the sample; in columns 2 through 5, annual observations of each country-industry pair in the sample between 1995 and 2019. The dependent value in column 1 is a dummy indicating whether policies introduced between 1995 and 2019 in a given nation targeted one of eight industries; in column 2 and 3, whether a policy targeting that industry was active in that nation and year; and in columns 4 and 5, the cumulative dollar value of policies active in a given country and year targeting a given industry. The independent variables in column 1 include the budget-weighted number of policies active targeting that industry in 1994, an indicator if the country-industry was in the top quartile of VC activity in 1994, and country and industry fixed effects; in column 2 through 5, the natural logarithm of venture capital investment in the country and industry in the year prior to the observation, population, and (in some regressions) per capita GDP in the immediately prior year, and country, industry, and year fixed effects. The standardized beta measures the percent change in the dependent variable relative to its mean with being a top VC industry-nation indicator in column 1 and one standard deviation increase in ln (VC investments in prior year in industry-nation) in columns 2 through 5.

	(1) Cross-section	(2) Panel	(3) Panel	(4) Panel	(5) Panel
	Targeted industry	Active program in industry-nation	Active program in industry-nation	ln (Policy expenditures in industry-nation	ln (Policy expenditures in industry-nation
Initial top VC industry-nation indicator	0.182**				
	(0.083)				
Initial weighted programs n industry-nation	-0.024				
	(0.032)				
ln (VC investments in prior year in industry-nation)		0.045***	0.045***	0.173***	0.173***
		(0.010)	(0.010)	(0.045)	(0.045)
ln (Population)		-0.087**	-0.092**	-0.316**	-0.343**
		(0.043)	(0.041)	(0.155)	(0.150)
ln (Per capita GDP)			-0.007		-0.038*
			(0.005)		(0.021)
Constant	0.096***	0.148***	0.165***	0.581***	0.673***
	(0.016)	(0.056)	(0.054)	(0.211)	(0.208)
Adjusted R^2	0.407	0.299	0.299	0.284	0.285
Std. beta	221.30	117.51	117.45	106.65	106.59
Country FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES
Year FE		YES	YES	YES	YES
Observations	1,640	41,000	40,896	41,000	40,896

Standard errors in parentheses; panel regressions clustered at firm level
$^{*} p < 0.10,$ $^{**} p < 0.05,$ $^{***} p < 0.01$

Table 8. Panel analysis of active weighted venture policies, with quality of public governance measures. Observations are annual ones of each country in the sample between 1995 and 2019. The dependent value is the budget-weighted number of policies active in that year in a given nation. The independent variables include the natural logarithm of venture capital investment, per capita GDP, and population in the immediately prior year, scores of the effectiveness of government and the rule of law in the year of the observation, interactions with venture capital measure, and country and year fixed effects. The standardized beta ln(VC investments in prior years) measures the percent change in the dependent variable relative to its mean with one standard deviation increase in ln(VC investments in prior years).

	(1)	(2)	(3)	(4)
ln (VC investments in prior year)	0.345	0.323	0.299	0.269
	(0.213)	(0.223)	(0.193)	(0.204)
Effectiveness of government score	0.122	0.334		
	(0.573)	(0.563)		
ln (Lagged VC activity)* Govt. effectiveness	0.301**	0.275**		
	(0.147)	(0.138)		
Rule of law score			0.431	0.666
			(0.422)	(0.449)
ln (Lagged VC activity) * Rule of law			0.320*	0.277*
			(0.180)	(0.166)
ln (Population)	-0.093	-2.152*	0.185	-1.760*
	(0.571)	(1.121)	(0.461)	(1.025)
ln (Per capita GDP)	1.029***	-0.114	0.976**	-0.084
	(0.390)	(0.412)	(0.411)	(0.367)
Constant	-0.906	3.823**	-1.150	4.050**
	(1.042)	(1.716)	(1.093)	(1.611)
Adjusted R^2	0.786	0.791	0.821	0.824
Std. beta ln(VC investments in prior years)	42.46	39.81	35.91	32.36
Country FE	YES	YES	YES	YES
Year FE		YES		YES
Observations	4,924	4,924	4,196	4,196

Robust standard errors in parentheses; clustered at the country level
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9. Panel analysis of active weighted venture policies, with focus on the impact of nearby nations. Observations are annual ones of each country in the sample between 1995 and 2019. The dependent value is the budget-weighted number of policies active in that year in a given nation. The independent variables include the sum of the budget-weighted number of policies active in the immediately prior year in neighboring nations, the natural logarithm of population and per capita GDP in the immediately prior year, the logarithm of venture capital investment in the immediately prior year, and country and year fixed effects. The standardized beta weighted policies active in bordering countries (prior year) measures the percent change in the dependent variable relative to its mean with one standard deviation increase in weighted policies active in bordering countries (prior year). Robust standard errors in parentheses.

	(1)	(2)	(3)	(4)
Weighted policies active in bordering countries (prior year)	0.075**	-0.012	0.056*	-0.020
	(0.030)	(0.027)	(0.029)	(0.028)
Weighted policies active in bordering countries (prior year) # ln (VC investments in prior year)		0.021**		0.021**
		(0.010)		(0.010)
ln (VC investments in prior year)	0.475**	0.157	0.442*	0.159
	(0.231)	(0.160)	(0.235)	(0.176)
ln (Population)	0.274	-1.328	-2.559**	-2.357**
	(0.916)	(1.264)	(1.028)	(1.064)
ln (Per capita GDP)		1.049*		0.488
		(0.565)		(0.592)
Constant	0.035	-0.007	5.274***	3.677**
	(1.726)	(1.537)	(1.750)	(1.541)
Adjusted R^2	0.776	0.787	0.779	0.788
Std. beta Weighted policies active in bordering countries (prior year)	72.29	-11.51	53.18	-19.38
Country FE	YES	YES	YES	YES
Year FE			YES	YES
Observations	4,325	4,325	4,325	4,325

Robust standard errors in parentheses; clustered at the country level
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10. The determinants of private sector participation in public entrepreneurial finance programs. The observations are public entrepreneurial finance program introduced between 1995 and 2019 with the requisite data. The dependent variable is a composite, measuring whether the program had a matching fund requirement, the involvement of the private sector in the investment decision-making process, and if it financed financial intermediaries. In Panel A, the independent variables include the natural logarithm of venture capital investment, population, and per capita GDP in the year immediately prior to the program introduction, and measures of the effectiveness of government and rule of law in the year of the policy introduction. The first two specifications employ an ordered logit specification; the remainder, an ordinary least squares one. Panel B adds a measure of whether the program was early stage, and an interaction of this dummy it the effectiveness of government or rule of law score. The standardized beta ln (VC investments in prior year) in both Panel A and B measures the percent change in the dependent variable relative to its mean with one standard deviation increase in ln (VC investments in prior year).

Panel A: Basic analysis.

	(1) Ordered logit	(2) Ordered logit	(3) OLS	(4) OLS
ln (VC investments in prior year)	-0.010	-0.020	-0.006	-0.010
	(0.036)	(0.035)	(0.014)	(0.013)
Effectiveness of government score	0.681***		0.245***	
	(0.189)		(0.065)	
Rule of law score		0.718***		0.265***
		(0.160)		(0.053)
ln (Population in prior year)	-0.010	0.053	0.007	0.030
	(0.089)	(0.085)	(0.034)	(0.032)
ln (GDP in prior year)			0.017	0.005
			(0.049)	(0.051)
Constant			0.401**	0.392*
			(0.195)	(0.203)
Adjusted R^2			0.063	0.085
Std. beta ln (VC investments in prior year)	70.29	86.61	25.31	31.96
Observations	583	539	583	539

Standard errors in parentheses
$^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Panel B: With early-stage measure and interaction.

	(1) Ordered logit	(2) Ordered logit	(3) OLS	(4) OLS
ln (VC investments in prior year)	-0.001	-0.011	-0.003	-0.007
	(0.033)	(0.033)	(0.014)	(0.013)
Early-stage focus	0.661***	0.946***	0.209***	0.285***
	(0.249)	(0.221)	(0.073)	(0.065)
Effectiveness of government score	0.437**		0.148**	
	(0.207)		(0.069)	
Effectiveness of government * Early-stage focus	0.231		0.099*	
	(0.176)		(0.055)	
Rule of law score		0.555***		0.188***
		(0.176)		(0.054)
Rule of law * Early-stage focus		0.071		0.060
		(0.148)		(0.046)
ln (Population in prior year)	-0.020	0.033	0.006	0.023
	(0.086)	(0.083)	(0.032)	(0.031)
ln (GDP in prior year)			0.020	-0.001
			(0.051)	(0.050)
Constant			0.319	0.314
			(0.200)	(0.205)
Adjusted R^2			0.116	0.147
Std. beta ln (VC investments in prior year)	45.12	66.96	15.26	22.69
Observations	583	539	583	539

Robust standard errors in parentheses; clustered at the country level
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix 1: Comparing Public and Private Entrepreneurial Finance Activity

Compiling data on traditional venture investment globally is difficult, due to the limited reporting. Probably the best regarded set of estimates over the past decade have been compiled by Crunchbase, Crunchbase compiles the total amount of capital into venture-backed firms, and exclude "private equity rounds in non-venture-backed startups, undisclosed funding rounds, secondary market transactions, post-IPO transactions, debt financings, grants, non-equity assistance, initial coin offerings, and … investments in companies not part of the technology ecosystem" (https://news.crunchbase.com/methodology/). Their compilation does include investments into venture-backed firms by investors who are not venture capitalists, such as corporations and sovereign wealth funds.

It should be acknowledged that this methodology is likely to lead to some double-counting. The Crunchbase funding includes equity invested directly by governments into companies already backed by venture capitalists (including by international organizations such as the International Finance Corporation and European Investment Fund not included in our analysis). Some of the capital of the venture groups will come from governments acting as limited partners as well.

The analysis focuses on the period from 1995 to 2019. The choice of the start date was associated data availability, as discussed in the body of the paper. It should also be noted that the level of public funding doubtless increased sharply in 2020, as many tens of billions of dollars allocated to support entrepreneurial firms and venture funds across major industrialized nations in the months after the onset of the COVID-19 crisis.[7]

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[7] See, for example,
https://www.cnbc.com/2020/04/02/coronavirus-europe-races-to-rescue-tech-startups.html;
https://betakit.com/bdc-launches-matching-investment-program-for-canadian-vc-backed-companies/; https://www.scribd.com/document/455681169/Letter-to-the-Chancellor; and
https://www.businessinsider.com/uk-future-fund-government-loans-startups-coronavirus-2020-4.

<u>Appendix 2: Examples of Criteria for Selecting Projects</u>

Policies in advanced economies focused on emerging markets

We drop policies focused specifically on emerging markets and not on the country in which they are initiated.

Examples:
- (Credit Guarantee) US Development Finance Corporation
  - Description: The US DFC assists in financing projects in emerging market economies. The program offers both direct equity into projects in the developing world as well as debt financing in the form of loans and loan guarantees to support investment projects in developing countries.
  - URL: https://www.dfc.gov/
  - Status: Dropped from sample

Policies supporting innovation centers

We keep policies supporting innovation centers so long as the innovation center itself offers financing activities aimed towards SMEs or entrepreneurial firms.

Examples:
- (Grant) Norway Centers for Research-Based Innovation
  - Description: The Centers for Research-Based Innovation focus on fostering collaboration between R&D-performing companies and research institutions. The Norwegian Research Council allocates an annual budget to the 24 active centers in the form of grants. The centers recruit doctoral students and encourage research output in the form of academic publications and commercial innovation. There do not appear to be any notable restrictions (other than that the business is involved in R&D) on companies that can participate. There is no emphasis on direct financing activities of the centers themselves to support SMEs or entrepreneurial firms.
  - URL: https://www.forskningsradet.no/en/about-the-research-council/programmes/sfi/
  - Status: Dropped from sample
- (Credit guarantee) Swiss Innovation Parks
  - Description: The Swiss Innovation Parks offer support initiatives ranging from building networks, providing working space, and fostering collaboration with research institutes. While the Parks assist businesses in applying for grants and funding instruments, they do not specialize in financing activities for SMEs, but rather in mentorship-style support. The Swiss government supports the Innovation Parks with loans and loan guarantees.
  - URL: https://www.parkinnovaare.ch/innovation-park
  - Status: Dropped from sample

Policies that participate in international or joint initiatives

We keep policies that participate in international or joint initiatives so long as the participation is only for funding purposes and the policy itself is a national government policy financing SMEs or entrepreneurial firms.

Examples:
- (Grant) Norway BIA Competition Arena
  - Description: The BIA program provides funding for research-based innovation projects across Norwegian industries. The program contributes to EUROSTARS, a joint initiative of EUREKA and the European Commission to strengthen research performance in SMEs. As a result, the BIA benefits from EUROSTARS and project financing is shared by the Norwegian Research Council and the EU. However, the policy provides support for Norwegian businesses only.
  - URL: https://www.forskningsradet.no/om-forskningsradet/programmer/bia/
  - Status: Kept in sample

Policies for special economic zones

We keep policies that are special economic zones so long as the zone emphasizes financing activities aimed towards SMEs or entrepreneurial firms that fit the relevant policy type. There are few zones that meet these criteria, however.

Examples:
- (Grant) Thailand Eastern Economic Corridor of Innovation
  - Description: The Thai government aims to turn eastern provinces into a leading economic zone. Planned investment projects in the EEC include developing transportation infrastructure, promoting tourism, and developing business hubs. The Corridor of Innovation would involve establishing science parks to foster R&D. Overall, the emphasis of the policy is not on financing policies for SMEs but on creating a hub for innovation.
  - URL with information: https://www.aseanbriefing.com/news/thailand-eastern-economic-corridor/
  - Status: Dropped from sample
- (R&D tax credit) Russia Special Economic Zones for Technological Innovation
  - Description: Russian companies in any of the 26 Special Economic Zones can enjoy reduced profit and property tax rates. While a subset of the Zones are aimed at encouraging innovation activity and businesses in these Zones are allowed tax benefits, the reductions are for all profits and not specifically for R&D activities.
  - URL with information: https://www2.deloitte.com/content/dam/Deloitte/ru/Documents/tax/Tax_incentives_in_Russia.pdf
  - Status: Dropped from sample

Policies with subprograms

Some policies have many subprograms that are labelled separately by the government. These can become quite complex, though they generally fall into one of three categories. We address policies in each category as follows:

- Umbrella policies that encompass a number of clearly distinct programs with different types of financing. In this case, we split the policy up into its defined subprograms.
  - Example: The Danish Growth Fund (https://vf.dk/)
    - The Danish Growth Fund offers financing in the form of equity, loans, and matching for business angel investments, where these are clearly presented as separate programs, each with detailed criteria and structure:
    - Loans for Entrepreneurs (https://vf.dk/en/financing/loans-for-entrepreneurs/), Business Angel Matching Fund (https://vf.dk/en/products-for-partners/eaf-denmark-business-angel-matching-fund/), VF Venture (https://vfventure.com/da/)
    - Thus, we code each program separately in each sheet
- Policies with subprograms that have the same structures but with minor differences (e.g. each subprogram is separated by industry): we classify these together and aggregate any budget information for the individual subprograms. Moreover, we only include programs with an explicit provision geared towards SMEs, entrepreneurs, VCs, or angels. If the program only funds innovation by firms or universities in general, we do not include it.
  - Example: (Grant) Innovate UK Funding Competitions (https://apply-for-innovation-funding.service.gov.uk/competition/search)
    - Description: The Biotechnology and Biological Sciences Research Council (BBSRC) and Innovate UK jointly fund a number of competitions to support collaboration between academia and businesses with the aim of developing innovative technologies and processes. The rules of the individual competitions vary, with some being geared to SMEs, some to all businesses, and others to any institution (including non-profit and academic)
    - We code any programs that fit our criteria together (which in this case, turns out to be only the Biomedical Catalyst Competition) and exclude the other competitions
- Policies where there is a clear primary financing type (e.g., equity programs with a small loan piece attached or loan programs that mention a guarantee). In these cases, we classify and code the policy where the primary financing is
  - Example: (Loan) US Small Business Investment Company (https://www.sba.gov/partners/sbics)
    - SBICs use their own capital, together with funds borrowed with an SBA guarantee, to make investments in small businesses. Since the guarantee is not a distinct credit guarantee scheme or guarantee fund, however, we include this policy in loans but do not additionally code it as a credit guarantee

Appendix 3: Definition the Entrepreneurial Finance Policy Variables

	Variable	Description	Value
1	Policy ID	Unique ID assigned to each program.	ID
2	Policy Country	Country implementing the program.	Country
3	Agency Name	Name of the government agency implementing the program.	Name
4	Policy Name	Name of the policy.	Name
5	Policy Type	Form of financing to the program's targeted companies.	Credit Guarantee, Loan, Grant, Equity, Mezzanine, Angel Investment, R&D Tax Credit, Innovation Voucher
6	Website	Website of the policy (if available).	Website
7	Drop	We focus on national government policies that aim to finance SMEs or entrepreneurial firms. Policies with a regional, transnational, or municipal reach, as well as non-financing policies (such as policies that provide mentorship services only) are dropped. If a policy does not satisfy these criteria, we mark it as "drop" and provide the reason.	Drop; non-finance, regional, non-SME/Ent targeted, non-government
8	Start Year	The year the program was initiated. If the policy existed in multiple phases, we use the earliest year.	Year
9	End Year	The year the program ended. We code a "not ended" if the program has not ended, or a future year if the program states the expected year of completion.	Year; not ended

10	Screener	The level of private sector involvement in screening the application. Indicates whether the screening entity is fully public, fully private (i.e., government outsources to private board), or public-private (i.e., committee comprised of representatives from both private and public parties).	Public, private, public-private
11	Due Diligence	The level of private sector involvement in the appraisal of an application or investment.	Public, private, public-private
12	Investment Committee	The level of private sector involvement in the final investment or application decision.	Public, private, public-private
13	Disbursed Budget	Disbursed program budget.	Amount
14	Allocated or Appropriated Budget	Allocated or appropriated program budget if actual disbursement is not available.	Amount
15	Min Budget	If the available budget information is a range only, report the lower end of the range; otherwise NA.	Amount
16	Max Budget	If the available budget information is a range only, report the upper end of the range; otherwise NA.	Amount
17	Years Budget	The years associated with the allocated budget, disbursed budget, or min/max budget.	Year
18	Currency	The currency in which the program's monetary amounts are quoted from the available sources. All monetary amounts are ultimately converted to inflation-adjusted US dollars.	Currency
19	Budget USD	Annual budget flow of the program in US dollars. Average of the most recent three years of the program, if possible. For policies for which this information is not available, we use the average of the two most recent years or, failing that, the most	Amount in USD

recent year. If available budget information is a cumulative amount over a longer period, we take the annual average.

20	Max Budget per Project	The program's maximum possible disbursement of funds per company or project, if available.	Amount
21	Objective	The purpose of the program as stated by the government agency. Most objectives within a program type have similar goals, e.g. to facilitate access to financing for small businesses, or similarly to boost exports, competitiveness, or job growth. Programs that have less common objectives, such as those that service specific government needs, or those aimed at entrepreneur diversity, are additionally flagged (see below).	Text
22	Objective - Diversity	An indicator for whether the program's goal is to boost diversity. Coded as partial (0.5) if this is one of multiple goals or full (1) if diversity is the primary or sole goal.	0/0.5/1
23	Objective - Government Need	An indicator for whether the program's goal is to meet the government's direct need. A program's objective is not included under Government Need or Non-Traditional unless there is an explicit alternative goal; programs solely focused on an industry from which there may be positive social spillovers (e.g., cleantech) are not counted. Coded as partial (0.5) if one of multiple goals or full (1) if primary goal.	0/0.5/1
24	Objective - Non-Traditional	An indicator equal to 1 if the program goal is neither diversity nor a direct government need, but also not traditional. Coded as partial (0.5) if one of multiple goals or full (1) if primary goal.	0/0.5/1

25	Intermediary	An indicator for whether the program involves a non-governmental intermediary. This includes loan guarantees to banks, funds of funds, loans to PE groups, and subsidies to non-government owned VCs or incubators. Takes a value of 0 if the program involves government funds to companies as direct investments or co-investments, or if the government (or government-owned corporation) operates a VC fund or incubator that directly funds companies. Takes a value of 0.5 if the program has elements of both direct and intermediated investments.	0/0.5/1
26	Matched	An indicator equal to 1 if the program involves a co-investment with the private sector or contains an explicit matching requirement. Takes a value of 0 if the program involves a direct investment or loan to companies with no matching requirement. Requirements on minimum levels of net worth or employee numbers are not counted as matching requirements.	0/1
27	Size	A categorical variable indicating whether the program is aimed at SMEs only, require an SME as a partner in a collaboration, or allows for both SMEs and larger businesses. Also indicates if a policy is aimed at individual entrepreneurs. Exact thresholds to qualify as a small business may vary by country.	SME only, SME partner, individual, any
28	Targeted Sectors	Sectors that are explicitly targeted by the program, if applicable.	Healthcare, technology, industrials, extractive, agriculture, sustainability, sin, financial
29	Excluded Sectors	Sectors that are explicitly excluded from the program, if applicable.	Healthcare, technology, industrials, extractive,

			agriculture, sustainability, sin, financial
30	Foreign Partnership	Does participation in the program require partnership with foreign companies?	Y/N
31	Export/Import oriented	Does the target company have to be import/export-oriented to be eligible? If yes, also indicates whether it should be focused on import or export.	Y/N; Export/import
32	Academia Partnership	As part of eligibility, does the program require partnership with academic institutions?	Y/N
33	IP sales restrictions	Does the program have restrictions on the sale of any IP to be eligible for the program?	Y/N
34	Age	Maximum age of the entrepreneur for program eligibility, if applicable.	Age, NA
35	Gender	Gender of the entrepreneur for program eligibility, if applicable.	Male, female, NA
36	Income	Maximum income of the entrepreneur for program eligibility, if applicable.	Amount, NA
37	Targeted Stage	Targeted stage of the program's investment.	Seed, venture, growth
38	Sources	List of sources containing program information. For cases where the primary website and its sub-pages have all the information, only the main page is listed.	Link

Appendix 4: Definition of Country-Level Variables

Variable	Units	Level	Description	Source

GDP	USD billions	Country-Year	The total of all economic activity in one country, regardless of who owns the productive assets.	Primarily Economist Intelligence Unit. Supplemented with data from the CIA Factbook, UN Data, and the government website of the respective country.
Region	Dummy	Country	United Nations' continent classification: Africa, Americas, Asia, Europe, Oceania	UN Stats Geographic Regions
Population	Millions	Country-Year	Total population of a country	Primarily Economist Intelligence Unit. Supplemented with data from the CIA Factbook, UN Data, and the government website of the respective country
Income group	Category	Country-Year	The income grouping measured using gross national income per capita in US dollars. The economics are divided into four income groups: low, lower-middle, upper-middle, and high. Income groups for a year are determined using the income from the fiscal year. For the year 1994, the income per capita cutoffs for the four categories were $725 or less; between $726 and $2,895; between $2,896 and $8,955; and $8,956 and above, respectively.	World Bank's World Bank Country and Lending Groups Historical Database for the year 1994
Patent applications	Count	Country-Year	The total number of patent applications filed annually by the country of residence of the applicant.	World Intellectual Property Organization's Intellectual Property Statistics Database
VC funding	USD Millions	Country-Year	Venture capital investment in a country by both domestic and foreign VC firms across all industries. Excludes Buyout, Fund of Funds, Generalist Private Equity, Mezzanine, Other Investor (Non-Private Equity), Other Private Equity, and Real Estate investments	National and regional associations & SDC Platinum's VentureXpert
VC funding by industry	USD Millions	Country-Year-Industry	Venture capital investment in a country by both domestic and foreign VC firms across eight industries based on 4-digit sic industry classification. The eight industry categories are: 1. Healthcare: Life sciences, Bio-, Medical, Pharma 2. Manufacturing: Aerospace, Defense, Machinery, Industrial, Transport, Aviation 3. Extractive: Mining, Energy 4. Agriculture: Agriculture, Forestry, Fishing, Agri-food, Aqua-culture, Agri-business 5. Technology: Electronics, Software, AI, IT, TMT, Blockchain, Digital tech 6. Financial, insurance, and real estate industries 7. Sin: Gambling, Betting 8. Sustainability: Sustainable tech, Climate, Environment, Clean energy, Renewables,	SDC Platinum's VentureXpert

Clean-tech
Note that we exclude Buyout, Fund of Funds, Generalist Private Equity, Mezzanine, Other Investor (Non-Private Equity), Other Private Equity, and Real Estate investments

Government effectiveness and rule of law indices	Index	Country-Year	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, 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. The data are composite governance indicators based on over 30 underlying data sources The six aggregate indicators are reported in two ways: (1) in their standard normal units, ranging from approximately -2.5 to 2.5 , with higher values corresponding to better outcomes.	World Bank's Worldwide Governance Indicators 2019
Ease of doing business and enforcing contracts	Index	Country-Year	The ease of doing business score helps assess the absolute level of regulatory performance over time. It captures the gap of each economy from the best regulatory performance observed on each of the indicators across all economies in the Doing Business sample since 2005. The enforcing contracts indicator measures the time and cost for resolving a commercial dispute through a local first-instance court, and the quality of judicial processes index, evaluating whether each economy has adopted a series of good practices that promote quality and efficiency in the court system. The scores scaled from 0 to 100, where 0 represents the lowest and 100 represents the best performance.	World Bank's Doing Business 2020
Number of IPOs	Count	Country	Initial public offerings with non-zero global proceeds across all markets. Excludes IPOs that were withdrawn, rejected, or postponed. Also excludes ADRs, unit offerings, offers with warrants, closed-end funds, and REITs, spin-offs, investment trusts, private placements, and financial firms.	SDC Platinum's Platinum Global New Issues Database, Bloomberg, and S&P Capital IQ

Total proceeds	USD Millions	Country	Global proceeds raised in IPOs across all markets, excluding those that were withdrawn, rejected, or postponed. Also excludes ADRs, unit offerings, offers with warrants, closed-end funds, and REITs, spin-offs, investment trusts, private placements, and financial firms. Also excludes offerings with zero or missing proceeds.	SDC Platinum's Platinum Global New Issues Database, Bloomberg, and S&P Capital IQ

Table A-1. Key summary statistics of sources that were used to identify policies.

Panel A: Year of publication of the academic papers or the reports.

Year of publication	Count of sources	Percent
1998	1	0.5%
1999	1	0.5%
2001	1	0.5%
2003	2	1.1%
2004	1	0.5%
2005	3	1.6%
2006	2	1.1%
2007	11	5.8%
2008	5	2.6%
2010	20	10.5%
2011	8	4.2%
2012	6	3.2%
2013	25	13.2%
2014	17	8.9%
2015	15	7.9%
2016	12	6.3%
2017	41	21.6%
2018	13	6.8%
2019	6	3.2%
Total	190	100.0%

Panel B: Year of publication of the academic paper or the report in five-year buckets.

Year of publication	Count of sources	Percent
1995-1999	2	1.1%
2000-2004	4	2.1%
2005-2009	21	11.1%
2010-2014	76	40.0%
2015-2019	87	45.8%
Total	190	100.0%

Panel C: Publisher of the report. If it is an academic paper.

Publisher of the Report	Count of sources	Percent
Organisation for Economic Cooperation and Development	139	73.2%
Academic papers	21	11.1%
European Union	5	2.6%
World Bank	3	1.6%
MTI	2	1.1%
United Nation	2	1.1%
African Development Bank Group and OECD	1	0.5%
CapGemini Consulting	1	0.5%
ERIA	1	0.5%
European Civil Society Platform	1	0.5%
European Investment Bank	1	0.5%
Finnish Ministry of Trade and Industry	1	0.5%
Foster Care Work Group	1	0.5%
Government of the United Kingdom	1	0.5%
Inter-American Development Bank	1	0.5%
International Monetary Fund	1	0.5%
Institut zur Zukunft der Arbeit	1	0.5%
Institute for Public Policy Research	1	0.5%
Manpower Group	1	0.5%
Migration Policy Institute	1	0.5%
Price Waterhouse Coopers	1	0.5%
Swedish Entrepreneurship Forum	1	0.5%
The Finance Project	1	0.5%
World Economic Forum	1	0.5%
Total	190	100.0%

Panel D: Type of source.

Type of source	Count of sources	Percent
Country-level reports	127	66.8%
Cross-national reports	42	22.1%
Academic	21	11.1%
Total	190	100.0%

Panel E: Country of focus for the reports. Note the count here is 140 (this includes 127 reports by country type and 13 academic papers with a country focus).

Country of focus (if any)	Count of sources	Percent
United States	11	7.9%
Italy	10	7.1%
Mexico	10	7.1%
Poland	9	6.4%
Canada	8	5.7%
Germany	8	5.7%
Russia	8	5.7%
Indonesia	7	5.0%
Hungary	6	4.3%
Israel	5	3.6%
Netherlands	5	3.6%
United Kingdom	5	3.6%
Portugal	4	2.9%
Thailand	4	2.9%
Bulgaria	3	2.1%
Denmark	3	2.1%
Ireland	3	2.1%
Kazakhstan	3	2.1%
Spain	3	2.1%
Sweden	3	2.1%
Belgium	2	1.4%
Chile	2	1.4%
China	2	1.4%
Finland	2	1.4%
Greece	2	1.4%
Slovenia	2	1.4%
Austria	1	0.7%
Czech Republic	1	0.7%
Estonia	1	0.7%
France	1	0.7%
Libya	1	0.7%
Malaysia	1	0.7%
Nigeria	1	0.7%
Slovak Republic	1	0.7%
Switzerland	1	0.7%
Tunisia	1	0.7%
Total	140	100.0%

Table A-2. Construction of the final sample of programs.
This table describes the specifics of the construction of the final sample of programs that were active between 1995-2019. We identify public entrepreneurial finance programs from 190 sources published between 1998 and 2020, summarized in Table A-1. We keep programs implemented at the national level only, dropping policies with a solely local or regional focus within a country, as well as programs implemented by international bodies such as the European Union, unless the international body is involved for funding purposes only. Similarly, we drop policies focused specifically on other markets and not on the country in which they are initiated, such as programs initiated by wealthy nations to promote entrepreneurship in emerging economies.

We exclude any policies that provide non-financing support only, such as training, mentoring, or similar activities, as well any programs without a focus on SMEs or entrepreneurial firms. Listed programs that are either duplicates of other programs or umbrella designations that encompass multiple programs already included in the sample are dropped as well. We exclude programs for which no details on program design or implementation can be found, as well as any programs started in 2020 or with designated future start years.

	Equity		Debt		Grant		Total	
	Dropped	Remaining	Dropped	Remaining	Dropped	Remaining	Dropped	Remaining
Starting Sample	--	351	--	315	--	660	--	1326
Regional	63	288	33	282	39	621	135	1191
International	36	252	8	274	24	597	68	1123
Non-Financing	2	250	15	259	28	569	45	1078
Non-SME/Ent targeted	12	238	25	234	67	502	104	974
Non-Government	24	214	10	224	0	502	34	940
Duplicate or Subprogram	13	201	48	176	45	457	106	834
Insufficient Information	10	191	15	161	5	452	30	804
Not Active during 1995-2019	17	174	8	153	22	430	47	757
No Country Data	0	174	2	151	0	430	2	755
Final Sample							--	**755**

Table A-3. Construction of venture capital activity by nation and year. This table describes the specifics of the construction of the sample of venture capital activity from Refinitiv VentureXpert used in the analysis, which is used in conjunction with the data from national and regional venture capital associations., Columns (1) and (2) characterize the number of deal-investor pairs, while Column (3) reports the number of associated deals.

	(1)	(2)	(3)
	Deal-Investor Pairs		Associated
	Dropped	Remaining	Deals
Starting Sample		741,650	342,832
Missing investment	99,117	642,533	
Zero investment	13	642,520	
Buyouts	85,824	556,696	
Fund of Funds	5,816	550,880	
Generalist Private Equity	46,375	504,505	
Mezzanine	3,516	500,989	
Other Investor (Non-Private Equity)	2,509	498,480	
Real Estate	2,206	496,274	
Final Sample (VC)		496,274	204,446

Table A-4: Construction of the IPO sample. This table describes the specifics of the construction of the sample of IPOs used in the analysis using SDC, Bloomberg, and Capital IQ databases. SDC was our largest source for IPO data. We dropped secondary offerings and IPOs that were withdrawn, rejected, or postponed. We also dropped ADRs, unit offerings, offers with warrants, closed-end funds, and REITs. In addition, we excluded spin-offs, investment trusts, private placements, and financial firms. Finally, we dropped offerings if the firm had zero or missing global proceeds across all markets. We also identified transactions in the Bloomberg and the Capital IQ databases to which we applied similar screens. Many of these transactions were duplicated across databases. Using Capital IQ identifiers, we matched the Bloomberg and Capital IQ database. We matched these with the transactions from the SDC database and ended up with a grand total of 51 thousand IPOs across 210 exchanges issued from 1990 to 2019. To further verify the accuracy of the IPO sample, we compared the IPO sample with the information provided on the websites of exchanges. We found multiple cases in which IPOs were misclassified by the data vendors. We corrected the classification of all these IPOs accordingly.

Steps	Sample	SDC		Bloomberg		Capital IQ	
		Dropped	Remaining	Dropped	Remaining	Dropped	Remaining
	Offerings (1960-2019)		259,024		50,317		108,951
1	Secondary offerings	189,292	69,732	11,963	38,354	73,177	35,774
2	IPOs withdrawn/rejected/ postponed/pending/rumored/ mandated/unknown		69,732	2,475	35,879	8,859	26,915
3	ADRs	1,062	68,670	458	35,421	555	26,360
4	Offers with warrants	805	67,865		35,421	985	25,375
5	Unit offerings	1,727	66,138	1,565	33,856	677	24,698
6	Closed-end (including REIT)	1,492	64,646	1,002	32,854	959	23,739
7	Limited partnership	284	64,362		32,854		23,739
8	Special acquisition	10	64,352		32,854		23,739
9	Spin offs	7,382	56,970		32,854		23,739
10	ETFs		56,970	56	32,798	310	23,429
11	Investment trusts	5,472	51,498	9	32,789	1,810	21,619
12	Private placements		51,498		32,789		21,619
13	Financial firms	8,005	43,493	4,345	28,444	1,794	19,825
14	Non-common shares	1,191	42,302	530	27,914	100	19,725
15	Missing ISIN/CUSIP/Issuer	10	42,292	311	27,603		19,725
16	Dropping IPOs from same firm after 30 days from initial IPO	169	42,123	218	27,385	20	19,705
17	Consolidating domestic tranche proceeds when the date is within 30 days	7,465	34,658	156	27,229	1,029	18,676
18	Missing or zero proceeds	346	34,312	1,274	25,955	144	18,532
	Sample for merging		34,312		25,955		18,532

Merging Databases	Sample
Matching Bloomberg & Capital IQ data	
Capital IQ sample	18,532
Bloomberg sample	25,955
Unmatched Capital IQ	7,623
Unmatched Bloomberg	15,046
Matched	10,909
Bloomberg + Capital IQ sample	33,578
Matching Bloomberg + Capital IQ & SDC	
Bloomberg + Capital IQ	33,578
SDC Sample	34,312
Unmatched Bloomberg + Capital IQ	18,274
Unmatched SDC	19,008
Matched	15,304
Bloomberg + Capital IQ + SDC	52,586
Bloomberg + Capital IQ + SDC (1990-2019)	51,200

Table A-5. Cross-sectional analysis of new venture policies and nation size. The three panels are the equivalent of Tables 4, 6 (Panel A), and 8 of the paper, without the venture capital independent variable. See the tables in the paper for detailed descriptions.

Panel A: Table 4.

	(1)	(2)
Initial ln (Population)	1.068***	1.250***
	(0.334)	(0.365)
Initial ln (Per capita GDP)		1.206***
		(0.410)
Initial weighted programs	0.255	0.152
	(0.248)	(0.247)
Constant	0.567**	-1.294**
	(0.234)	(0.605)
Adjusted R^2	0.139	0.182
Std. Initial ln(Population)	117.0	137.0
Observations	205	204

Robust standard errors in parentheses
$^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Panel B: Table 6, Panel A.

	(1) Equity	(2) Grant	(3) Debt
Initial ln (Population)	0.066**	0.591**	0.490**
	(0.031)	(0.258)	(0.206)
Initial weighted equity programs	0.516		
	(0.747)		
Initial weighted grant programs		0.076	
		(0.127)	
Initial weighted debt programs			-0.032
			(0.064)
Constant	0.096***	0.246	0.277**
	(0.035)	(0.149)	(0.108)
Adjusted R^2	0.016	0.081	0.054
Std. beta ln(pop)	82.07	155.27	134.76
Observations	205	205	205

Robust standard errors in parentheses
$^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Panel C: Table 9.

	(1)	(2)	(3)	(4)
Weighted policies active in bordering countries (prior year)	0.085**	0.070**	0.062**	0.061**
	(0.033)	(0.032)	(0.030)	(0.031)
ln (Population)	0.788	-1.395	-2.507**	-2.677**
	(0.850)	(1.284)	(1.047)	(1.227)
ln (Per capita GDP)		0.947		0.226
		(0.581)		(0.587)
Constant	-0.599	0.456	5.299***	4.941**
	(1.685)	(1.542)	(1.809)	(1.908)
Adjusted R^2	0.771	0.774	0.775	0.775
Std. beta Weighted policies active in bordering countries (prior year)	81.11	67.34	59.27	58.20
Country FE	YES	YES	YES	YES
Year FE			YES	YES
Observations	4,325	4,325	4,325	4,325

Robust standard errors in parentheses; clustered at the country level
$^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table A-6. Cross-sectional analysis of the unweighted count of new venture policies. The panels are the equivalent of Table A-5, Panel A and Table 4, but using unweighted rather than weighted counts. See the tables in the paper for detailed descriptions.

Panel A: Table A-5, Panel A.

	(1)	(2)
Initial ln (Population)	0.639***	0.895***
	(0.146)	(0.168)
Initial ln (Per capita GDP)		1.538***
		(0.351)
Initial programs	2.460***	1.813**
	(0.869)	(0.813)
Constant	1.668***	-0.599
	(0.321)	(0.454)
Adjusted R^2	0.245	0.322
Std. Initial ln(Population)	44.10	61.77
Observations	205	204

Robust standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Panel B: Table 4.

	(1)	(2)
Initial top VC nation indicator	5.585**	3.481
	(2.288)	(2.353)
Initial ln (Population)	0.397**	0.698***
	(0.170)	(0.206)
Initial ln (Per capita GDP)		1.258***
		(0.351)
Initial weighted programs		
Initial programs	1.714*	1.466*
	(0.876)	(0.839)
Constant	1.472***	-0.307
	(0.300)	(0.441)
Adjusted R^2	0.293	0.336
Std. Initial top VC nation indicator	2,084.2	1,676.3
Observations	205	204

Robust standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A-7. Panel analysis of active weighted venture policies. Observations are annual ones of each country in the sample between 1995 and 2019. The dependent value is the budget-weighted number of policies active in that year in a given nation. The independent variables include the natural logarithm of venture capital investment, population, and per capita GDP in the immediately prior year, and country and year fixed effects. Policies are divided by whether they are equity, debt, or grant in orientation. The standardized beta ln(VC investments in prior years)measures the percent change in the dependent variable relative to its mean with one standard deviation increase in ln(VC investments in prior years).

	(1) Equity	(2) Grant	(3) Debt	(4) Equity	(5) Grant	(6) Debt
ln (VC investments in prior year)	0.041	0.400*	0.188**	0.029	0.353*	0.129
	(0.027)	(0.210)	(0.093)	(0.025)	(0.206)	(0.086)
ln (Population)	0.035	0.076	0.405	-0.238	-1.021*	-0.948*
	(0.044)	(0.089)	(0.344)	(0.159)	(0.595)	(0.520)
ln (Per capita GDP)				-0.005	0.098	-0.173
				(0.042)	(0.256)	(0.113)
Constant	0.009	0.218	0.027	0.337	1.376	1.803***
	(0.060)	(0.201)	(0.494)	(0.209)	(0.835)	(0.658)
Adjusted R^2	0.605	0.751	0.762	0.611	0.756	0.766
Std. beta ln(VC investments in prior years)	88.58	117.20	49.87	62.59	103.37	34.32
Country FE	YES	YES	YES	YES	YES	YES
Year FE				YES	YES	YES
Observations	5125	5125	5125	5112	5112	5112

Robust standard errors in parentheses; clustered at the country level
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A-8. Panel analysis of active weighted venture policies, with alternative quality of government measures. The panel is the equivalent of Table 8 but now using scores for the ability to enforce contracts and the ease of doing business rather than the effectiveness of governance and rule of law scores. See the table in the paper for a detailed description.

	(1)	(2)	(3)	(4)
ln (VC investments in prior year)	0.379	0.368	-2.549**	-2.278**
	(0.439)	(0.419)	(1.147)	(1.061)
Score-Enforcing contracts	-0.005	-0.006		
	(0.024)	(0.024)		
ln (Lagged VC activity) * Enforcing contracts	0.001	0.000		
	(0.008)	(0.008)		
Score-Ease of doing business			0.019	-0.003
			(0.029)	(0.030)
ln (Lagged VC activity) * Ease of doing business			0.043**	0.038**
			(0.019)	(0.017)
ln (Population)	-0.504	-4.163***	-0.445	-2.702***
	(0.492)	(1.497)	(0.353)	(0.983)
ln (Per capita GDP)	0.851**	-0.494	0.564**	-0.257
	(0.346)	(0.378)	(0.230)	(0.201)
Constant	0.818	8.577**	-0.513	5.068**
	(1.527)	(3.463)	(1.680)	(2.564)
Adjusted R^2	0.880	0.885	0.886	0.889
Std. ln(VC investments in prior years)	45.65	44.40	-310.5	-277.5
Country FE	YES	YES	YES	YES
Year FE		YES		YES
Observations	3940	3940	4340	4340

Robust standard errors in parentheses; clustered at the country level
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table A-9. The determinants of private sector participation in public entrepreneurial finance programs, with alternative quality of government measures. The panel is the equivalent of Panel A of Table 10 but now using scores for the ability to enforce contracts and the ease of doing business rather than the effectiveness of governance and rule of law scores. See the table in the paper for a detailed description.

	(1) Ordered logit	(2) Ordered logit	(3) OLS	(4) OLS
ln (VC investments in prior year)	0.081**	0.042	0.023	0.010
	(0.038)	(0.041)	(0.018)	(0.017)
Enforcing contracts score	0.019**		0.007**	
	(0.008)		(0.003)	
Ease of doing business score		0.035***		0.013***
		(0.013)		(0.005)
ln (Population in prior year)	-0.095	-0.082	-0.019	-0.016
	(0.086)	(0.081)	(0.035)	(0.032)
ln (GDP in prior year)			0.051	0.040
			(0.055)	(0.063)
Constant			0.045	-0.338
			(0.306)	(0.363)
Adjusted R^2			0.026	0.029
Std. beta ln (VC investments in prior year)	28.92	14.87	8.16	3.58
Observations	533	536	533	536

Robust standard errors in parentheses; clustered at the country level
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A-10. The determinants of private sector participation in public entrepreneurial finance programs. The observations are public entrepreneurial finance program introduced between 1995 and 2019 with the requisite data. The dependent variable is in the three panels are measures of whether the program had a matching fund requirement, the involvement of the private sector in the investment decision-making process, and if it financed financial intermediaries. The independent variables include the natural logarithm of venture capital investment, population, and per capita GDP in the year immediately prior to the program introduction, and scores for the effectiveness of government and rule of law. The first two specifications in each panel employ a probit specification; the second two, an ordinary least squares one. The standardized beta ln (VC investments in prior year) in all the panels measures the percent change in the dependent variable relative to its mean with one standard deviation increase in ln (VC investments in prior year).

Panel A: Did the program have a matching fund requirement?

	(1) Ordered logit	(2) Ordered logit	(3) OLS	(4) OLS
ln (VC investments in prior year)	-0.002	-0.024	-0.010	-0.011
	(0.053)	(0.053)	(0.014)	(0.014)
Effectiveness of government score	0.715***		0.125***	
	(0.191)		(0.044)	
Rule of law score		0.713***		0.141***
		(0.177)		(0.038)
ln (Population in prior year)	-0.025	0.018	0.009	0.013
	(0.109)	(0.116)	(0.026)	(0.028)
ln (GDP in prior year)			0.111**	0.075*
			(0.043)	(0.045)
Constant			-0.044	0.071
			(0.145)	(0.161)
Adjusted R^2			0.064	0.067
Std. beta ln (VC investments in prior year)	-0.619	-8.687	-3.718	-4.077
Observations	683	636	683	636

Robust standard errors in parentheses; clustered at the country level
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Panel B: Did the program finance financial intermediaries?

	(1) Probit	(2) Probit	(3) OLS	(4) OLS
ln (VC investments in prior year)	0.034	0.026	0.014*	0.009
	(0.042)	(0.045)	(0.007)	(0.007)
Effectiveness of government score	-0.346**		-0.021	
	(0.148)		(0.021)	
Rule of law score		-0.159		-0.003
		(0.144)		(0.017)
ln (Population in prior year)	-0.123*	-0.076	-0.030**	-0.017
	(0.073)	(0.081)	(0.011)	(0.011)
ln (GDP in prior year)			-0.089**	-0.062*
			(0.034)	(0.032)
Constant	-0.934***	-1.298***	0.416***	0.285**
	(0.225)	(0.254)	(0.122)	(0.117)
Adjusted R^2			0.028	0.006
Std. beta ln (VC investments in prior year)	127.444	103.921	49.912	35.354
Observations	684	637	684	637

Robust standard errors in parentheses; clustered at the country level
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Panel C: Did the program involve the private sector in the investment decision-making process?

	(1) Probit	(2) Probit	(3) OLS	(4) OLS
ln (VC investments in prior year)	-0.110***	-0.094***	-0.020**	-0.018**
	(0.035)	(0.035)	(0.008)	(0.009)
Effectiveness of government score	0.646***		0.162***	
	(0.178)		(0.045)	
Rule of law score		0.541***		0.144***
		(0.167)		(0.041)
ln (Population in prior year)	0.128**	0.130*	0.033*	0.037*
	(0.062)	(0.067)	(0.019)	(0.021)
ln (GDP in prior year)			-0.007	-0.007
			(0.033)	(0.031)
Constant	-1.026***	-0.948***	0.050	0.063
	(0.222)	(0.214)	(0.127)	(0.124)
Adjusted R^2			0.060	0.066
Std. ln (VC investments in prior year)	222.099	216.743	55.679	57.519
Observations	584	540	584	540

Robust standard errors in parentheses; clustered at the country level
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A-11. Cross-sectional analysis of the impact of new venture policy introductions. Observations consist of each country in the sample. The dependent value is the natural logarithm of one plus the mean (between 2015 and 2019) VC financing volume (in millions of US dollars), patent counts, and IPO proceeds of companies in that country (in millions of US dollars). The independent variables include the budget-weighted number of policies introduced between 1995 and 2014 in a given nation, the logarithm of the mean of the dependent variable between 1990 and 1994, and the natural logarithm of population and per capita GDP in 1994. The standardized beta sum of venture program initiations (1995-2014) measures the percent change in the dependent variable relative to its mean with one standard deviation increase in sum of venture program initiations (1995-2014).

	(1)	(2)	(3)
Sum of venture program initiations, 1995-2014	0.100^{***}	0.035^{**}	0.036
	(0.028)	(0.014)	(0.022)
Initial ln (VC investment)	1.506^{***}		
	(0.186)		
Initial ln (Patenting)		0.666^{***}	
		(0.031)	
Initial ln (IPO proceeds)			0.937^{***}
			(0.075)
Initial ln (Population)	0.203^{***}	0.266^{***}	0.174^{***}
	(0.041)	(0.036)	(0.049)
Initial ln (Per capita GDP)			
Constant	0.553^{***}	0.988^{***}	0.530^{***}
	(0.081)	(0.088)	(0.098)
Adjusted R^2	0.691	0.782	0.664
Std. beta Sum of venture program initiations (1995-2014)	44.236	9.889	14.425
Observations	205	205	205

Standard errors in parentheses
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$