Industrial Policy via Venture Capital*

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Abstract

1/3 of venture capital (VC) investment in Europe comes from the government. We study government-backed VC investment intermediated via private VC funds that focus on different stages of the firm life cycle. We link data on the portfolio of VC investments of the largest European government agency engaged in such form of industrial policy, showing large increases in the volume of VC funding per firm. Reduced-form regressions show government-linked financing via private VCs has significant and persistent effects only when focused on young firms. Despite being much less effective when targeting older firms, we find government-linked VC funds are biased towards later-stage investments in so-called "scale-ups". We develop a structural model of firm life cycle dynamics in which government spending funds entrepreneurs via private VCs. Counterfactuals show the targeting across VC stages that maximizes aggregate productivity depends on the degree of financial market imperfections. The model rationalizes the policy focus on mature firms in highly frictional markets. However, in a calibration with relatively mild financial frictions, reallocating a constant budget towards early-stages produces aggregate effects of the same magnitude as a more costly “Big Push" that increases the amount of spending.

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1 Introduction

Governments around the world use industrial policy to try to stimulate economic dynamism with mixed results.[1] Detractors argue governments end up allocating resources inefficiently because they struggle to target the "right" firms. What if industrial policy were intermediated via private funds, with the government investing passively across active funds, relying on their private expertise in selecting and supporting firms?[2]

In this paper, we investigate this form of industrial policy intermediated via Venture Capital (VC) funds which has become a common way for governments to make large-scale equity investments globally.[3] We focus on Europe because aggregate productivity and dynamism there have long been underwhelming[4]. Corporate investment in Europe significantly trails that of the United States despite substantial savings, talent, and public investment — a puzzling gap highlighted by the recent "Draghi Report" (Draghi (2024)). The VC market is one area where Europe is particularly under-capitalized compared to the US.[5] Given the importance of VC as a source of financing for innovative firms,[6] the Draghi Report and other policy analyses have called for coordinated interventions to strengthen Europe's VC ecosystem as a means to boost economic dynamism.

1/3 of new VC investment in Europe originate from government agencies.[7] Our empirical and theoretical investigation zooms into one of such agencies, the European

[1] See Juhász, Lane, and Rodrik (2024) for a survey of the literature.

[2] De Haas and González-Uribe (2024) literature review concludes empirical evidence on the effectiveness of publicly sponsored VC is mixed like for other industrial policy interventions via private finance

[3] Andonov, Li, and Smeets (2025) provides an empirical analysis at a global scale focusing on the 30 largest of such institutions (see also Lerner (1996), Lerner (2013), Bernstein, Lerner, and Schoar (2013) and Bai et al. (2021)). Colonnelli, Li, and Liu (2024) and Beraja et al. (Forthcoming) analyze empirically role the government in the Chinese venture market.

[4] This has been linked to concentration on less dynamic mature firms (Biondi et al., 2023).

[5] Europe lags both in terms of investment volume and number of deals (Arnold, Claveres, & Frie, 2024)

[6] Our work relates to a rich literature related to VC Barkai and Panageas (2021), Davis et al. (2014), Gompers and Lerner (2004), Hellmann and Puri (2002), Kerr, Lerner, and Schoar (2014), Kerr and Nanda (2015), Kortum and Lerner (2001), Lerner and Nanda (2020), Samila and Sorenson (2011), Sorensen, Wang, and Yang (2014), and Sørensen and Yasuda (2023)

[7] This is not unique to Europe: González-Uribe (2020) documents state pension funds (which Hochberg and Rauh (2013) have local development concerns) have become the most important "Limited Partners" in VC in the US, accounting for around 30% of new funds committed to VC.

Investment Fund (EIF). This leading institution invests in private VC funds that independently select and monitor portfolio companies.[8] We find its policy mandate to support relatively mature "scale-ups" can have productivity-enhancing aggregate effects when targeting sectors or regions with strong financing frictions. However, for our calibrated values of the degree of financial frictions of Europe as a whole, reallocating funds towards early-stages first would be a cost-effective way to increase aggregate productivity.

In the first part of the paper, we digitize EIF's annual reports and match funds that received public commitments to VC deal databases, then track all subsequent investments made by EIF-backed funds. 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 magnitude, allocation, and impacts of government-supported VC activity against purely private market investments in Europe.

In the data, the gap between the European and the US VC markets is stark. Fewer companies receive VC funding and VC-backed European firms get less funding volumes. The European government via the EIF has taken steps towards expanding the aggregate supply of venture capital in Europe with the hope of closing these funding gaps. We document EIF-backed VC funds have become a large part of the European market and give increasingly larger funding amounts per firm.[9] European firms funded by an EIF-backed VC feature average funding levels resembling US ones.[10]

EIF-backed firms grow similarly to other VC-backed firms post-investment, but these

[8]The empirical literature finds a mix of underperformance of more direct interventions in VC (Cumming, Grilli, and Murtinu (2017) in Europe and Brander, Egan, and Hellmann (2010) in Canada) which may be due to the lack of selection and value creation of lower-tier VCs that collaborate with the government, since Colonnelli, Li, and Liu (2024) firm top VCs avoid the government to not constrain their investment decisions.

[9]These findings resonate with Brander, Du, and Hellmann (2015) who show globally that public interventions in VC can lead to more VC funding per enterprise and more VC-funded enterprises largely augmenting rather than crowding-out private VC finance, crowding-in larger volumes of capital known as "additionality". Leleux and Surlemont (2003) also find no evidence of crowding out and state "public involvement seems to cause greater amounts of money to be invested in the industry as a whole." In our conversations with policymakers, we learned they believe their main role is not to provide capital but to crowd-in private co-investors by alleviating information asymmetries through their extensive due diligence process.

[10]EIF-linked firms also more money independently of their size (controlling for age, sector, or region).

effects are persistently positive only for young firms and not for older ones. Given the outsized impact on young firms one might expect policy to prioritize funds focused on early-stages, especially given how important the EIF has become in the financing of relatively large, young firms.[11]

In practice, however, the EIF—like many public VC investors in Europe and globally—prioritizes later-stage investments.[12] EIF-backed funds disproportionately target older firms relative to the broader VC market. Why?

Our discussions with policymakers behind the EIF — supported by our estimates of the EIF's own portfolio allocation — indicate an intentional focus on supporting later-stage "scale-ups" over early-stage "start-ups". This policy stance is rooted on the belief that large later-stage funding gaps remain while progress in closing early-stage funding gaps has been more substantial.[13]

In the second part of the paper, motivated by this evidence, we develop a model in the macro-development tradition with entrepreneurs subject to borrowing frictions of Buera, Kaboski, and Shin (2011), Midrigan and Xu (2014), and Moll (2014) among others.[14] Heterogeneous workers with business ideas may become entrepreneurs which can be venture financed by heterogeneous VC funds, which specialize in different stages of the firm life cycle. Funds intermediate money from a large institutional investor which

[11] PitchBook data shows almost 40% of 20-250 employee firms under 5 in Europe are linked to the EIF.

[12] Andonov, Li, and Smeets (2025) show similar patterns hold outside of Europe. 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 of the kinds we study here.

[13] In our analyses of VC-backed firm data in the current vintage of PitchBook, we observe disproportionately smaller number of later-stage firms vs early-stage ones in Europe vs the US. However, unlike research using prior PitchBook vintages World Economic Forum (2014), we do not observe that average funding amounts in later-stages vis-a vis early-stages are disproportionately lower relative to US levels.

[14] Many papers build on these early frameworks to study related questions to ours: Di Giovanni et al. (2023) study government procurements, Kochen (2024) study firm trade in PE, and Peter (2019) studies Initial Public Offerings (IPOs) in Europe. None study industrial policy via VC. Ando (2024) and Akcigit et al. (2022) also study VC in the context of models of firm dynamics but do not discuss industrial policy intermediated by VC funds in Europe. Acemoglu et al. (2018) study industrial policy in the US through subsidies and grants, but not indirect investments of the ones we study.

allocates money across funds following mandates.[15] We estimate this mandated allocation using EIF data and calibrate the rest of the model to match standard moments.[16]

Our main innovation in the model is inspired by the data, where EIF-backed firms raise more money independently of firm size and other firm-level measures. Thus, we allow the funding VC-backed firms can raise to depend not only on their own ideosyncratic constraints (i.e. the amount of capital they need to reach their productive potential) but also on the aggregate (constrained) supply of equity for different stages.

This new model ingredient highlights that government interventions can affect the overall volume of venture capital[17]. In turn, by expanding the overall supply of venture capital, entities like the EIF can end up lifting financing constraints unevenly across firms depending on the distribution of financing "gaps" along the firm age distribution.[18] These financing gaps in different stages — which are endogenous to the economic environment and central for the solution of the model — are crucial to the policy debate.[19]

Counterfactuals reveal our main result: industrial policy via venture capital can improve aggregate productivity, but implementation details matter. In particular, to maximize aggregate productivity, the share of funds allocated to funds — specialized across different life cycle stages, sectors, or regions — needs to depend on the degree of financial market imperfections.[20] We find that a high degree of financial frictions rationalizes the policy focus on mature firms.[21] Starting to invest in previously untapped markets

[15] We can also allow for multiple institutional investors with regional or sectorial mandates.

[16] These include the firm age distribution of economic activity and leverage

[17] We view this as a similar mechanism as "Prudent Man Rules" that happened in the US with the deregulation of public pension funds that led to their expansion as investors in VC (González-Uribe (2020)) or (de)regulation changes that affect the overall supply of venture capital like "Blue Sky Laws" (Ewens and Farre-Mensa (2020)) and other rule changes (Chen and Ewens (2021))

[18] Our theoretical mechanism for a volume increase of government funding in VC resonates with the empirical studies in Brander, Du, and Hellmann (2015) and Leleux and Surlemont (2003); however, little is known about life cycle stage asymetries.

[19] There are other attempts in the literature at modelling the use of public funding to crowd-in private capital via the decision making of Development Financial Institutions /textciteflammer2025economics

[20] Aggregate TFP is the benchmark measure in the macro-development literature following Hsieh and Klenow (2009); Hsieh and Klenow (2014) emphasize the importance of the firm life cycle in this context

[21] In fact, the model's "optimal" share of young firms targeted closely resembles the empirical share biased towards older firms. That is, the expansion of venture capital supply has disproportionately affected later-stage VC, as in Ewens and Farre-Mensa (2020).

with underdeveloped financial markets can yield large effects, but supporting later-stage VC there is necessary.[22] However, our model calls into question the ongoing policy shift towards "scale-ups" in more financially developed economies: increasing early-stage investments there could improve aggregate productivity.[23] To reap the full benefits of a "Big Push" in markets with milder financial frictions one needs to reallocate funds towards early-stage VC first before increasing them.[24] Indeed, in our baseline calibration, we find that reallocating budget towards early-stages but keeping the total amount spent constant produces aggregate effects of the same magnitude of increasing the amount of spending to try to do a “Big Push".

The theory built in this paper aims to overcome some of the drawbacks in the empirical literature using *ex-post* data surveyed in De Haas and González-Uribe (2024). In particular, our framework allows for evaluating the effectiveness of industrial policy via venture capital *ex-ante* via counterfactuals, in particular regarding effects on long-run, aggregate productivity which are difficult to capture using only empirical analyses. Our model shows these aggregate effects vary widely across institutional contexts, hinting at the role of varying degree of financial market incompleteness, heterogeneous funding volumes, and firm life cycle focus as potential explainations for the mixed empirical literature.[25]

[22]Our theoretical results resonate with the empirical findings of Cole et al. (2020), who use data on the International Financial Corporation argue "financial frictions have prevented the flow of capital from rich to poor countries, and that the persistence of impact investors' performance may rely on identifying or creating new markets that lack access to capital." However, the literature on impact investment (Cole et al. (2023), Jeffers, Lyu, and Posenau (2024), Barber, Morse, and Yasuda (2021), textcitezhang2021impact) hints that although in practice institutions such as these may be more able to target the right regions or sectors in need of capital, whether then they are able to expand the financing frontier rather than crowd-out private capital is contentious, perhaps due to political economy considerations (Dreher, Lang, and Richert (2019), Frigerio and Vandone (2020)).

[23]Our findings resonate with Howell (2017), who finds that even in the relatively financially developed US economy, government-provide grant awards to companies can alleviate financial frictions by crowding-in investments by private VCs that promote innovation. In the design of related policies, preserving a bottom-up approach is crucial (Howell et al. (2021)).

[24]Our work corroborates the important of the firm life cycle when trying to understand the aggregate, a point emphasized by Krusell, Thurwachter, and Weiss (2023) and Aragoneses (2023), especially when considering financial frictions as a limit to firm growth, as in Sterk, Sedláček, and Pugsley (2021), Ottonello and Winberry (2024), and Kochen (2024).

[25]The model also allows us to learn about inter-firm spillovers (in our model happening through factor prices and the endogenous funding "gaps") and let's us understand the distributional consequences through wealth inequality. We are currently exploring these and other angles with the model.

2 Institutional Setting & Data Sources

We describe data on the European private equity market and public investment in it.

2.1 Institutional Setting

We highlight 30-40% of new VC funds in Europe originate from government agencies.

European Private Capital Markets. In 2024, Mario Draghi published a report highlighting weaknesses in EU business dynamism, private investment, and productivity partly linked to a weakness of private equity markets.[26] European private capital 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: (a) a lack of risk capital supply for firms with good long term projects to invest, (b) a lack sufficiently good projects that require long-term risk finance perhaps due to the lack of supply, and (c) that the lack of later-stage financing discourages the creation of firms with growth perspectives.

Government Investment via the European Investment Fund (EIF). We document government agencies account for 30–40% of new VC investment in Europe, with the European Investment Fund (EIF) emerging as one of the largest players. As part of the European Investment Bank Group, the EIF operates under both financial and policy mandates to expand access to risk capital, particularly for SMEs. It invests indirectly through intermediaries—VC and PE funds, banks, and other financial institutions—allowing it to reach firms across all stages of development. This indirect model enables broad coverage of the innovation lifecycle, from early-stage to growth-phase firms. Other more direct or national investment initiatives (e.g., the European Innovation Council (EIC) or Bpifrance) are discussed in the Appendix.

[26] Draghi (2024). The report brought back to light unsolved issues that had been discussed ten year earlier by a World Economic Forum report World Economic Forum (2014)

2.2 Data Sources

We build a dataset on VC/PE backed European firms invested on by the government.

Reports on Government PE and VC Investment Portfolios. We digitized the European Investment Fund's (EIF) annual reports to obtain fund-level data on equity allocations, including recipient fund names and annual capital commitments. These equity investments—distinct from EIF loans or guarantees—have grown substantially over time: the EIF's annual equity allocation exceeded €5.6 billion in 2023, up from near-zero levels in the late 1990s (see Appendix).[27] The EIF's scale is comparable to major private investors: SoftBank invested approximately €4.8 billionglobally in 2023. It also exceeds the combined European investments of the top five sovereign wealth funds, the largest being Singapore's GIC, which invested €1.9 billion in Europe in 2024.[28]

Deal-Level Data from Private Equity and Venture Capital Markets. PitchBook provides detailed information on private equity and venture capital transactions, including deal date, company characteristics, investors, and deal size. We link this data to EIF investments through a two-step matching procedure based on fund names from EIF annual reports. This allows us to identify deals involving EIF-backed funds and compare them to purely private investments. The Appendix presents descriptive statistics on EIF-backed activity, and we benchmark our micro-level data against macro-level aggregates from an independent EU industry association.[29]

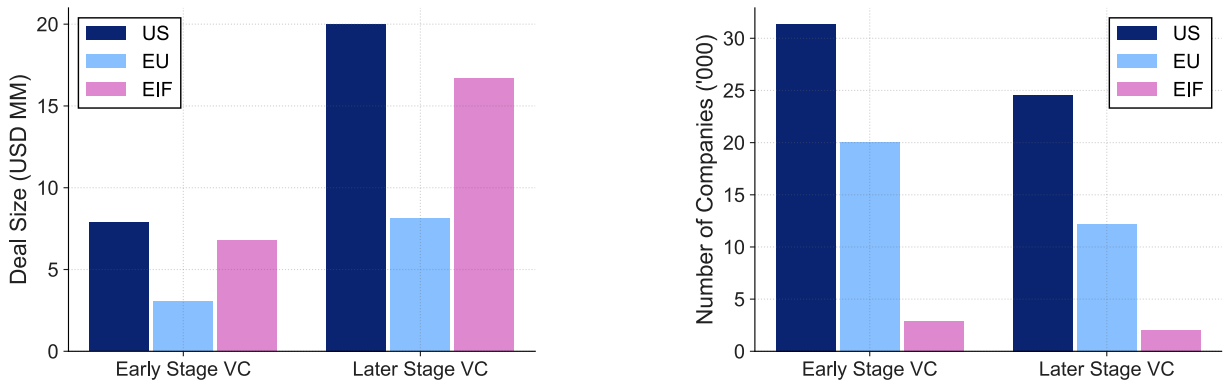
Micro and Macro Data on European Firms. Orbis provides panel data on European firms, including financials (sales, profits, assets, debt) and firm characteristics (age, size, employment, industry). To track firm outcomes before and after EIF-backed investments,

[27] This last year, total government agency commitments to PE in Europe were estimated at €8.3 billion, implying that the EIF accounted for a substantial share.

[28] We also digitized data on the European Innovation Council (EIC) using government records and Dealroom, but report these separately in the Appendix since they are of smaller scale due to their distinct investment model.

[29] We have also produced results based on CrunchBase, Dealroom, and Preqin, which are in the Appendix; we have these sources to be of lower quality relative to Pitchbook in terms of matching ratios observed in the European independent industry reports relative to Pitchbook.

Figure 1: *Size of Venture Capital Market in the US and the EU, 2010-2019*



Notes: This figure shows the number of companies funded and the average amount received by a funded firm in a year, broken down by the age of the firm. In each panel, we also show the corresponding statistic for firms in the EU which received investments from EIF-backed funds. 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.

we link Orbis to PitchBook using firm names and locations, employing advanced text-matching techniques, including LLM-based embeddings. Finally, we use Eurostat and CompNet data to match regional and sectoral characteristics of EIF investments and calibrate our model using corresponding empirical moments.

3 Empirical Facts

In this section, we document three facts about industrial policy via venture capital in Europe: (1) the magnitude of government investment directed at the short-falls of the European VC market is large and (2) its allocation is skewed towards later-stage VC investments in relatively older firms (3) despite the fact that their reduced-form impact is only strong and persistent when investing in younger firms – a group which they are particularly large source of funds.

3.1 Weak European Private Capital Market & Public Investment

The size of VC markets between the US and the EU is stark: annual VC investments make up 0.7% of GDP in the US compared to only 0.2% of GDP in the EU[30].

Fact 1. In Europe, relative to the US, fewer companies receive VC funding (especially in later-stages) *and* each firm gets less funding. European companies with the EIF as an investor feature higher average funding levels closer to the US market.

Figure 1 shows 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.[31] The former is 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 a second graph in the same figure, we show that, on average, EU firms receive only 40% of the venture capital that US firms receive across *both* early and later stages. The relative difference between early and late funding amounts is surprisingly similar EU vs US, suggesting the supply of venture capital per funded EU firm is depressed uniformly.[32]

Also in Figure 1, we highlight the number of deals funded by funds backed by the EIF and compare their average funding levels to the broader EU and US markets. While only around one out of size of EU VC deals are backed by the EIF,[33] these deals are on average closer to the US levels than the average EU deal: deals where the EIF is involved as an investor end up being twice as large on average than the average deal in Europe.[34]

[30] See (Arnold, Claveres, & Frie, 2024) 2024 IMF report. This macro-level difference also appears in micro data from PitchBook between 2010 and 2019

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

[32] 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.

[33] A proportion that seems to apply to global institutions of this kind, see Andonov, Li, and Smeets (2025)

[34] In the Appendix, we show that an even smaller share of EU VC deals are backed by the EIC, but these direct deals are significantly less well funded than those indirectly funded by 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.

We aim to evaluate the aggregate effects of this intervention.

The micro data also shows that despite the volume differences between the EU and the US, the two 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 cost structure conditional on funding not being too 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. This could indicate that while the VC industry in the two continents works similarly, in Europe there is a lower aggregate volume of funding being dedicated towards VC.[35]

EIF-backed VC funds are not only a large part of the European market, but also give increasingly larger funding amounts via-a-vis non-EIF backed funds. In the Appendix, we document the importance of the EIF in the EU's VC and PE market and how this institution's investment has evolved over time. The Appendix shows EIF-backed funds accounted for a consistently large share of 30-40% out of the aggregate supply of early- or late-stage VC since the EIF's inception in the 1990s.[36] Further, the Appendix 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.[37] 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.[38] Hence our focus on VC and away of PE.

[35]One hypothesis we test in the model is wether allowing for large entities like the government or institutional investors to pour liquidity into the VC eco-system alone, effectively finding a way to reallocate currently-trapped savings into productive investment, could improve aggregate dynamism.

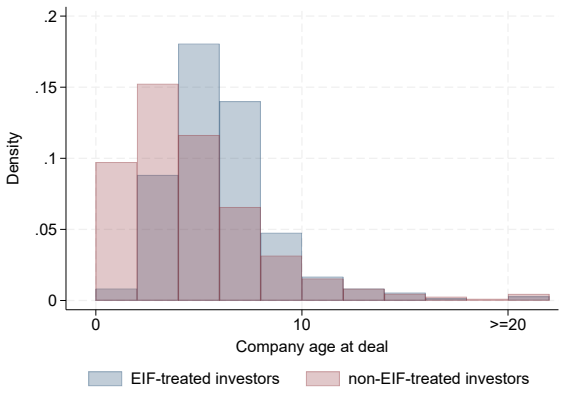
[36]While these numbers come from our EIF-Pitchbook linked sample, Figure 1 shows government agencies were the source of 37.4% of all European funding for VC in 2023 using data from an independent association in the European VC/PE industry.

[37]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.

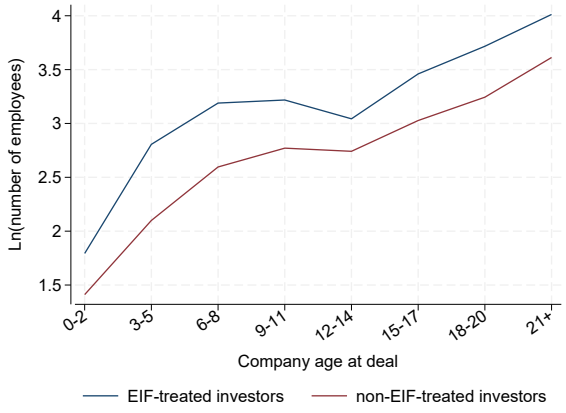
[38]Again, we do not think these numbers are unique to Pitchbook, since alternative industry reports indicate government agencies are responsible for 7.5% of PE investment money in Europe in 2023.

Figure 2: *Share of EU Firms Funded by Age & Size | EIF vs. Market*

(a) *Allocation by Firm Age*



(b) *Allocation by Size given Age*



Notes: This figure shows the share of firms in each age bracket that received fundings from EIF-backed funds and non-EIF-backed funds; it also shows size conditional on age. Results are weighted by deal size to describe where the money goes. The data are from PitchBook for the period 2010-2019.

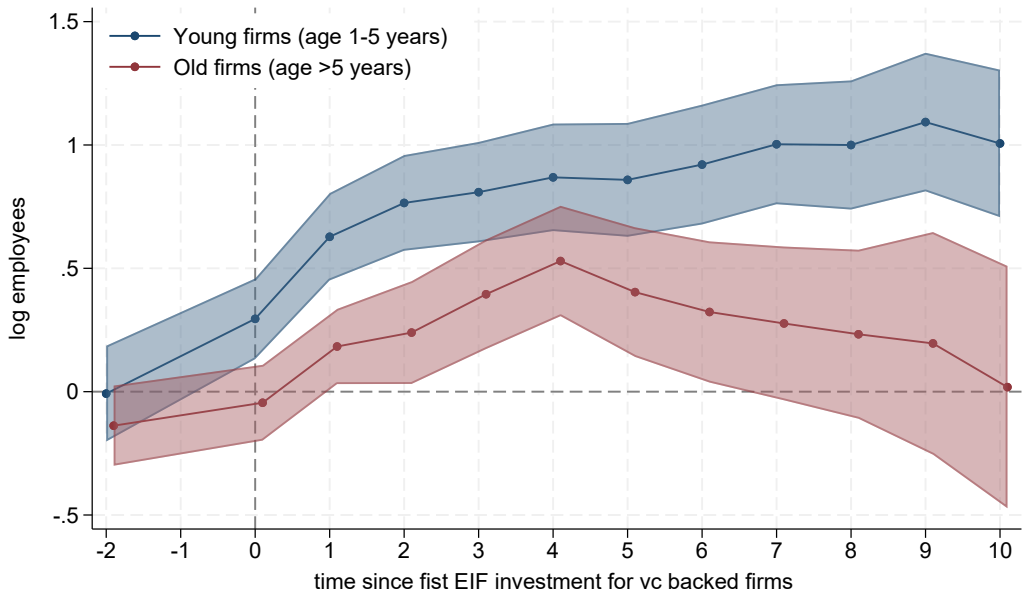
3.2 The Allocation of EIF Funds across Heterogeneous Firms

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

Fact 2. Relative to the rest of the market, EIF-backed VC funds end up investing in *older* firms. They also tend to invest in larger firms relative to the market, especially when investing in young firms in the early-stage.

In Figure 2, we show that firms backed by EIF-linked venture capital tend to be older at the time of the deal than those backed by non-EIF investors. In the Appendix, we also show the their of the budget allocated to each fund declines with the share of young portfolio companies in the fund (based on age at the time of the firm deal). However, we also observe EIF-backed firms are also systematically larger conditional on age, with this size-bias being seemingly stronger when investing in younger firms. Figure 2 confirms this using employee-based size brackets: EIF-backed funds allocate a greater share of capital to larger firms, but this bias is most pronounced in early-stage investments.

Figure 3: *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.

In the Appendix, we show that EIF-backed firms account for nearly 30% of all employees at VC-backed firms in the EU, despite representing less than 20% of such firms. The disparity is more pronounced in specific firm categories: among early-stage VC-backed firms with 20–249 employees, EIF-backed firms represent roughly 40% of total employment. These patterns suggest that while the EIF does invest in older, larger firms, its role is especially significant for younger, larger firms.

3.3 Firm Dynamics Post VC Investment

We examine the dynamic firm-level effects of indirect public venture financing in the EU, focusing on EIF-backed firms relative to matched peers. We run a stacked (staggered) differences-in-differences specification on Orbis employment data, we define treatment

by the timing of first EIF-linked investment. [39] Controls are selected via Propensity Score Matching based on observables like firm age, size, sector, and financial ratios, following standard practices in the private equity literature. We confirm parallel trends but treat our estimates as suggestive due to potential spillover effects.

Fact 3. EIF-backed firms experience strong, persistent post-investment growth when investing in young firms and no persistent effect when investing in the old.

Figure 3 show EIF funding via private VC intermediaries significantly improves post-investment firm performance—especially when directed at young firms in the early-stages. These effects are persistent and robust across outcomes (e.g., revenue, valuation, productivity) and datasets (Orbis and Pitchbook). In contrast, late-stage investments in older firms yield muted and short-lived gains.[40] Regardless of age, we observe a slightly statistically significant, but small, over-performance of firms financed by an EIF-linked VC relative to those financed by the rest of the private venture market, which we attribute to the higher EIF funding amounts documented above.[41]

3.4 Take-aways from the Data for the Model

The government-led EIF has aimed at expanding the aggregate supply of venture capital with the hope to close European funding gaps, effectively trying to undo the facts that fewer European companies receive VC funding and VC-backed firms get less funding

[39]
$$y_{ict} = \alpha_i + \alpha_t + \sum_{-L \leq t-c < -1} \beta_k^{\text{pre}} \, x_{i,c,t}^{\{c=t-E_i\}} + \sum_{0 \leq t-c \leq F} \beta_k^{\text{post}} \, x_{i,c,t}^{\{c=t-E_i\}} + X'_{ist}\theta + \epsilon_{it}$$

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

[41] In the Appendix, we compare 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 choose firms. Venture investments directly chosen by the government also 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.

volumes relative to the US. EIF-backed firms — similar to other VC-backed firms – experience positive and persistent post-investment growth only if investments take place when firms are young. Given the outsized impact on young firms one might expect policy to prioritize funds focused on early-stages, especially given how important the EIF has become in the financing of relatively large, young firms.

In practice, however, there is a puzzle: EIF backs funds that disproportionately target older firms relative to the broader VC market. We conducted qualitative interviews with European policymakers behind the EIF that indicate there is an intentional priority on supporting later-stage "scale-ups" over early-stage "start-ups".[42]

Below we present a structural model where an institutional investor (the EIF) allocates equity investments to funds mandated to target different stages of the firm life cycle. In the model, whether the EIF wants to target early- or later-stages depends on the degree of financial frictions. When investing in regions with underdeveloped financial markets or high-tech sectors with difficult to collateralize assets, targeting some later-stage investments is not only not a bad idea, but it actually improves aggregate productivity relative to going all-in on early-stage investments.

4 Model

We develop an equilibrium firm dynamics model of venture finance with heterogeneous workers, entrepreneurs, and funds. Workers with business ideas may become entrepreneurs facing borrowing constraints they can partially overcome by equity investments from VC funds. VC funds, which specialize in different stages of the firm life cycle, intermediate money from an institutional investor. This investor, which could be the government, allocates a limited budget across funds with different mandates, shifting the supply of equity supply across different life cycle stages.

[42]This policy stance is rooted in the belief that later-stage gaps are larger—which we observe in the disproportionately smaller number of VC-backed later-stage firms vs early-stage ones.

4.1 Setup

Time is discrete, and the horizon is infinite. The model features three types of agents: workers, entrepreneurs, and funds.

Workers. Workers and entrepreneurs have some stock of assets a and productivity z, and derive utility $u(c)$ over consumption c. Workers gain the option to run a firm with probability ζ (exogenous for now). With some probability ϕ_0, they receive seed funding F_0 from VC markets which adds to their stock of next period's assets. ϕ_0 and F_0 are endogenous objects that will depend on the aggregate supply available for seed funding new entrants. Once funded, the state variable f' will track the funding history.[43]

Workers' value function subject to a budget constraint

$$\begin{aligned} v^w(z,a) &= \max u(c) + \beta(1-\zeta)\ \mathbb{E}_{z'|z}\left[v^w(z',a')\right] \\ &+ \beta\zeta\ (1-\phi_0)\ \mathbb{E}_{z'|z}\, v_0^e(z',a',0) \\ &+ \beta\zeta\ \phi_0\ \mathbb{E}_{z'|z}\, v_0^e(z',a'+F_0,f') \\ c &= wh(z) + (1+r)a - a' \end{aligned}$$

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.

Entrepreneurs. After entry, entrepreneurs will face different life-cycle stages, g[44]. $v_g^e(z,a,f)$ is the value function of a firm owned by an entrepreneur, and it depends on whether the firm has been funded in the past or not, given by status f; if the entrepreneur is unfunded, then $f=0$. Once the business idea arrives, with some probability η (exogenous for now), the entrepreneur continues to operate the firm, and with some probability $1-\eta$, the entrepreneur loses their business idea and the option to run their business, and becomes a regular worker.

[43] This state will determine the share of equity in the firm given up to outsiders by the entrepreneur.
[44] which could be firm age or coarser stage classifications

With some probability ϕ_g, it receives later-stage financing F_g from VC markets which depends on the stage at which they are in. Note that follow-on funding is allowed. The value function is given by the following subject to the budget constraint which incorporates the option of not operating the firm at no cost while retaining the idea.[45]

$$\begin{aligned} v^e_{g_}(z,a,f) = &\max u(c) + \beta(1-\eta)\,\mathbb{E}_{z'|z}\left[v^w(z',a')\right] \\ &+ \quad \beta\eta\,(1-\phi_g)\;\mathbb{E}_{z'|z}\,v^e_g(z',a',f) \\ &+ \quad \beta\eta\,\phi_g\;\mathbb{E}_{z'|z}\,v^e_g(z',a'+F_g,f') \\ c \;= &\max\left[\pi(z,a,f), wh(z)\right] + (1+r)a - a' \end{aligned}$$

where $\pi(z,a,f)$ denotes profits from operating a firm with funding status f with productivity z and asset holdings a. Profits from operating a firm with funding status f are given by a function given a collateral constraint

$$\pi(z,a,f) = (1-\tau(f)) \max_{l,k}\left[y\,(z,l,k) - w\ell - (r+\delta)\,k\right]$$

$$\text{such that} \quad k \leq \lambda a$$

where k and ℓ are the capital and labor inputs, respectively, τ is the share of firm owned by VCs in exchange for equity finance, 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 λ.[46]

VC funding allows the most productive entrepreneurs to reach a level of assets that gets them in equal footing to compete with their wealthy counterparts that have a business idea of much lower quality.

[45] This allows for situations where the entrepreneur has effectively sold the entire business or situations where a is so low that the entrepreneur does not find profitable to work on the firm at all.

[46] In the appendix, we allow this parameter to be a function of firms' states such as g, for example, if older firms have less strict borrowing constraints due to reputation built.

Funds. Large institutions like the EIF allocate an exogenous flow spending G across different funds, and often seek to invest in funds with very specific and fixed mandates often determined by the different "pockets" where their budget comes from. [47]

We model $\mathcal{J}$ VC funds indexed by j in the economy which differ in the groups of firms g in which they focus. While these groups later include regions or sectors where the EIF needs to spend specific budget "pockets", for now we focus on different life-cycle stages.[48] Only constrained firms with positive financing needs will seek to be equity financed. Let N_g^c is the mass of constrained firms of type g[49].

Funds also differ in their scale and the number of portfolio companies in which they can invest in every period n_j. Each fund j needs to follow a pre-specify mandate X_{jg}

$$X_{jg} = \phi_{jg} \cdot N_g^c / n_j$$

where ϕ_{jg} is the probability that fund j funds firms of type g. Consistent with the data, funds may allocate to multiple groups with different weights. We use the matrix $\mathbf{X}$ to define the network of $\mathcal{J}$ funds to groups $\mathcal{G}$. Given these probabilities determined by the funds' mandates, constrained entrepreneurs will match funds with probability: $\phi_g = 1 - \prod_j (1 - \phi_{jg})$.

The amount firms can raise will depend on their idiosyncratic funding needs as well as the overall supply of equity which will be affected by the mandates of funds in which a large institutional investor, such as the EIF, invest an exogenous budget.

[47] For example, one of the recent calls for interest from the EIF for VC funds operating in Slovenia states: *"The investment strategy shall be focused on innovative early stage companies with high growth potential. The Fund shall mainly focus on early stage initial investments and have the potential to follow-on in the next round. However, it could also allocate a small share of the Fund size to initial investments into "Series B" or "Series C" rounds provided appropriate opportunities occur."* Source: Call for Expression of Interest to select a financial intermediary to be funded within the scope of the Slovene Equity Growth Investment Programme (SEGIP)

[48] For example, coarse groupings such as early or later stage, or fine as Series B or Series C as in the Slovenian example above

[49] For example, the number of financially constrained firms in Slovenia seeking early stage funding. This is an endogenous object that depends on the underlying distribution of firms of different g and whether they are financially constrained given their z, a: $N_g^c = \int 1[k^*(z) \geq k(a)] dD_g(z, a, f)$

Absent financing constraints, $k^*(z)$ would be the optimal capital choice of a firm with ability z. Let $F^*(z,a)$ be the external financing needs of an entrepreneur with ability z and assets a. Given the constraint:

$$F^*(z,a) = \max\{0, k^*(z) - k(a)\}/\lambda$$

Let $\bar{F}_g$ be the average funding "gap" for the N_g^c constrained firms of type g:

$$\bar{F}_g = \int F^*(z,a) \cdot dD_g(z,a,f)/N_g^c$$

Each fund receives share s_j of the institutional investor's budget

$$B_j = s_j(\mathbf{X}) \cdot G$$

Funding firms raise depends on two factors: (1) firms' financing needs at the micro level F^* and (2) funds' financing capacity towards stage g at the macro level ω_g.[50]

$$F_g(z,a) \quad = \quad \omega_g \cdot F^*(z,a)$$

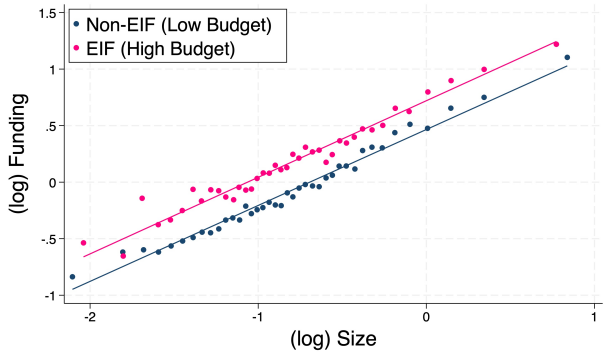
Letting $\mathbf{f} = \{\bar{F}_g\}_{\forall g}$ be the set of endogenous funding gaps across groups (i.e. life-cycle stages, sectors, regions), we can define ω_g as the funding capacity that depends on the mandates across funds with different g specialization and the overall budget G.

[50] ω_g reflects that funds must allocate budgets according to pre-specified mandates:

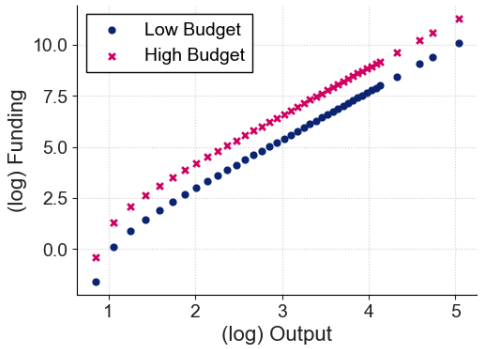
$$B_j = \sum_g \phi_{jg} \cdot F_{jg}$$

Figure 4: *Average Funding of EIF-backed Firms is Higher given Firm Size*

(a) *Data*



(b) *Model*



Notes: This figure shows both in the data and in the model, firms funded by an EIF-linked investor receive higher average funding amounts independently of their size; we view the higher intercept as the average ω_g. First, using PitchBook from 2010-2019, it shows the average funding per firm (deal sizes) as a function of firm size for EIF v.s. non-EIF backed firms in a binscatter plot residualizes age, sector, and region; a similar pattern hold unconditionally. Underlying this is that funds backed that the EIF are larger in terms of funding, giving more money per firm.

$$\omega_g := \omega_g\left(\mathbf{X}, \mathbf{f}, G\right) \quad \propto \quad \sum_j \frac{X_{jg} \cdot \left[s_j(\mathbf{X}) \cdot G\right]}{\sum_g X_{jg} \cdot \bar{F}_g}, \quad \forall g$$

In the model, a higher budget G translates into higher funding amounts through ω_g independently of the firms' idiosyncratic funding needs determined by z, a. In the data, we indeed see *EIF-backed firms raise more money independently of firm size*. In Figure 4, we highlight *how* deal size increases with firm size for EIF and non-EIF linked firms, discussing the similar slope versus the different intercept in this relation. Surprisingly, regardless of whether the fund is linked to the EIF or not, deal size tracks firm size in the same fashion, indicating both types of investors are equally able to allocate relatively more money to firms that likely have higher productivity z. However, EIF-linked funds allocate larger funding amounts to firms on average, and thus, EIF-backed firms command a funding premium independent of firm size.

Table 1: *Externally Calibrated Parameters*

Parameter	Description	Value
η	Pr(Firm Lose Idea)	8%
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	2
ν	Returns to scale	0.8
$1-\tau$	Insider share per round	0.85
γ	Productivity persistence	0.8
$\underline{z}$	Pareto Min Productivity	1.11

Equilibrium. We solve for w and r clearing labor and capital markets.

$$\int h(z) \cdot D_w(z,a) + \sum_g \int h(z) \cdot D_g^e(z,a,f) = L_c + \sum_g \int l(z) \cdot D_g^e(z,a,f)$$
$$\int aD_w(z,a) + \sum_g \int aD_g^e(z,a,f) = K_c + \sum_g \int k(z,a) D_g^e(z,a,f)$$

G enters directly in goods markets clearing, by Walras Law, and indirectly through it's effect on the asset distribution of funded firms and equilibrium prices. Further, we solve for a fixed point on "financing gaps" investors take as given, which determines $\omega_g(\mathbf{X}, \mathbf{f}, G)$, which depends on endogenous firm policies and the distributions. We add a competitive representative public firm (a "corporation") with a constant return to scale technology given by $Y_c = Z_c K_c^{\alpha} L_c^{1-\alpha}$. Details will be in the Appendix.

4.2 Calibration

We consider a baseline European economy without industrial policy $G = 0$.

Table 2: *Internally Calibrated Parameters*

Parameter	Description	Value	Moment	Model	Data
λ	Borrowing Const.	2.686	Debt/Assets Ratio	48.4%	48.5%
ζ	Pr(Worker has Idea)	0.009	% of Young Firm	37.7%	35%
η_z	Pareto Tail Prod.	3.289	Employment % at Young	20.9%	20%
X	Mandate Matrix J x G	$[0,1]$	% Firms Funded by Age	[0,1]	[0,1]
s_j	Fund Portfolio Shares	$[0,1]$	% Funding by Stage	[0,1]	[0,1]

Tables 1 and 2 present the parametrization of the model.[51] 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

$$y(z,l,k) = z \cdot Z_e \cdot \left(k^{\alpha} l^{1-\alpha}\right)^{\nu}$$

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: $M = \frac{\eta_z}{\eta_z - \frac{1}{1-\nu}}$.

[51] We use a Nelder-Mead Simulated Method of Moments (SMM) algorithm to calibrate the model. We internally calibrate the parameters of the productivity process and the borrowing constraint to make the model match data moments of the firm age distribution of economic activity and leverage.

Skill Dynamics. z evolves according to a law of motion with γ persistence

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

$\mathcal{P}$ is a Pareto distribution with scale parameter z_{min}, shape parameter η_z, and density

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

Standard targeted moments. The model reproduces well 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. We also match aggregate leverage.

Novel fund parameterization. For now, estimate parameters for the fund of funds from the data. We first fix a set of characteristics for each fund, e.g. X_{j0} share of investments into early stages (pre-seed, seed, and Series A) made by a fund 8 years after the EIF's investment. We choose 8 because that is the typical life-cycle of a fund accounting for time raising money. We then estimate $s_j(X)$ from the data on the portfolio shares of the EIF across different funds with different stage preferences.

Equity share parametrization. For now, we choose something simple: every time a firm gets equity funded through follow-on investments, it must give up a share of it's equity, so $1 - \tau(f) = (1-\tau)^f$. We calibrate this so that after 5 times founded ($f = 5$ is the maximum we allow) the entrepreneur retains 44% of the equity in the company.[52]

[52]We are working on a version where $\tau(f) = f$, i.e. where we keep track of only the equity share given

5 Industrial Policy via Venture Capital Counterfactuals

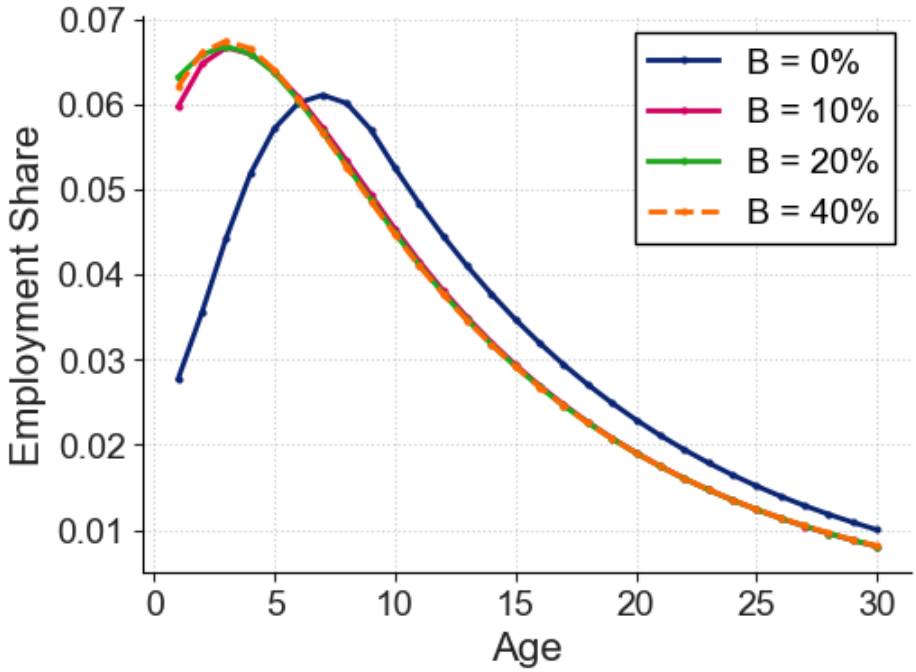
Armed with our calibrated model, we now turn to evaluating industrial policy in which governments investment is intermediated via private venture capital funds. We examine the long-run aggregate productivity and distributional effects of expanding and reallocating the supply of venture capital via such government investment. We highlight key results from our simulations, redoing all our analyses for different levels of financial market imperfections, captured by varying parameter λ. We contrast results for the European average as a whole to markets with high financing frictions which we view as present in less financially developed countries or sectors where assets cannot be collateralized well or risky cashflows are far in the future.

First, we do a "Big Push" counterfactual, where we increase budget-financed spending $G = B$ by different amounts given the allocation $s_j(X)$ which we hold at the calibrated current investment portfolio in the data. This is motivated by proposals in Draghi (2024) which argues for public spending to lead a "Big Push".[53] Second, we do a "Reallocating budget" counterfactual, where for any budget G we change the allocation $s_j(X)$ focusing on a shift in early versus late-stage focus via X_{j0}. This is motivated by the proposal in Fuest et al. (2024) who argue that the current allocation of funds is too skewed towards older firms. Third, we do a "Big Push" while "Reallocating budget" counterfactual where we increase spending while reallocating its stage target.

up, which we re-calculate in every round of financing based on the share of equity given up that makes the entrepreneur indifference between raising or not.

[53] We perform counterfactuals relative to a baseline economy without such policy in place which could be thought of as the period prior to the mid-1990s before the EIF existed. One can view the pre 2010 as a period with less funding capacity where the EIF committed a relatively modest amount of about 500 million euros per year on average to equity investments mainly through VC funds. One can also view the post-2010 as a period of higher funding capacity where the funding of the EIF has rise to over 5 billion euros per year. However, since the 2027 budget is currently being discussed with the potential to consolidate the size of the EIF amidst fiscal tensions in Europe, one can view our low vs high budget counterfactuals as letting the EIF manages the budget from other entities like the EIC, shifting resources from direct to indirect industrial policy.

Figure 5: *Employment Share by Age*



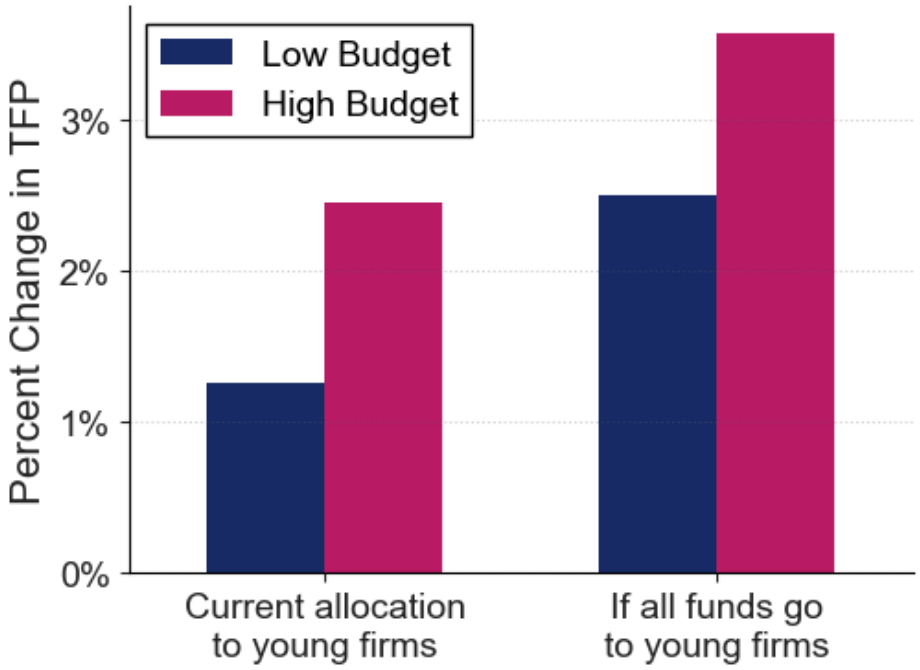
Notes: This figure shows employment share by firm age under different budgets $B = G$.

5.1 Increasing versus Reallocating Spending

Given the asset-based borrowing constraint, young firms that have not yet had the time to accumulate assets are more likely to be constrained than older firms. As a direct consequence of the expansion of venture capital supply, even when relatively biased towards later-stages, the borrowing constraint of young firms is relaxed too, allowing them to expand relative to the baseline scenario. Figure 5 shows an indirect shift in the distribution of economic activity towards young firms. Directly re-allocating the age composition of investments towards young firms further amplifies this effect. Note these policies help undo the pattern that European economic activity has reallocated away from young firms, as documented in Biondi et al. (2023).

Figure 6 shows the aggregate productivity (TFP) effects of industrial policies at the baseline calibration. Consistent with our previous discussion, keeping the current al-

Figure 6: *Changing Spending vs Allocation of Industrial Policy via Venture Capital*

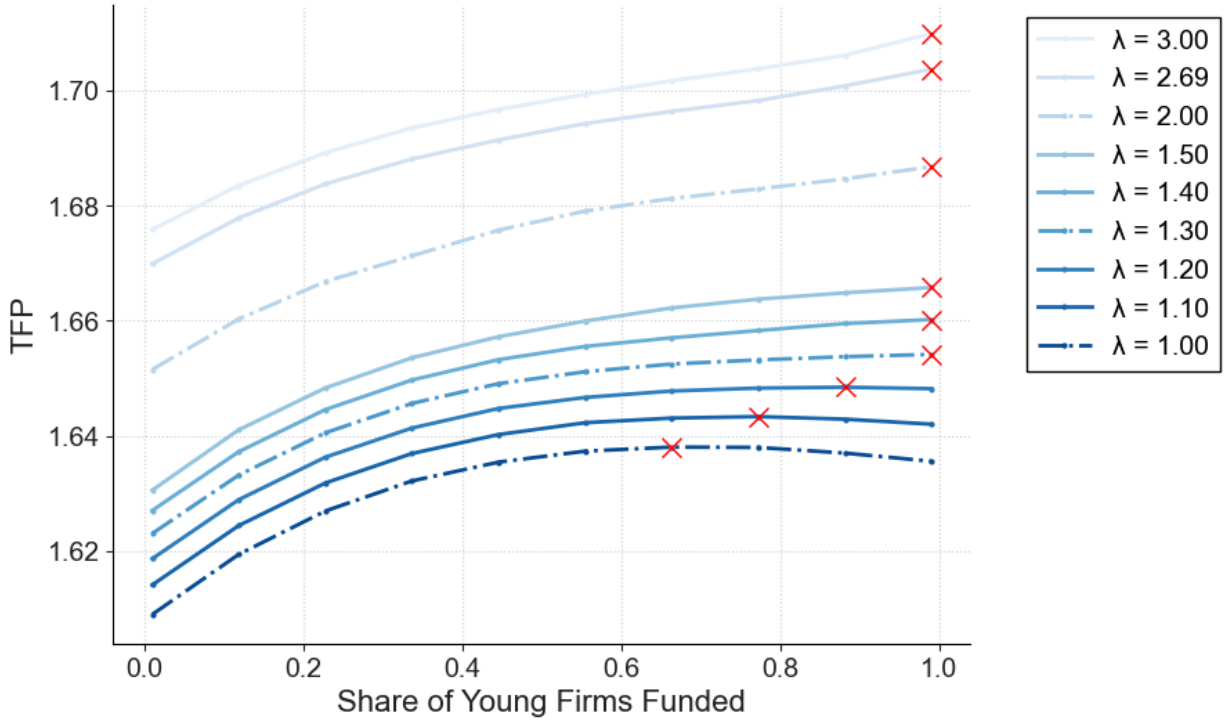


Notes: This figure shows model counterfactuals of changes in the budget for industrial policy via venture capital and changes in the allocation of funding across funds of different life cycle stage focus at the baseline calibration.

location but doubling the amount of spending performing a "Big Push" doubles the TFP gains from 1.25% to 2.5% relative to baseline.[54] Surprisingly, "reallocating budget" towards early-stages but keeping the total amount spent constant produces aggregate effects of the same magnitude.[55] Thus, this indicates that in the baseline calibration for the European economy, it would be more cost-effective to reallocate the current budget of industrial policy via venture capital to early-stage investments before continuing to increase it. Doubling spending when reallocating towards early-stages triples its effects.

[54] In the graph, this corresponds to High Budget + Current allocation to young firms
[55] In the graph, this corresponds to: Low Budget + If all funds go to young firms

Figure 7: *Aggregate Productivity*



Notes: This figure shows simulations of aggregate productivity as a function of the share of young firms financed, the early-stage mandate X_{j0}, for different degrees of financial frictions λ.

5.2 Industrial Policy via VC and Financial Market Imperfections

In the baseline calibration, with mild financial imperfections, the strongest benefits come from the reallocation of investment towards early-stages. In markets with more financial imperfections, the productivity impacts of reallocating investment towards younger firms gets muted and provide a rationale towards focusing on more mature "scale-ups".

Figure 7 plots aggregate TFP in economies with different degrees of financing constraints and allocations to early-stage investment (for a given budget).[56] The figure highlights again that in economies with relatively high λ, such as in our baseline calibration, policies that go "all in" towards early-stage investing maximize aggregate TFP.

[56]Higher λ improves aggregate productivity a la Midrigan and Xu (2014).

However, Figure 7 shows that as the degree of financing frictions increases, focusing resources on later-stage financing to some degree is beneficial for aggregate productivity. Indeed, in extreme cases where $\lambda = 1$, there is a hump-shape relation between how much young firms are targeted and aggregate TFP. This may justify why we see a substantial amount of funding being directed towards the later-stages, i.e. "scale-ups".

A central contribution of our paper is to identify the existence of this share and the hump-shaped relation between the share of young firms financed and aggregate productivity that appears in markets where financial frictions. Our model implies a form of "fiscal policy rule" of sorts for the conduct of industrial policy via venture capital. This rule, meant to maximize aggregate productivity, prescribes to vary the allocation of funds targeted towards early or laters-stage VC as a function of the degree of financial frictions of the different segmented sectors and regions in which investors operate. Beyond a certain threshold of financial market imperfections, targeting exclusively early-stage investments maximizes aggregate productivity.

Figure 7A in the appendix revisits the example above with a lower λ. It shows that the aggregate TFP effects of investing markets where bank financing is more difficult (where misallocation and marginal revenue products of capital are the highest) are 2.5x higher than in more developed markets even at the baseline allocation and low budget.[57] However, further expansions in the supply of venture capital in less financially developed markets and reallocation towards younger firms may yield muted increases in aggregate TFP (or even declines) that might not justify the cost of this fiscal expansion. Surprisingly, the improvements in aggregate TFP that come as a result of increasing budget and reallocating towards the young may be much larger in more developed financial markets. A "Big Push" that also "reallocates budget" towards the early-stages improves the TFP gains in financially developed markets by nearly 3x (from 1.25% to 3.5%) while in developing financial markets by 1.33x.

[57] This is consistent with the empirical findings in Andonov, Li, and Smeets (2025) comparing developed and developing countries globally.

5.3 Discussion of Some Preliminary Policy Implications

Industrial policy via venture capital can improve aggregate productivity. However, our model shows the optimal investment allocation across VC funds — specialized in different stages, sectors, or regions — depends on degree of financial market imperfections. To reap the full benefits of a "Big Push" in markets with milder financial frictions one needs to reallocate funds towards early-stage VC first before increasing them. Starting to invest in previously untapped markets with underdeveloped financial markets can yield large effects, but supporting later-stage VC there is necessary.

Reallocate Funds First Before Increasing Them in Developed Markets. In financially developed economies, like the European average, it is more cost-effective to shift existing industrial policy funds towards early-stage companies. The above counterfactuals point to the fact that even smaller investments can go a long way in less financially developed markets. In markets with less financing constraints, where a lot of the funding goes, it could indeed be more cost-effective to reallocate the current budget to early-stages before continuing to increase it. These quantitative findings are consistent with the policy proposal discussed in Fuest et al. (2024) and the reduced-form regression evidence presented in the empirical section. Altogether, they call into question whether the policy focus on "scale-ups" should be sustained in regions or sectors where borrowing is easier, as shifting allocations towards early-stage investing there would improve aggregate productivity. Indeed in our baseline calibration focusing investments precisely towards relatively productive younger firms, which are the furthest away from their optimal size, tends to deliver robust productivity increases on aggregate.

Optimal Investment Strategy Depends on Degree of Financial Market Imperfections. The ideal allocation of capital is not one-size-fits-all. In markets with significant financial frictions (e.g., less-developed regions or sectors with intangible assets), a continued focus on financing more mature "scale-ups" is justified. Importantly, our model shows that

the focus on markets with a high degree of financial frictions provides a rationale for the existing policy focus on "scale-ups" of mature firms. If policy-makers believe most markets they target have a λ closer to 1 than the one reflected in the calibration, "scale-up" financing is not a bad idea; indeed Figure 8 shows in most European countries, this form of industrial policy targets a share of young firms that is not 1.[58] The model yields conclusions that counter results from reduced-form diff-in-diff regressions because the latter are not equipped to handle the anticipation and selection effects that are crucial from a theoretical standpoint. Indeed, we find that when financial frictions are high, one needs to target later-stage financing and not just early-stages to reap the full benefits of the intervention.[59] If early-stage funds are given but these are not enough for firms to be unconstrained in later-stages, highly productive entrepreneurs are still not going to find it optimal to operate a firm that will not scale, and the effects of these interventions will be muted.[60].

Starting to Invest more Financially Imperfect Markets Yield High Effects. Even small investments can have a large impact in less-developed financial markets where capital constraints are more severe. Given the impacts relative to a baseline with no policy in markets with high financial frictions—less developed regions or sectors with more intangible assets—our model would indicate focusing resources there would be beneficial.[61] We are developing theoretical methods to identify untapped sectors (or regions) with stronger financial market imperfections where investing in funds (or helping develop a VC ecosystem) there would yield the largest improvements in aggregate productivity.[62]

[58]Except for Germany, it does not seem to be the case that in more financially developed countries the share of investment in young firms increases, something we are exploring further.

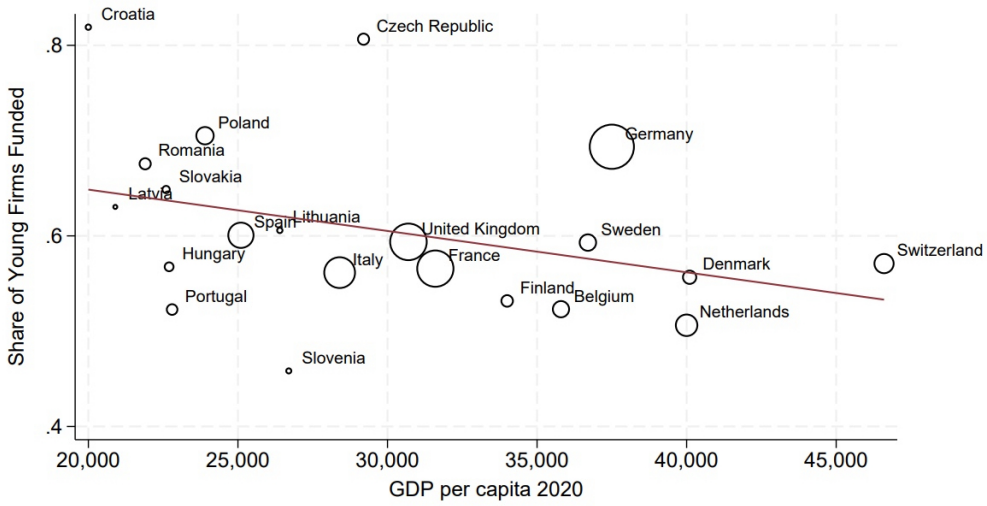
[59]We are working on identifying which sectors and regions are the ones where directing investment there yields the largest aggregate TFP effects (i.e. using survey measures of financing constraints) to understand market-specific targeting.

[60]These results might change when allowing for things like technology adoption decisions in the early stages which we are currently exploring

[61]This theoretical conclusion of our model complements the empirical findings in Andonov, Li, and Smeets (2025) who argue institutions that engage in industrial policy via venture capital is most effective in developing countries, where stronger market failures — such as frictions to access capital as we study here – leave more room for impact

[62]This echoes the call from De Haas and González-Uribe (2024) and Fuest et al. (2024) to increase investment in so called high-tech, disruptive sectors

Figure 8: *Early-stage Focus by Country GDP Per Capita*



Notes: This figure shows the relationship between the share of young firms funded by the EIF and GDP per capita of the different European countries. It weights countries by size.

A "Big Push" Can Work Well in Developed Financial Markets if Also Reallocated. If a large budget increase (a "Big Push") is fiscally possible, it can generate substantial aggregate productivity gains in developed markets, but only if the new funds are also reallocated towards early-stage companies. Whether these policies are cost effective at all and whether the government wants to do this directly through financing, or indirectly by undoing the regulations that impair large, later-stage investors is a question we leave for future iterations of this paper.[63] Our counterfactuals show that if the budget allows for a "Big Push" to be made, one might not only want to focus on the least developed markets. When properly targeting young firms, expansions of early-stage financing in more developed areas can have large aggregate effects.[64]

[63]These may relate to frictions in the integration of capital markets, taxation of exits, or other regulatory barriers that prevent flows to risk capital.

[64]There are countervailing effects of these policies we are currently exploring: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.

6 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 30-40% of the total VC investments. We rely on data on an agency, the European Investment Fund (EIF) that has become a key player in the VC market in Europe.The EIF follows an indirect approach by investing in private VC funds who then select and fund firms. The EIF has become a large source of equity capital for relatively large, young European firms, and young firms indirectly financed by the EIF experience the most positive and persistent dynamics. In contrast, the impacts of investments into older firms quickly dissipate. Despite that, the portfolio of the EIF, like the ones of many similar institutions around the globe, is skewed towards older firms away from early-stages. Why? Qualitative interviews with policymakers shows this tilt is intentional in order to boost supply of capital for more mature "scale-ups" hindered by financial frictions.

Motivated by these puzzling 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.

In this paper, we highlight the stark differences in European private capital markets relative to the US and study one industrial policy solution. 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[65]. This lack of private capital supply in the EU may have various origins we leave for future work, 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 institutions (e.g. banks) invested lower-risk assets and preventing them from reaching firms ready to invest.

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

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