Industrial Policy via Venture Capital*

Martin Aragoneses† — *INSEAD Finance*

Sagar Saxena‡ — *University of Pennsylvania*

March 17, 2025

Abstract

In this paper, we document that around 30% of new funds invested into venture capital (VC) in Europe come from the government. We link firm micro data to the portfolio of VC investments of the largest European government agencies engaged in this form of industrial policy. We study the allocation of government-backed VC investment, highlighting the superiority of "indirect" investments intermediated via private VC funds relative to "direct" investments in which government officials choose companies to finance. We show indirect public VC investments reach 15% of VC-backed firms in Europe, over 30% of all employees that work at such firms, and nearly 40% for relatively large young firms. We find indirect financing via private VCs has significant and persistent effects when focused on young firms. In contrast, indirect investments reaching mature firms or direct investments overall seem to be much less effective. We develop a model of firm life cycle dynamics in which the government funds financially constrained entrepreneurs via venture capital. We show that government-backed venture capital shocks can increase dynamism especially among young firms at the micro level. However, whether such industrial policies increase output and productivity at the macro level greatly depends on the details of their implementation and the economic environment.

*We gratefully acknowledge financial support from the Wharton-INSEAD Alliance. Yuancheng Li, Huaihan Shan, and Oleg Telegin provided excellent research assistance. All errors are our own.

†Email: martin.aragoneses@insead.edu

‡Email: sagarsxn@wharton.upenn.edu

1 Introduction

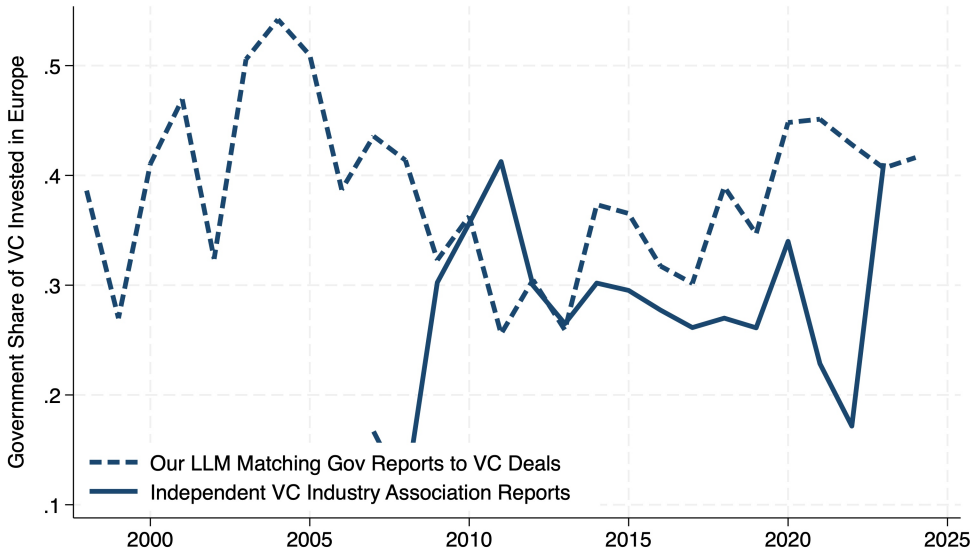
Governments around the world frequently turn to industrial policy to stimulate economic economic activity and firm productivity. Yet, the evidence on the effectiveness of some of these interventions remains mixed. A popular criticism is that such interventions are ineffective because government agencies allocate resources inefficiently, struggling to target the "right" kinds of firms to support. What if industrial policy were intermediated by private markets instead of public agencies? Could private-sector expertise in selecting and supporting promising ventures improve the effectiveness of public investments?

In this paper, we investigate precisely this idea within the context of industrial policy via venture capital (VC). We focus specifically on Europe, where aggregate productivity and business dynamism have long been underwhelming (Biondi et al., 2023). Despite substantial public investment relative to GDP, private investment in Europe significantly trails that of the United States — a puzzling gap highlighted by the recent "Draghi Report" (Draghi (2024)). One area where this is very salient is the venture capital market, which is particularly underdeveloped in Europe compared to the US, lagging both in terms of investment volume and deal count (Arnold, Claveres, & Frie, 2024). The VC market is an important source of financing for young and innovative firms and VC-backed firms significantly outperform similar non-VC-backed peers (Hellmann & Puri, 2002; Samila & Sorenson, 2011). Recognizing this critical gap, the Draghi Report and other policy analyses have called for coordinated interventions to strengthen Europe's venture capital ecosystem as a means to boost economic dynamism.[1]

We begin by documenting the striking fact that about 30% of new VC funds in Europe already originate from government agencies (see Figure 1). In particular, two of the largest of such agencies, the European Investment Fund (EIF) and the European Innovation Council (EIC), have been major players in the European VC market, although

[1]Industrial policy via VC is not unique to Europe; the Small Business Innovation Research (SBIR) program in the US and sovereign wealth funds in China and the Gulf states also make large-scale equity investments of this kind

Figure 1: *Share of VC Investments Linked to the Government in Europe*



Notes: For the first measure, we match annual reports on the VC funds where the EU government invests through its leading investment fund to micro data on VC investors and deals, and shows how much out of every euro raised in Europe for VC is backed by the government. The second measure shows our own calculations from independent industry report macro data showing the weight of investments from government agencies into all new, classifiable VC funds in Europe. These data sources and methodology used will be described in the next section.

they follow fundamentally different approaches. The EIF employs an indirect approach, investing in private VC funds that independently select portfolio companies, effectively outsourcing the company selection and funding process to private intermediaries. In contrast, the EIC adopts a direct approach, where government officials identify promising firms and invest in them directly, hoping to attract private co-investment in the process. These contrasting strategies provide a unique setting to test empirically and theoretically whether industrial policy via venture capital is more effective when intermediated through private markets versus directly implemented by government agencies.

Our research questions require several data sources. First, we digitize EIF's annual reports and obtain names of funds that received EIF contributions. We match these to fund names in VC deal databases, then track all subsequent investments made by the

matched EIF-backed funds. We follow a similar strategy to identify companies that received direct funding from the EIC. We also link VC deal micro data on all companies in Europe, enabling us to track firm outcomes both before and after receiving VC investments. This allows us to compare the allocation and impacts of different forms of government-supported VC activity against purely private market investments.

Our data confirm that Europe's VC market continues to trail that of the United States in both the intensive and extensive margins. Compared to the US, European venture-backed companies typically receive just 40% of the capital that U.S. firms secure at both early and later stages. In addition, the EU features only two-thirds the number of early-stage VC-funded firms and half as many later-stage firms in the 2010s.

Using our matched dataset, we document that indirect government interventions in the European VC market have become an important source of venture capital for young firms. We find that indirect (EIF-backed) deals are significantly larger, and fund larger firms, than the typical EU private venture investment, with average funding levels per firm closer to the US level especially for young firms in the early stages. We find evidence that indirect government VC money is behind 15% of all VC backed firms in the EU and accounts for between 30% and 40% of all employment among young firms that are relatively large. In contrast, direct investments (EIC-backed) tend to have much less reach and give much smaller funding amounts relative to the EIF, and are far from closing the funding gap with the US especially in the earlier stages of financing.

We then study the effects of industrial policy via venture capital on firm dynamics among VC-backed firms relative to peer firms using a difference-in-differences design. We show indirect EIF VC investments have significant, positive, and persistent effects mainly when funds are allocated towards young firms via early-stage VC, with little persistent effects when funds are allocated towards older firms via late-stage VC. When compared with other private VC funds, we find that indirect EIF VC investments are just as impactful which suggests that the EIF's funds perform as well as the funds allocated by the market. However, when compared with direct EIC VC investments, we find that

indirect EIF VC investments outperform direct EIC VC investments in terms of firm employment and productivity dynamics. This evidence suggests that industrial policy via venture capital is best done indirectly, intermediated by private VC funds, and is more effective if allocated towards early-stage investments.

Motivated by this evidence, we develop a heterogeneous firm dynamics model where entrepreneurs can be venture financed in the early or later stages helping them overcome the borrowing frictions that inefficiently tie their scale to their wealth. In the model, the most productive entrepreneurs when VC funded can reach a level of assets that at least gets them in equal footing to compete with their wealthy counterparts that have a business idea of much lower quality. We propose a simple funding rule that allow for government investment in VC to reach companies intermediated by VCs or directly. Like private funding, intermediated funding is allocated unequally across entrepreneurs in proportion to their firms' unconstrained ex-ante valuation and are larger on average irrespective of firm characteristics. Direct VC funding is smaller and uniform.

Using this model, we study the aggregate and distributional consequences of a "Big Push" industrial policy via venture capital. This is inspired by the Draghi Report where the government injects funds to entrepreneurs today (like lump-sum transfers) in exchange for future equity shares (like corporate taxes) in the hope of stimulating business dynamism. We ask, given the lack of VC funding existing in the EU, what would happen if we injected VC capital into the economy through government investment? We show in a simulation that the public VC shock leads to an increase in output by crowding-in capital investment among high productivity young firms that previously were unable to borrow from banks due to low initial wealth. We also show there are distributional effects as the wealth distribution shifts for VC backed entrepreneurs. We see substantial reallocation of economic activity among previously constrained young firms while leaving older firms that are already wealthy, unconstrained, and around their optimal size unresponsive. Despite this, in some scenarios, such VC shock can depress TFP.

We then explore how these aggregate and distributional effects depend on imple-

mentation details. For example, we vary the degree to which funds target early v.s. late stage VC., and we also vary the ability of VCs to target productive young firms with high growth potential in need of capital due to financing constraints.[2]

Our main finding is that reallocating VC investments towards younger firms (early-stage VC) can most robustly achieve large increases in both aggregate productivity and output across a range of policy experiments. We show that the policy is most effective when younger firms receive larger funding amounts on average, in proportion to their ex-ante productivity. We view this as a counterfactual policy that shifts direct government investments currently allocated through the EIC to the EIF to be done indirectly intermediated via private VC funds — a policy change that is currently being discussed.

Related Literature. This paper is related to several important papers in the literature of firm dynamics, private finance, and industrial policy.

Our paper builds on the canonical models of macro-development with entrepreneurs subject to financial frictions following Midrigan and Xu (2014) and Buera, Kaboski, and Shin (2011) among many others. Like we do, many related papers use this framework as building blocks to study various questions: Di Giovanni et al. (2023) study the effects of government procurements, Kochen (2024) studies the trading of firms in private equity markets, and Peter (2019) studies the IPO decision of entrepreneurs subject to equity frictions. Our work more broadly informs the literature on firm heterogeneity with financial frictions: Kochen (2024) discusses financial frictions in Europe, Ottonello and Winberry (2024) discuss financial frictions in general, Krusell, Thurwachter, and Weiss (2023) look at the importance of firm age. Sterk, Sedláček, and Pugsley (2021) also

[2]We are working on several results to answer: Does the ability of public investments to crowd-in private investment differ by the stage of the firm life cycle (e.g. young v.s. mature) at which the investment is made? (2) How should estimates of the growth trajectories of firms (e.g. firm size at the time of investment relative to the startup size of firms at entry) be used when allocating funds to better select and stimulate investments among high growth potential firms? (3) What shapes the relative effectiveness of different EIB Group's instruments, from early to late-stage private equity to firm of different ages? (4) What are the effects and best ways to encourage co-financing by VCs and private banks without crowding out private capital? (5) How should the EIF policy rule depend on the private financing limitations faced by young firms in intangible-intensive sectors with high fixed costs?

discuss the importance of financial frictions as a barrier to firm growth.

Our work also relates to the PE and VC literature, such as Barkai and Panageas (2021), Davis et al. (2014), Hellmann and Puri (2002), Samila and Sorenson (2011), Sorensen, Wang, and Yang (2014), and Sørensen and Yasuda (2023). Of particular relevance are Colonnelli, Li, and Liu (2024) and Beraja et al. (Forthcoming) which analyze empirically role the government in the Chinese venture market. Howell (2017) focuses on VCs in the US following government grants. Further, Ando (2024) and Akcigit et al. (2022) study VC in the context of endogenous growth but do not discuss industrial policy in Europe.

We also build on a rich literature on industrial policy (see Juhász, Lane, and Rodrik (2024) for a recent survey). In the European context, Fuest et al. (2024) provide suggestive evidence that one of the VC-like arms of the EU government, the European Investment Council (EIC) provides funds to relatively mature firms instead of financing "disruptive" innovations and propose redirecting funds towards a new ARPA-like government agency in Europe and outsourcing VC activities to specialzied funds.[3]

2 Setting & Data

In this section, we describe the sourced used to provide an overview of the EU private equity market and the rising important of the government in this market acting "indirectly" via private funds through the European Investment Fund or "directly" choosing companies through the European Investment Council.

2.1 EU Private Equity and Venture Capital Market

In 2024, Mario Draghi published a report highlighting weaknesses in EU business dynamism, private investment, and productivity partly linked to a weakness of private

[3]In our paper, we study precisely this investment of the EU government intermediated via specialized VC funds where the government simply deposits money without picking which companies get financed.

equity markets.[4] The report brought back to light unsolved issues that had been discussed ten year earlier in the World Economic Forum.[5] These reports highlight that, in essence, EU private equity markets systematically underfund firms at different stages of the life cycle, providing a lower amount of early-stage funding and less later-stage funding for growth. Behind these patterns there is likely both a lack of risk capital supply for firms with good long term projects to invest and that EU firms lack sufficiently good projects that require long-term risk finance perhaps due to the lack of supply. It could well be the case that these two issues are interconnected if the lack of later-stage financing discourages the creation of relatively large and capital-intensive young firms with growth perspectives.

The micro data described below shows the EU and the US have surprisingly stationary and similar ratios of young v.s. old firms getting funded and the average funding deal size per firm. This hints at the technological parameters in the VC production/cost function being not so different between the US and the EU, which could explain the strikingly similar proportions at which the industry allocates less money on average to a larger number of young firms. Thus, all the differences could simply arise from the fact that there is less aggregate amount of money being poured into VC despite the VC industry's inner workings being pretty similar. In this case, having outside entities like the government or institutional investors simply pour liquidity into the VC eco-system alone (effectively finding a way to reallocate savings from households that are right now sitting at banks or invested in public firms at low returns) could improve things.

2.2 "Indirect" Investments: The European Investment Fund (EIF)

The EU government has become an important player in the EU private equity market through "indirect" investments via the EIF. The EIF is part of the European Investment Bank (EIB) Group, the "biggest multilateral financial institution in the world". The EIF

[4] Draghi (2024)
[5] World Economic Forum (2014)

specializes in providing access to risk finance to support small and medium-sized enterprises (SMEs) across Europe. EIF conducts its activities using its own resources or those provided by the EIB, the European Commission, EU Member States, and other third parties. Rather than financing beneficiaries directly, EIF develops and offers targeted financial products to intermediaries mainly through private equity (PE) funds, venture capital (VC) funds, growth funds, and mezzanine funds, but also invests through banks, business incubators, guarantee and leasing companies, micro-credit providers to enhance SMEs' access to finance. By facilitating access to equity across the entire life cycle of corporate innovation, the EIF aims to play a crucial role in developing high-growth and innovative SMEs. Its investment strategy spans the early stages of intellectual property development and technology transfer to more mature phases of growth. One of its aims is to help develop the European financial sector while advancing core European Union objectives of entrepreneurship, growth, and job creation.

2.3 "Direct" Investments: The European Innovation Council (EIC)

The European Innovation Council (EIC) fund represents another critical pillar in the EU's strategy to bolster innovation and entrepreneurship across Europe. Unlike the European Investment Fund (EIF), the EIC bypasses intermediary venture capital funds and targets startups and SMEs "directly" through a combination of grants and equity investments. This means that the EIC retains much stronger control on decision making relative to private VCs, which act as co-investors. Rather than letting private VCs choose companies, firms submit project proposals directly to the EIC. The European Commission is the main entity responsible for the EIC, and while the EIB is set to take over the EIC in the near future, it currently acts merely as an "advisor". Fuest et al. (2024) recently criticised the investment strategy of the EIC in a report which suggests that the EIC may not be investing in the right firms.

2.4 Data Sources

We combine multiple data sources to construct a comprehensive dataset that allows us to analyze venture capital investments made by the European Investment Fund (EIF), compare these to investments made by other non-EIF-linked investors, and track firm outcomes both before and after receiving venture capital funding.

2.4.1 Reports on Government PE and VC Investment Portfolios

Our first data source comes from the European Investment Fund's annual reports, which we digitized to obtain detailed information about the EIF's equity investments. These reports provide granular data on fund-level capital allocations, including the names of recipient funds and the amount of capital allocated to each fund on an annual basis. It's important to note that these equity investments are distinct from the EIF's other policy interventions (such as loans). The scale of the EIF's equity investment activities has grown substantially over time. As shown in Figure 2, which displays both the annual budget allocations and the cumulative assets under management, the EIF has expanded rapidly since its inception in the last 1990s. By 2023, the EIF's annual allocation for equity investments exceeded 5.6 billion euros.[6] The scale of the EIF alone is comparable to major private sector investors like Softbank deploy globally, which invested approximately 4.8 billion euros (784 billion yen) in the same year across all countries.[7]. The EIF alone deploys an amount equivalent to the combined investments made by the top 5 sovereign wealth funds in the world that invest in Europe, the closes being GIC from Singapore, which invested 1.9 billion euros in the continent in 2024.[8] These numbers hint at the scale of the EU government's involvement in the EU venture market.

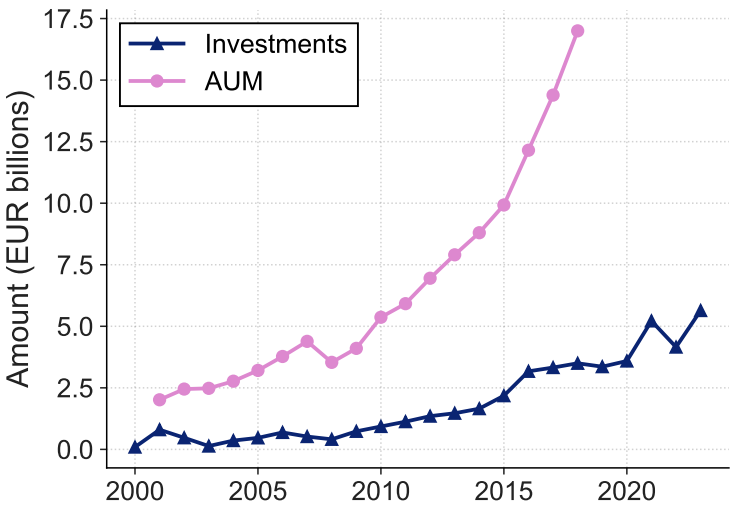
In addition, we digitised the investment portfolio of the European Investment Council

[6]The EIF represents a large share of the overall commitment of government agencies acting as PE investors in Europe, which is estimated to be 8.3 billion euros in the same year by an association of private capital providers in Europe.

[7]Source: Softbank's Consolidated Statement of Cash Flows found here.

[8]Source: Industry reports on the importance of sovereign wealth funds in Europe here.

Figure 2: *Investments and Assets Under Management (AUM) of the EIF*



Notes: This figure shows the total amount of capital allocated to the European Investment Fund's (EIF) equity investments and the total assets under management of the EIF. The data are from the EIF's annual reports.

using a combination of government records and data provided by Dealroom which flags companies that received support (either through grants or equity) from the EIC.

2.4.2 Deal-Level Data from Private Equity and Venture Capital Markets

PitchBook, our second data source, captures comprehensive deal-level information on private equity and venture capital investments. Each deal record includes the transaction date, company details (name, location, and founding year), participating investors and their associated funds, and deal size. We link these records to EIF investments through a two-step process: we first match fund names across the EIF annual reports and PitchBook datasets, then track all subsequent investments made by the matched EIF-backed funds. This matching strategy identifies which deals involve funds that received EIF support versus those that did not, allowing us to compare EIF-supported venture capital activity against purely private market investments. In Section 3, we provide several facts related to investments made by EIF-backed funds. Further, we contrast our aggregated

micro data with aggregated information from an independent, anonymous association of private capital providers in the EU that reports macro data on the EU VC and PE industry (see Figure 1 in the introduction). In addition to PitchBook, we have tested our results with other standard micro data sources used in the PE literature including CrunchBase and Preqin.[9].

2.4.3 European Firm-Level Micro Data

For our third dataset, the Orbis database, provides panel data on private and public companies across Europe, allowing us to track firm-level outcomes over time. For each firm, we observe detailed financial metrics including sales, profits, assets, and debt, alongside firm characteristics such as age, size, number of employees, and industry classification. We link Orbis records to our PitchBook dataset using firm names and locations.[10] This linkage enables us to track firm outcomes both before and after they receive investments from EIF-backed funds.

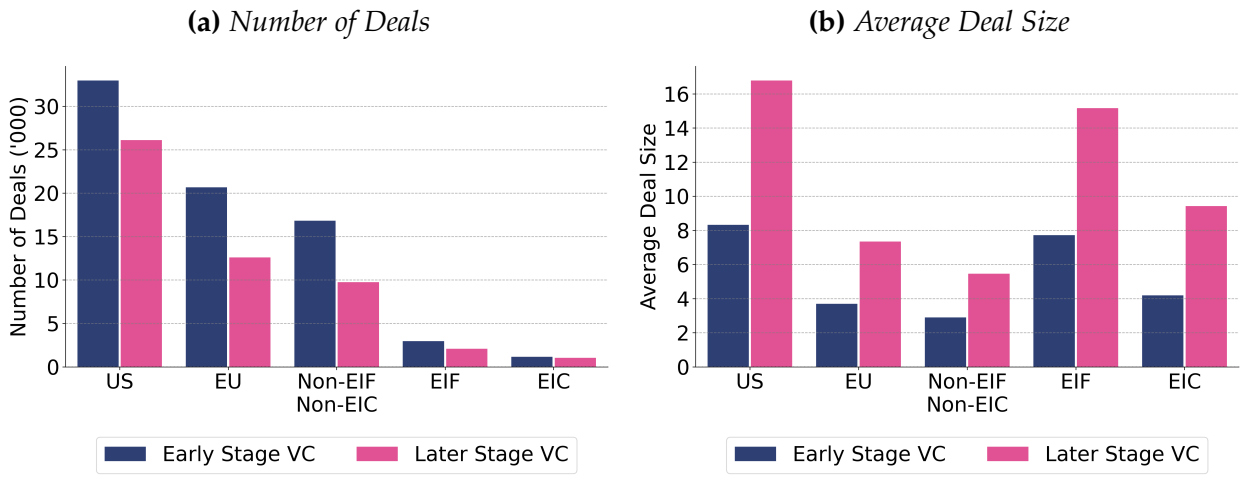
2.4.4 Aggregated/Macro Data

Our final datasets comes from EuroStat and CompNet, which contains aggregated Census data for European countries. We leverage the regional (NUTS-2) and sectoral (NACE-2) information from each EIF investment, along with firm characteristics like age and size, to connect our EIF-Pitchbook/Orbis sample to CompNet. We use these data to construct moments which we use to calibrate our model.

[9]Results based on CrunchBase and Preqin are in the Appendix; we have found CrunchBase to be of lower quality relative to Pitchbook in terms of matching ratios observed in the European independent industry reports relative to Pitchbook.

[10]We employ a variety of techniques to ensure matching across potentially inconsistent string names, including text embeddings generated using state-of-the-art LLMs.

Figure 3: *Size of Venture Capital Market in the US and the EU, 2010-2019*



Notes: This figure shows the number of deals and the average deal size by funding stage and source. The columns correspond to deals in the US and in the EU. The EU deals are futher sub-divided into deals in which the EIF was involved, deals in which the EIC was involved, and deals in which neither of the two government agencies was involved. The data are from PitchBook for the period 2010-2019. The sample is limited to the US and the EU, where the EU includes the set of countries included in the CompNet sample.

3 Empirical Facts

In this section, we present some descriptive and reduced-form facts related to the EIF's investments in the EU.

3.1 Venture Capital in the EU

The difference in the size of the Venture Capital (VC) market in the US and the EU is well known. One estimate, from a 2024 IMF report, shows that annual VC investments make up 0.7% of GDP in the US compared to only 0.2% of GDP in the EU, only 30% the size of the US market[11].

[11](Arnold, Claveres, & Frie, 2024)

This macro difference also appears in our micro data, which shows that fewer firms receive VC funding in the EU *and* each firm gets less funding on average. In Figure 3, using PitchBook data between 2010 and 2019, we show that the number of early-stage VC funded deals in the EU is about 2/3 of the number in the US; for later-stage VC funded deals, this number is half of that in the US.[12] These patterns are surprising since the US and the EU have similar startup rates.

Remarkably, there are large differences in the average funding received by a firm in a year as well. In panel B of the same figure, we show that, on average, EU firms receive only 40% of the venture capital that US firms receive at both early and later stages. The relative difference between early and late funding amounts is surprisingly similar between the EU and the US, suggesting the supply of venture capital per funded EU firm is depressed uniformly across all financing stages, an observation we will be building into the model presented later.[13]

These striking differences may have important implications for the long-run trajectory and performance of firms in these markets, and may partially explain recent concerns about the decline in business dynamism in Europe[14]. This lack of private VC funds supplied in the EU may have various origins we do not attempt to shed light on, such the lack of capital market integration (since VCs in one country still face regulatory burdens in raising and investing funds in other EU countries) or the concentration of the excess household savings Europe in the hands of the government or banks (preventing them from reaching firms in need of funds to invest).

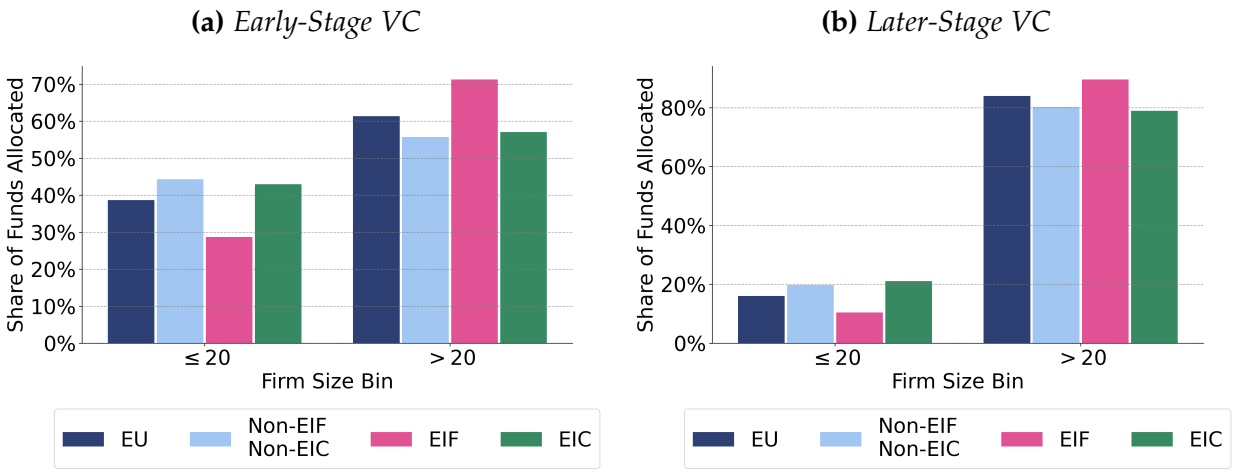
On the same plots, we highlight the number of deals funded by government-backed funds and compare their average funding levels to the broader EU and US markets. While only about 15% of EU VC deals are backed by the EIF, these deals are on average closer to the US levels than the average EU deal: deals where the EIF is involved as an

[12]Data from an industry association shows an even starker difference in the number of firms getting financed in later stages in Europe.

[13]Indeed, regardless of the data source we used, we found that on average receive between 2 and 3 times the funding in later stages as they do in earlier rounds.

[14]See Biondi et al. (2023) for a recent discussion of the decline in business dynamism in Europe

Figure 4: *Share of Funds Allocated by Size*



Notes: This figure shows the share of firms in each size bracket that received fundings from EIF-backed funds and non-EIF-backed funds. The data are from PitchBook for the period 2010-2019.

investor end up being twice as large on average than the average deal in Europe. An even smaller share of EU VC deals are backed by the EIC, but these deals are significantly less well funded than those of the EIF, and tend to resemble more the typical EU deal. The difference in funding size between the EIF and the EIC seem especially stark for early-stage deals, where the EIF gives much larger amounts of money to younger firms. By providing larger cash injections especially in the early stages, the indirect approach to VC industrial policy of the EIF could be bolstering the EU's VC market and positioning its portfolio companies to be more "competitive". But how effective and well-targeted this policy is, especially relative to direct approaches to VC industrial policy like the EIC, remains an empirical question. The true impact of these interventions — both on the long-run performance of firms and Europe's overall economic dynamism — is not immediately clear, and the primary goal of this paper is to rigorously evaluate how well this differential funding policy performs.

3.2 Allocation of EIF and EIC Funds

In this section, we compare firms receiving EIF and EIC funds with those that do not in order to understand how investments differ by the stage of the funding life cycle and firm size.

Specifically, we split the deals into early-stage versus later-stage, and within each funding stage, we further separate firms according to whether they received EIF backing indirectly. We also highlight whether companies receive EIC backing directly, or whether they receive funding from other private sources in the EU. We find that while a significant amount of funding being channeled towards firms younger than 5 years old through early-stage VC funding, significant amounts of government money end up invested in the later-stages.[15].

In addition to broad age categories, we group firms into two size categories — small (1–20 employees) and large (20+ employees) —based on the number of employees, and compute the share of funds allocated to each size bracket. These comparisons allow us to highlight how EIF and EIC support is distributed across different firm sizes.[16]

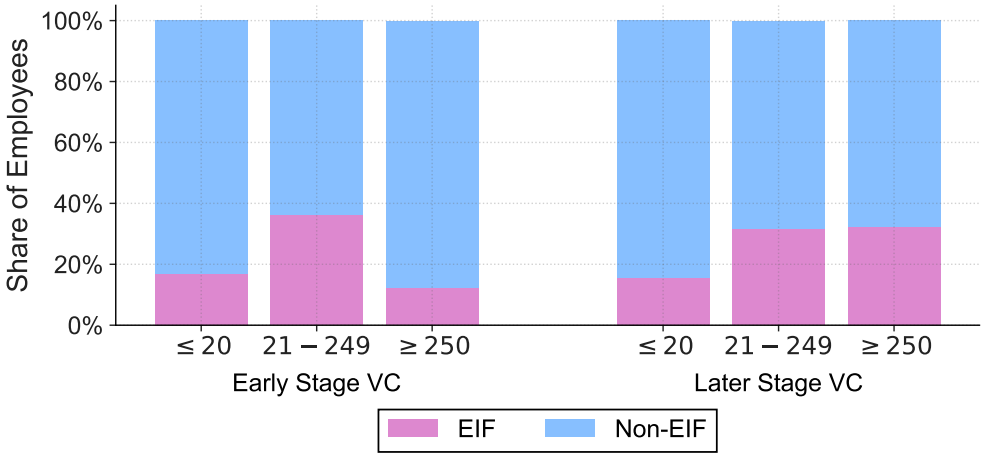
As shown in Figure 4, across both early-stage and later-stage venture capital deals, EIF-backed funds are relatively more inclined to invest in larger firms compared to non-EIF-backed funds. Notably, the difference is more pronounced for early-stage deals where EIF-backed investments exhibit a clearer bias toward medium-sized firms. At the same time, we find little difference in terms of the allocation of funding of the EIC by size for different ages relative to the general EU market. Overall, the key takeaway is that EIF-backed indirect investments lean toward relatively larger firms especially in early stages but also in later stages of the life cycle of firm financing. We show in the Appendix that these patterns show when categorizing firms as young v.s. old relative

[15]This echoes the findings in Fuest et al. (2024) who document that even among the "Accelerator" programs of the EIC's Horizon Europe ends up, less than 20% of beneficiaries are "startups" which are less than 5 years old

[16]In the Appendix, we show our main results hold by breaking down size categories into 20-50, 20-250, and 250+.

to age 5 instead of comparing early-stage and late-stage deals. The finding that indirect industrial policy via VC ends up funding relatively large, young firms stand in contrast with those of direct forms of venture finance in the EU that have been shown to be biased towards much smaller firms that tend to be mature.[17].

Figure 5: *Share of Employees in Deals Backed by the EIF*



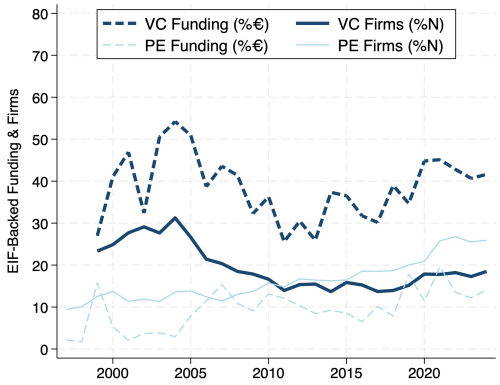
Notes: This figure shows the share of employees at firms involved in deals backed by the EIF in each size bracket and funding stage. The data are from PitchBook for the period 2010-2019.

Another way to summarize the allocation of EIF funds is to look at the share of employees in EIF-backed deals across different funding stages and firm size brackets. In Figure 5, we show that EIF-supported firms employ close to 30% of all employees supported by VC in the EU. This is despite the fact that EIF-supported firms make up less than 20% of all firms supported by VC in the EU, and reinforces the idea that the EIF invests in relatively larger firms. When we focus on specific categories of firm age and size, the gap becomes even more striking. For example, among medium-sized firms (20–249 employees) receiving early-stage VC funding, EIF-backed companies account for around 40% of the employees in that group. These figures emphasize the scale and significance of the government's intervention in the European VC market.

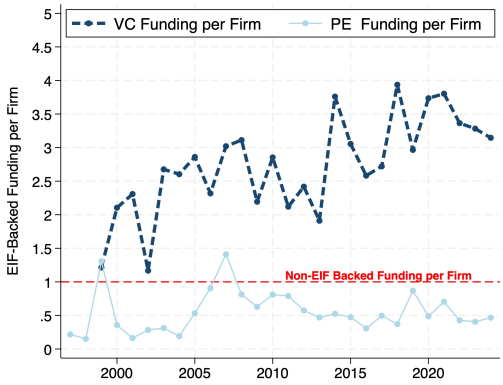
[17]While we find less than 30% of indirectly EIF-backed firms in early VC stages are 20 employees or less, Fuest et al. (2024) find that over 40% of firms financed by the "Accelerator" programs of the EIC's Horizon Europe are 11 employees or less

Figure 6: *Government-Backed VC and PE Financing in the EU*

(a) *Share of EIF-backed Investment & Firms*



(b) *EIF-backed Investment per Firm*



Notes: The first panel shows the rising funding per firm for firms that receive funding from the EIF relative to firms that were not linked to the EIF within a given investment class (VC or PE). The second panel plots the share of aggregate investment and firms financed that are linked to the EIF within a given investment class (VC or PE). The data are from the EIF's annual reports (first panel) and the reports linked to Pitchbook (second panel).

Finally, Figure 6 documents the importance of the EIF in the EU's VC and PE market and how this instutition's investment strategy has evolved over time. Figure 6a shows EIF-backed funds accounted for a consistently large share of nearly 40% out of the aggregate supply of early- or late-stage VC since the EIF's inception in the 1990s.[18] Further, Figure 6b shows that their VC investments per firm has increase significantly since its early days, going from investing amounts comparable to the rest of the market to investing 3 times more per firm, consistent with our earlier findings.[19] In contrast to VC, the weight of the EIF in the EU's PE market is much more limited, representing under 10% of the overall supply of both buyout and growth funding and their PE investments are on average slightly smaller than those of the market.[20] These numbers confirm the

[18]While these numbers come from our EIF-Pitchbook linked sample, Figure 1 shows government agencies were the source of 37.4% of all European funding for VC in 2023 using data from an independent association in the European VC/PE industry.

[19]We confirm this rise in VC funding per firm holds among all stages of financing: seed, early, and later VC; thus, it is not due to a changing composition towards deals where funding sizes are larger. If anything, their weight in seed funding has increased.

[20]Again, we do not think these numbers are unique to Pitchbook, since alternative industry reports indicate government agencies are responsible for 7.5% of PE investment money in Europe in 2023.

EU government acting through the EIF (and various national government agencies) is a major source of funds for seed and VC (rather than PE) in the EU, motivating our focus on these forms of financing where the EU government has become a key player.

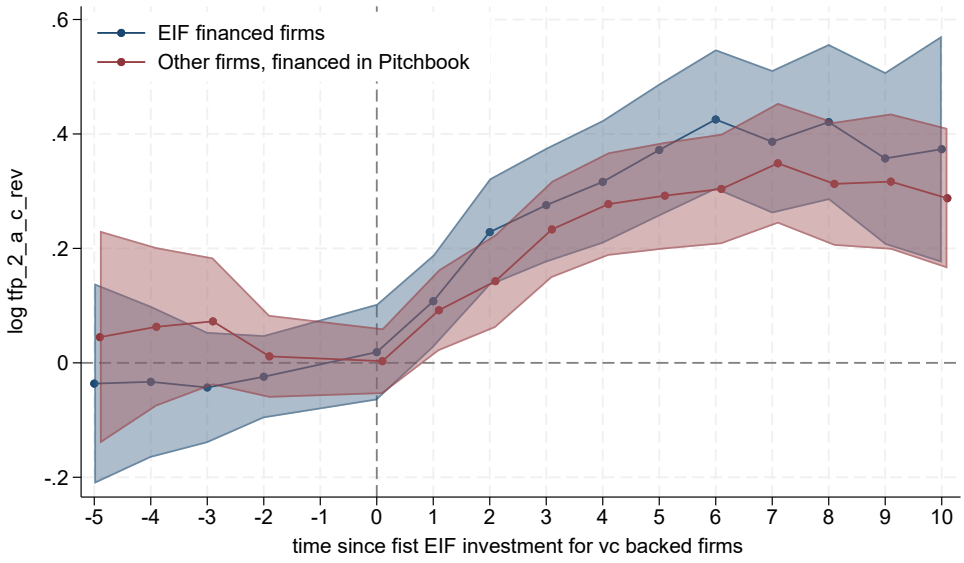
3.3 Firm Dynamics Post VC Investment

We study the reduced-form dynamic effects of indirect and direct public venture financing on firm-level outcomes among treated firms relative to their peer firms in EU VC data. We show significant, positive, and persistent effects of EIF VC funding mainly when funds are allocated towards young firms in the early-stages intermediated via private VCs. In contrast, we observe little persistent effects when funds are allocated towards older firms via late-stage VC. We observe no significant difference in the performance of firms financed by private VCs regardless of whether the government was an investor in the fund. However, we observe smaller effects when funding is allocated directly by the government without the intermediation of private VCs. All in all, this suggests an indirect approach to venture capital industrial policy that focuses on younger firms is superior.

We estimate the main result using a stacked differences-in-differences regression on firm-level employment and revenue productivity from an Orbis-based panel, with time since first EIF-linked funding as the treatment indicator. Our control group consists of peer firms selected via Propensity Score Matching following the private equity empirical literature.[21] We assess robustness to alternative specifications, including synthetic control and shift-share instruments, as detailed in the Appendix. We also show there robustness to different variables (e.g., revenue, valuations) from Orbis, using a longitudinal panel and outcomes only from Pitchbook, as well as to within-firm impulse responses

[21] While we describe it in more detail in the appendix, the PSM procedure uses the treated firm in our sample and a set of characteristics such as age, size, several key ratios, and sector to find a comparable set of control firms that are similar at least along observables. We further have also checked there are no signs of pre-trends. Naturally, spillovers between treated and control firms would challenge the validity of the preliminary estimates discussed here, and thus, we view these estimates as merely suggestive.

Figure 7: *Productivity Dynamics post Intermediated v.s. Private VC Investment*



Notes: This figure shows a stacked diff-in-diff run separately for EIF and private VC invested firms using longitudinal data from Orbis to estimate revenue productivity via a control function approach.

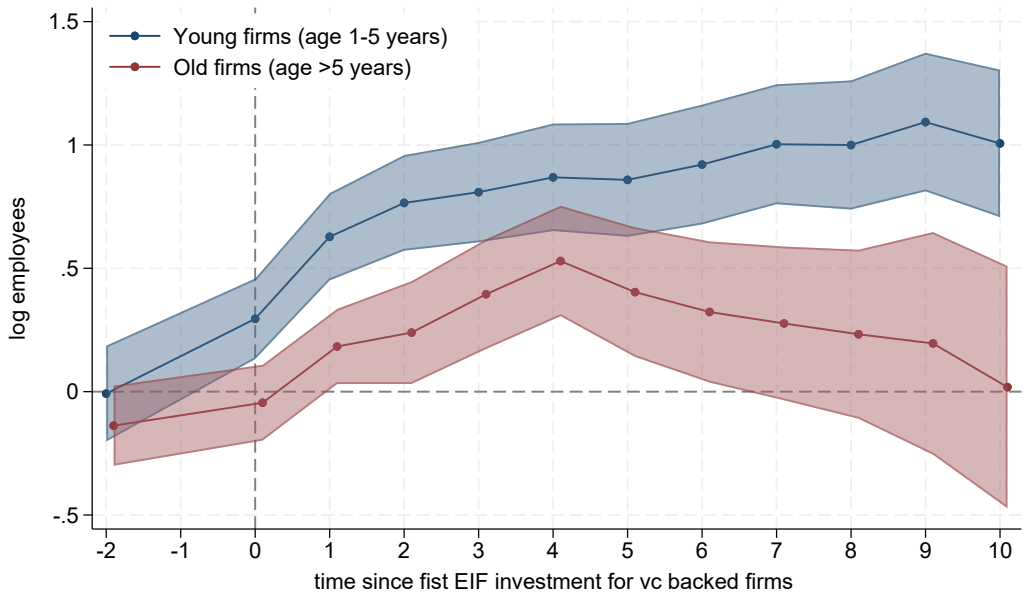
using local projections (Jorda, 2005; Dube et al., 2023).

$$y_{ict} = \alpha_i + \alpha_t + \sum_{-L \leq t-c < -1} \beta_k^{\text{pre}} \, x_{i,c,t}^{\{c=t-E_i\}} + \sum_{0 \leq t-c \leq F} \beta_k^{\text{post}} \, x_{i,c,t}^{\{c=t-E_i\}} + X_{ist}'\theta + \epsilon_{it}$$

Our main specification confirms that EIF financing significantly boosts different measures of firm performance relative to EIF-backed firms themselves before the first financing and relative to firms that were similar based on observables before the financing. This evidence is not meant to be causal nor taking a stance on the structural mechanisms that underlie these effects. Our goal here intends merely to show that there is reduced form support for the fact that EIF funds seem to be associated with persistent post-investment positive dynamics of a large magnitude among young firms funded in the early stages even relative to peer firms.

The post-financing impact on firms is not limited to size measured in terms of employment: estimates of revenue productivity using a control function approach also

Figure 8: *Firm Dynamics Post EIF Investment on Young vs Old*



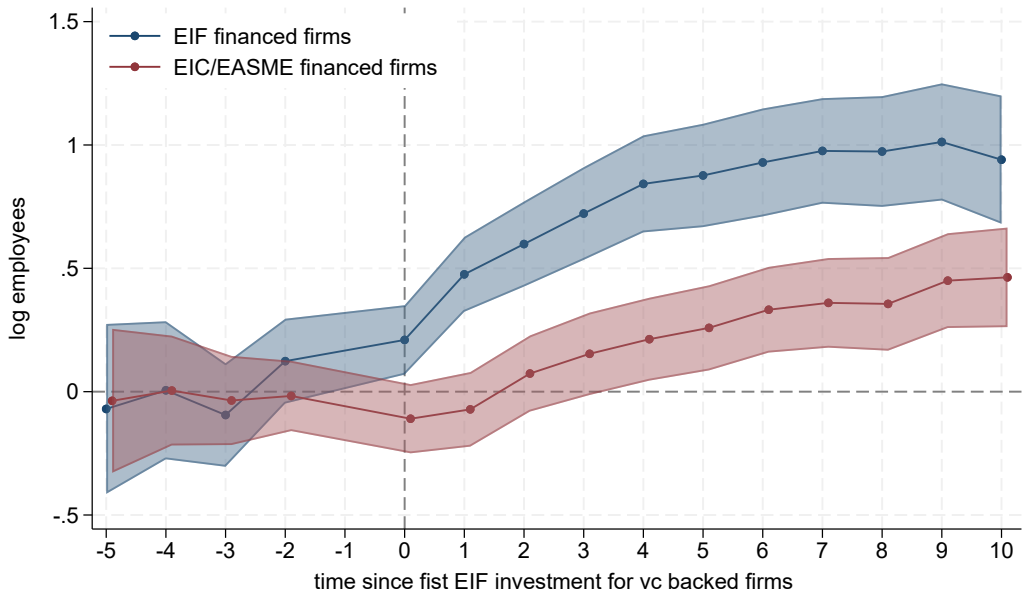
Notes: This figure shows a stacked diff-in-diff run separately for young and old firms using data on longitudinal employment from Pitchbook and EIF treatment indicators from annual reports.

show significant, persistent effects. Interestingly, we encounter little significant difference between the post VC-investment dynamics of EIF-invested firms and those that those invested on by private VCs on their own. This suggests that, at least in the European context comparing firms that are similar in terms of observables, there is little difference on the impact of investments made by private VCs and those made by VCs where the government acts as an investor.

Further, we show that the effects among older firms following later-stage VC investments are much more muted and do not seem to persist relative to a control group of peers that were also older at the time of treatment and may be receiving funding from other sources. In the Appendix, we present further subgroup analyses that show the effects are only significant among older firms that are relatively large, and that the effects among older firms disappear when focusing on old and small. In contrast, when the EIF invests in young firms they seem to have significant, positive, persistent effects.[22].

[22]These results echo the ones in Howell (2017) who found smaller early-stage grants awarded to firms

Figure 9: *Firm Dynamics post Indirect vs Direct VC Investments*



Notes: This figure shows a stacked diff-in-diff run separately for EIF and EIC invested firms using data on longitudinal employment from Pitchbook.

Finally, Figure 9 compares the post investment dynamics of indirectly (EIF) versus directly (EIC including EASME) financed firms. It shows public investments intermediated via private VCs are nearly twice as effective at boosting firm performance relative to direct investments when government agencies choos firms. Venture investments directly chosen by the government take much longer to translate into firm growth and half roughly half of the longer term impacts relative to those allocated by private VCs. This highlights the benefits of private intermediation relative to full public intervention when governments choose to engage in industrial policy via venture capital.

by the US government had much more powerful effects than later grants awarded at later-stages; she interprets these results as early-on funding relaxing financing constraints, allowing entrepreneurs to experiment and develop a proof-of-concept

4 Model

We develop a general equilibrium firm dynamics model of venture finance where workers that have business ideas have the option to become entrepreneurs that can be funded in the early or later stages by private financial markets funded by the government. A central contribution of our analysis is to study the aggregate and distributional consequences of a "Big Push" via venture capital inspired by the Draghi Report where the government injects funds to entrepreneurs today (like lump-sum transfers) in exchange for future equity shares (like corporate taxes) to try to stimulate business dynamism.

4.1 Setup

There are two types of agents: (1) workers, and (2) entrepreneurs with a business idea. Each agent has some stock of assets a and productivity z, and all agents have utility $u(c)$ over consumption c. Time is discrete, and the time horizon is infinite.

Workers can become entrepreneurs with probability ζ, and with some probability ϕ_E, they receive seed funding F_E from the government. Both probabilities are unaffected by the agent (for now), but the probability of getting funded is endogenous to government funding policy choices.

Workers' value function is given by

$$\begin{aligned} v_w(z,a) = \max_{c,a'>0} \; & u(c) + \beta(1-\zeta)\,\mathbb{E}_{z'|z}\left[v_w(z',a')\right] \\ & + \beta\zeta\left[(1-\phi_E)\,\mathbb{E}_{z'|z}\,v_e(z',a',u) + \phi_E\,\mathbb{E}_{z'|z}\,v_e(z',a'+F_E,f)\right] \end{aligned}$$

subject to the budget constraint

$$c + a' = wh(z) + (1+r)a$$

where $h(z)$ is an exogenous function that maps productivity to hours worked, w is the wage rate, a' denotes savings for the next period, and r is the interest rate. We use letters f and u to indicate whether the firm has been funded or not, respectively. Finally, $v_e(z, a, s)$ is the value function of a firm operated by an entrepreneur, where $s \in \{u, f\}$ denotes the funding status of the firm.

The value function $v_e(z, a, s)$ of a firm owned by an entrepreneur depends on whether the firm has been funded in the past or not. If the firm has been funded, with some probability η (exogenous for now), the entrepreneur continues to operate the firm, and with some probability $1 - \eta$, the entrepreneur exits, losing the option to run their business, and becomes a regular worker.

$$v_e(z, a, f) = \max_{c, a' > 0} u(c) + \beta \left[\eta \, \mathbb{E}_{z'|z} \, v_e(z', a', f) + (1 - \eta) \, \mathbb{E}_{z'|z} \, v_w(z', a') \right]$$

subject to the budget constraint

$$c + a' = \max \left[\pi(z, a, f), wh(z) \right] + (1 + r)a$$

where $\pi(z, a, f)$ denotes profits from operating a *funded* firm with productivity z and asset holdings a.

If a firm has not been funded in the past, with some probability ϕ_L, it receives later-stage financing F_L from the government. Its value function is given by

$$\begin{aligned} v_e(z, a, u) = \max_{c, a' > 0} \; & u(c) + \beta(1 - \eta) \, \mathbb{E}_{z'|z} \left[v_w(z', a') \right] \\ & + \beta\eta \left[(1 - \phi_L) \, \mathbb{E}_{z'|z} \, v_e(z', a', u) + \phi_L \, \mathbb{E}_{z'|z} \, v_e(z', a' + F_L, f) \right] \end{aligned}$$

subject to the budget constraint

$$c + a' = \left[\pi(z, a, u), wh(z) \right] + (1 + r)a$$

where $\pi(z, a, u)$ denotes profits from operating an *unfunded* firm with productivity z and

asset holdings a.

Firm Profits. Profits from operating a firm with funding status s are given by

$$\begin{aligned}\pi(z,a,s) &= (1-\tau\cdot\mathbb{1}\{s=f\})\cdot\widetilde{\pi}(z,a,s)\\ &= (1-\tau\cdot\mathbb{1}\{s=f\})\cdot\max_{l,k}\left(z\cdot Z_e\cdot\left(k^{\alpha}\ell^{1-\alpha}\right)^{1-\nu}-w\ell-(r+\delta)\,k\right) \qquad (1)\\ k &\leq \lambda(s)a, \quad s\in\{u,f\}\end{aligned}$$

where k and ℓ are the capital and labor inputs, respectively, τ is the share of firm owned by the government in exchange for venture capital, and Z_e is the productivity of the private sector. Unfunded firms retain all of their profits.

Note that firms are subject to an asset-based borrowing constraint, governed by the parameter $\lambda(s)$. We allow this parameter to be a function of the funding status of the firm to allow for the possibility that being "funded" makes it easier for firms to access credit markets.

Skill Dynamics. Skill z evolves according to the following law of motion where γ governs persistence

$$z_{i,t+1}=\begin{cases}z_{i,t} & \text{with probability } \gamma\\ z'\sim\mathcal{P}(z_{min},\eta_z) & \text{with probability } 1-\gamma\end{cases}$$

where $\mathcal{P}$ is Pareto distribution with scale parameter z_{min} and shape parameter η_z. Note that the PDF of a Pareto distribution is given by

$$f(z)=\eta_z\cdot z_{min}^{\eta_z}\cdot z^{-\eta_z-1}$$

Government-Backed Venture Capital. Let total government budget be given by G. This budget can be broken into funds given to entrants (G_E) and funds given to unfunded firms (G_L).

$$G = G_E + G_L$$

where

$$G_E = \zeta \cdot \phi_E \int F_E(z) \cdot D_w(z, a)$$
$$G_L = \eta \cdot \phi_L \int F_L(z) \cdot D_e(z, a, u)$$

where D_w and D_e are the distributions of workers and entrepreneurs, respectively. The funding amounts $F_E(z)$ and $F_L(z)$ are assumed to be a function of the productivity z of the firm.

Government spending is financed by dividends from funded firms and exogenous net transfers:

$$R = \int \tau \cdot \pi(z, a, f) \cdot D_e(z, a, f) + \bar{T}$$

Thus, the following equation must hold:

$$G = G_E + G_L = R$$

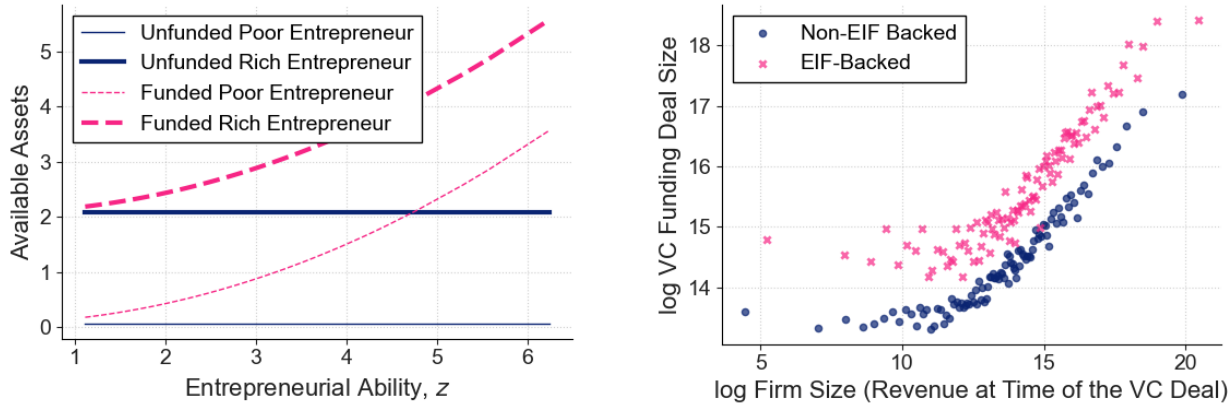
or more explicitly,

$$\zeta \cdot \phi_E \int F_E(z) \cdot D_w(z, a) + \eta \cdot \phi_L \int F_L(z) \cdot D_e(z, a, u) = \int \tau \cdot \pi(z, a, f) \cdot D_e(z, a, f) + \bar{T}$$

which states that the government's funding of entrants and unfunded firms must be equal to the revenue from funded firms and exogenous net transfers.

Figure 10: *Funding Amounts in the Model and the Data*

(a) *Model* **(b)** *Data*



Notes: Panel A shows our simulated VC funding policy rule in the model $\varphi_i = \varphi$ and $\tau_i = \tau$, which increases with productivity and shifts uniformly with the government funding parameter μ. Panel B shows how that the relationship between average VC deal size and firm size at the time of funding from our PitchBook deal data matched to EIF reports is similar qualitatively than in the model.

Funding Amounts. The government-backed VC follows a funding rule that injects funding proportional to the expected discounted value of the company, computed under the assumption of no borrowing constraints. This assumption is supported by the data as shown in Figure 10. This lifetime value of an unconstrained firm, denoted by $v(z)$, only depends on its productivity z. For funds offered to a new entrant, we assume that the government supplies amount $F_E(z)$ and takes an ownership share τ_E of the firm. For funds offered to a later-stage unfunded firm, we assume that the government supplies amount $F_L(z)$ and takes an ownership share τ_L of the firm. Thus, the amount offered to a firm depends on its productivity and whether it as a new entrant or a later-stage firm. These amounts are given by

$$\begin{aligned} F_E(z) &= \mu \cdot \tau_E \cdot v(z) \\ F_L(z) &= \mu \cdot \tau_L \cdot v(z) \end{aligned} \tag{2}$$

The factor μ is a common multiplier which determines the amount received by

funded firms. We can think of μ as a "wedge" that arises from the technology and constraints behind the government's intervention in VC markets. For example, μ could be a markdown reflecting the profit motives of VC intermediates, it could reflect the marginal cost of searching and monitoring companies due to information assymetry and risk, or simple be the multiplier on a budget constraint. Regardless of the sources of these technological or inefficiency frictions, we treat μ as one of the parameters that can change in counterfactuals perhaps through government policy.

Given our assumption on the law of motion of productivity, we can derive an analytical expression for $v(z)$. We have

$$v(z) = \frac{\overline{\pi}(w,r)}{1-\eta\beta\gamma} \cdot \left(z^{\theta} + \frac{\eta\beta}{1-\eta\beta} \cdot \frac{\eta_z}{\eta_z - \theta} \cdot (1-\gamma) \cdot z_{min}^{\theta} \right) \tag{3}$$

where $\theta = \frac{1}{\nu}$, $\overline{\pi}(w,r) = \nu \cdot \overline{y}(w,r)$, and η_z is the shape parameter of the Pareto distribution.

With this expression, we can compute the funding amount for a firm with productivity z as given in (2). This funding rule is shown in Figure 10a. Intuitively, more productive firms will get a higher funded amount if they happen to become funded since the funding rule $F(z) = \mu \cdot \tau \cdot v(z)$ increases with z due to its effect on firm value. In the baseline where entrepreneurs are self-financed, the level of wealth of a person determines whether entrepreneurs can carry out production after getting a good business idea. If a poor entrepreneur gets a good business idea, due to the borrowing constraint, their level of production will be constrained to be lowered than its unconstrained level $y(a,z) \leq y^*(z)$, inducing productivity and output losses from misallocation. When allowing VCs to intermediate government funds skewed towards highly productive entrepreneurs, low-wealth yet highly productive productive entrepreneurs, when funded, can reach a level of assets that at least gets them in equal footing to compete with their wealthy counterparts that have a business idea of much lower quality.

Table 1: *Calibration*

Parameter	Description	Value
Table 1: Calibration		
η	Business idea destruction rate	8%
ζ	Business idea creation rate	1.6%
Z_e	Entrep productivity	1
Z_c	Corporate productivity	0.6
α	Capital elasticity	0.33
δ	Depreciation rate	0.06
β	Discount factor	0.9115
σ	Inter-temporal Substitution	0.8
λ	Borrowing constraint	0.25
ν	Returns to scale	0.6
γ	Productivity persistence	0.8
$\underline{z}, \eta_z, M$	Pareto param., $\frac{\eta_z}{\eta_z - \frac{1}{1-\nu}}$	$1.11, 4.15, 3$

Equilibrium. In general equilibrium, we solve for the equilibrium values of w and r that make the labor and capital markets clear (and goods market clearing follows by Walras Law). Note here that the economy also features a zero-profit corporate firm with a constant return to scale technology given by $Y_c = Z_c K_c^{\alpha} L_c^{1-\alpha}$.

Labor market clearing is given by

$$\int h(z) \cdot D_w(z,a) = \underbrace{L_c + \int h(z) \cdot D_e(z,a,f) + \int h(z) \cdot D_e(z,a,u)}_{\text{Demand for labor}}$$

Capital market clearing is given by

$$\int aD_w(z,a) + \int aD_e(z,a,f) + \int aD_e(z,a,u) = \underbrace{K_c + \int aD_e(z,a,f) + \int aD_e(z,a,u)}_{\text{Demand for capital}}$$

4.2 Calibration

We consider a baseline European economy in which the government does not fund any firms.

Table 1 presents a preliminary parametrization of the model. We choose the business idea destruction rate $\eta = 8\%$ and idea creation rate $\zeta = 1.6\%$ to target the firm exit and entry rates in EuroStat (note in the model, since ζ is the share of workers that get ideas, the firm entry rate is ζ times average workers per firm). We choose $\lambda = k/a$ for all firms from Orbis between 1997 and 2007 to target the ratio of capital to assets in the data. We use a CRRA utility function $u(c) = \frac{c^{1-\gamma}}{1-\gamma}$ with a standard value for the EIS. We set β to target a desired level of the interest rate in the 1997-2007 period in Gopinath et al (2017). For the worker human capital to ability relation we use $h(z) = \log(z)$. We use a decreasing returns to scale Cobb-Douglas production function $f(k, \ell) = \left(k^{\alpha} l^{1-\alpha}\right)^{\nu}$, with a standard δ and α. We normalize the productivity shifters to make sure corporate firms are larger than entrepreneurs. In our model, long run life cycle growth profile of firms since entry is determined by η_z, z_0, λ, and ν. Entrepreneurial skill evolves according to the following law of motion where $z_{it+1} = z_{it}$ with probability γ and $z' \sim \mathcal{P}(z_0, \eta_z)$ with probability $1-\gamma$, where $\mathcal{P}$ is Pareto distribution with scale parameter z_0 and shape parameter η_z $CDF(z) = 1 - (z/z_0)^{-\eta_z}$. Note that we have to calibrate η_z (describing the productivity process) and ν (the degree of returns to scale) jointly so that the following factor is non-negative: $M = \frac{\eta_z}{\eta_z - \frac{1}{1-\nu}}$.

Untargeted moments. The model reproduces remarkably well two key objects that were not directly targeted in the calibration: the distribution of firms by age and (importantly) its size-weighted counterpart, the distribution of employment across firms of different ages. In EuroStat data, roughly 35% (65%) of firms are "young" ("old") defined as being less (more) than 5 years old, while in the model 37% (63%) of firms are young (old) in equilibrium. In the data, because size increases with firm age, roughly 20% (80%) of employees work at young (old) firms, while 22% (78%) in the model. Since in this simple version of the model employment is proportional to output, the distribution

of output is similarly skewed towards older firms.

4.3 Policy Analysis

Armed with our calibrated model, we now turn to evaluating industrial policy interventions in the form of government-backed venture capital. In our counterfactuals — which we think of as "Draghi Big Push via Venture Capital" experiments —– we examine the long-run effects of injecting VC capital into the economy through government investment, relative to a baseline in which no firms receive government funding. This exercise is motivated by proposals such as those advanced in Draghi's recent report, and it is intended to capture dynamics similar to the early, modest investments of the EIF between 1997 and 2006, as well as subsequent increases in funding capacity. Between 1997 and 2006, the EIF committed a relatively modest amount of about 500 million euros per year on average to equity investments through venture capital funds. Since then, the spending capacity of the EIF has risen significantly to around 5 billion euros per year, $10x$ its initial spending capacity, and may increase even more in the future if the recommendations made in the Draghi report end up influencing the 2027 budget discussion.

We consider four policy scenarios:

1. **Low Share, Low Funding Size:** Only a small share of firms (15%) receives funding, and the per-firm funding amount is modest (low μ).
2. **Low Share, High Funding Size:** A small share of firms (15%) is funded, but the deal sizes are large (high μ).
3. **High Share, Low Funding Size:** A larger share of firms (30%) is funded, with small funding amounts per firm (low μ).
4. **High Share, High Funding Size:** A large share of firms (30%) is funded, and the per-firm funding is large (high μ).

Figure 11: *Change in Outcomes Relative to Baseline (No Government Funding)*

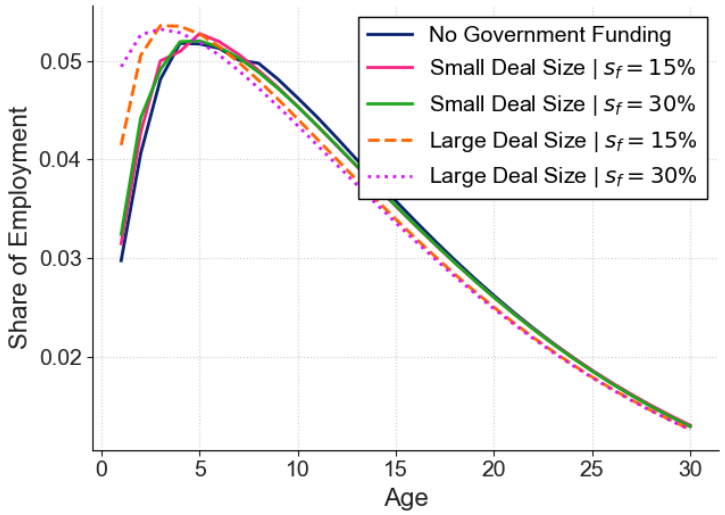


Notes: This figure shows the percentage changes in aggregate output, total factor productivity (TFP), and the output shares of young and old firms relative to the baseline scenario of no government funding, across different policy counterfactuals.

For a given share of funded firms, s_f, we solve for the implied funding probabilities φ_E and φ_L that satisfy the government's budget constraint. In our preliminary results we impose symmetry across early and later stages ($\varphi_i = \varphi$ and $\tau_i = \tau$) so that the policy does not explicitly target younger firms. Additionally, we temporarily shut down the revenue side of government VC spending to focus on the expenditure effects.

Below, we highlight some of the key results from our simulations.

Figure 12: *Employment Share by Age*



Notes: This figure shows employment share by firm age under different combinations of deal size and funding rate.

Impact on young firms. Since our model features an asset-based borrowing constraint, young firms which have not had the time to accumulate assets are more likely to be constrained than older firms. As a direct consequence of government funding, the borrowing constraint of young firms is relaxed, allowing them to expand their output and employment relative to the baseline scenario. This can be seen in Figures 11c and 12 – as more firms are funded and deal sizes increase, the share of output and employment from young firms increases. Correspondingly, share of output by old firms decreases, as shown in Figure 11d. Thus, these interventions change the composition of firms contributing to economic activity, shifting production towards younger firms.

Aggregate Output and Total Factor Productivity (TFP). While production is reallocated towards younger firms under all scenarios, the net impact of these government interventions on aggregate outcomes like output and TFP depends on the exact design of the policy. In some cases, the counterfactual policy raises overall output while lowering TFP, and in other cases both output and TFP improve. We present the impact on

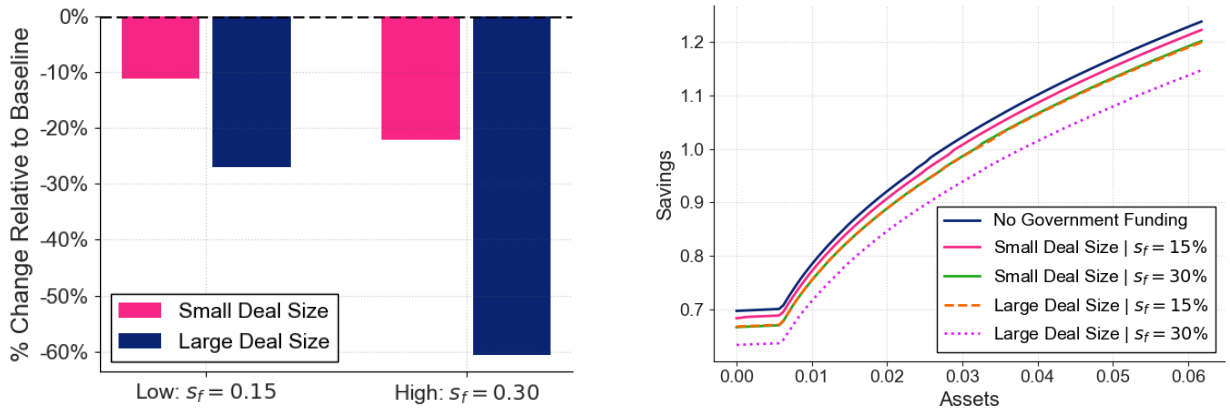
aggregate output and TFP relative to the baseline scenario in which no firms receive government funding in Figures 11a and 11b. As shown in these figures, funding a small share of firms with large deal sizes raises aggregate output but lowers TFP, whereas funding a larger share of firms with large deal sizes raises both output and TFP.

In scenarios where only a small share of firms is funded, the funding policy tends to capture many low-productivity firms. Because firm productivity is drawn from a Pareto distribution, high-productivity "unicorns" are relatively rare. A narrow funding scope may therefore miss these outliers, leading to capital being allocated primarily to firms that are, on average, less efficient which shows up as lower overall TFP. However, if large deal sizes are combined with a a large share of firms being funded, overall TFP can be higher as some of these highly productive firms (who remain highly productive) are able to grow and expand their output. This also brings up a related but important point: the persistence of productivity is crucial. Since funding is allocated based on productivity, if this productivity is fleeting, the benefits of funding may dissipate more quickly, making the policy less effective at boosting long-run TFP. However, if productivity is more persistent, relaxing borrowing constraint of highly productive firms (which will continue to be highly productive) can lead to higher TFP.

Impact on Unfunded Firms. Our analysis also uncovers an important unintended consequence: a "discouragement effect" among unfunded firms. The mere possibility of receiving government funding appears to reduce these firms' incentives to accumulate assets through savings, as illustrated in Figure 13b. As unfunded firms adjust their savings behavior downward, they become more capital-constrained, which in turn reduces their output and overall productivity. Output per unfunded firm goes down in all scenarios, as shown in Figure 13a. This discouragement not only affects individual firm performance but can also have aggregate implications. By dampening the self-financing efforts of a significant fraction of firms, the policy may inadvertently slow overall capital accumulation and innovation. In effect, while the funded firms benefit from relaxed constraints, the resulting reallocation of resources and reduced investment by unfunded

Figure 13: *Impact on Unfunded Firms*

(a) *Output Per Unfunded Firm* **(b)** *Savings Policies*



Notes: This figure shows the impact of government funding on the output per unfunded firm and the savings policies of unfunded firms under different combinations of deal size and funding rate, relative to the baseline scenario in which firms do not expect to receive government funding.

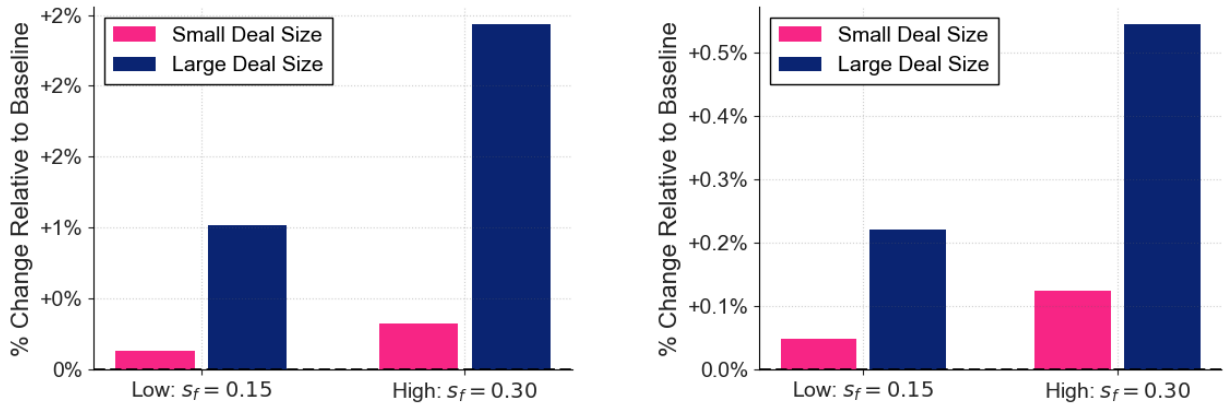
firms may undermine the potential gains from the intervention, suggesting the need for careful policy design to mitigate these adverse spillovers.

We now present additional sets of counterfactuals that are meant to provide insights for policy makers engaged in industrial policy via venture capital.

Funding Early Stage Firms Only. We repeat the set of counterfactuals described above but instead of funding both early and later stage firms, we shut down later-stage financing and only fund firms in early stages. The results are shown in Figure 14. Overall, focusing resources in early-stage financing shows very positive impacts, and these effects are stronger when more firms are financed with larger deal sizes. Indeed, in the model, the youngest firms are the furthest away from their optimal size due to funding constraints. Thus, an equity injection early on helps these firms get closer to their optimal size, improving allocative efficiency.

Figure 14: *Aggregate Outcomes If Funding Early Stage Firms Only*

(a) *Aggregate Output* **(b)** *Total Factor Productivity*



Notes: This figure shows the impact of a government funding policy that only funds early stage firms on aggregate output and TFP. The left panel shows the change in aggregate output relative to the baseline scenario in which no firms receive government funding. The right panel shows the change in TFP relative to the baseline scenario.

Uniform Funding. Finally, we also consider the case where the government funds all firms uniformly. The results are shown in the Appendix. In practice, we set the parameter θ in (3) to 0, so funding is no longer a function of firm productivity. This is meant to replicate a scenario where the government agency is unable to target the best performing firms, and therefore puts little weight on firm productivity when allocating funding. Some existing evidence (Fuest et al., 2024) and our own analysis suggests that unlike the EIF, the EIC leans less towards larger young firms when allocating funding. Thus, we see this counterfactual as replicating a world where all allocations are made by an agency like the EIC. As shown in the appendix, without a direct link between productivity and funding amounts, perhaps because the government is less able than private VCs at observing the entrepreneur's ability, a lot of the TFP and output gains from the baseline exercises can become muted.

In summary, our preliminary evaluation of the Draghi Big Push via Venture Capital experiment — motivated by the proposals in the Draghi report — suggests that

government-backed VC interventions can reallocate resources towards high-growth, younger firms, thereby boosting aggregate output. However, there are also countervailing effects of these policies.[23] The effects of the policies are in principle ambiguous and depend critically on the exact nature of the policy and the details of the economic environment, an area we are actively researching by refining our model and calibration to ensure that our findings robustly inform policy recommendations.

Our results, however, provide some preliminary insights. They highlight the appeal of shifting from direct to indirect forms of industrial policy in VC. In the data, investments seem more likely to target relatively productive young firms, and indeed in the model focusing investments precisely towards relatively productive younger firms, which are the furthest away from their optimal size, tends to deliver robust output and productivity increases on aggregate. Furthermore, indirect investments may be less costly (as the government can outsource the costs of screening/monitoring to VC) while a way to exploit the ability of VCs to screen productivity of entrepreneurs better than the government especially in the early-stages. Based on these findings, letting the EIF manage the EIC budget (shifting from direct to indirect industrial policy) might be a good idea precisely because it is more effective at financing enough young firms with large amounts.

5 Conclusion

This paper investigates the allocation and impact of industrial policy investments by the European government via venture capital (VC) markets in Europe, where it makes up 30% of the total VC investments. We focus on two agencies in particular: the European Investment Fund (EIF) and the European Innovation Council (EIC). They are both important players in the VC market in Europe but follow different approaches to selecting

[23] For example, they shift economic activity towards younger firms, which on average are less productive, which may result in a lower TFP. Additionally, these policies may discourage investment among unfunded firms, and therefore, lower growth over their life cycle.

and funding firms. The EIF follows a more indirect approach by investing in private VC funds who then select and fund firms. The EIC instead follows a more direct approach by funding firms directly. We also show that indirect funding from the EIF seems to have become an important source of capital for relatively large, young European firms: around 30% of all employees at VC-backed EU firms work for an EIF-backed company, while among young VC-backed firms with 20-250 workers, EIF-backed firm account for nearly 40% of all workers.

Using a comprehensive dataset of VC investments in Europe, we show that the impact of indirect EIF-backed investments on employment and productivity is just as effective as the market but dominates the direct interventions of the EIC. Importantly, we show that young firms indirectly financed by the EIF also experience the most positive and persistent dynamics.

Motivated by these empirical facts, we build a model of firm life-cycle dynamics in which the EU government invests in venture capital. We use this model to shed light on the role of EU industrial policy in the presence of financial frictions. In particular, we conduct policy experiments in the model to shed light on the aggregate and distributional effects of a government-sponsored venture capital supply shock as proposed by a recent report by Mario Draghi. Consistent with the empirical evidence, we show that such a shock reallocates resources towards young firms that outgrow their borrowing constraints and expand their output. In general, the net effects of industrial policy intervention through VC funds on aggregate output and TFP are nuanced and depend on the details of the implementation and the economic environment. However, we find that financing younger firms with larger funding amounts in proportion to their ex-ante productivity is a promising policy to explore further.

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