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Stepping Up Venture Capital to Finance Innovation in Europe

Nathaniel Arnold, Guillaume Claveres, and Jan Frie

Under the guidance of Ashok Vir Bhatia

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Stepping Up Venture Capital to Finance Innovation in Europe
Prepared by Nathaniel Arnold, Guillaume Claveres, and Jan Frie*

Under the guidance of Ashok Vir Bhatia

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ABSTRACT: Relative to the US, productivity growth and investment in R&D in lagging in the EU, where it is more difficult to finance and scale up promising, innovative startups. Many of the most successful EU startups move elsewhere for financing, causing the EU to lose out on both the direct growth benefits and positive spillovers from these innovative firms. The EU could nurture innovative startups by accelerating the development of its venture capital (VC) ecosystem. Reducing regulatory frictions, especially ones that deter pensions funds and insurers from investing in VC, combined with well-designed tax incentives for R&D investments could help accelerate the development of the VC sector. These and other key CMU initiatives, such as the consolidation of stock markets and reforming and harmonizing insolvency regimes, will take time. Given the urgency to boost innovation, giving public financial institutions like the European Investment Fund a more active and expanded role in kickstarting VC markets where needed and in familiarizing investors with the VC asset class can be a helpful interim step.

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Contents

Summary	3
I. Introduction	4
II. The Economic Effects of Venture Capital	6
III. Startup Financing Stages and the Ecosystem	7
Startup Financing Stages	7
The Startup Financing Ecosystem	8
IV. The State of Venture Capital in the EU	10
V. Some Practical Reform Proposals	12
Reforms at the National Level	13
Reforms to Common EU Policies	15
VI. Conclusion	17
Figures	18
Annex I. Key Players in the VC Ecosystem	29
Annex II. Key EU Legislation and Regulations Relevant to VC Financing	31
European Venture Capital Fund Regulation (EuVECA)	31
Alternative Investment Fund Managers Directive (AIFMD)	31
Solvency II Directive	32
Institutions for Occupational Retirement Provision Directive (IORP II)	32
Annex III. Description of Data	34
References	35

Summary

The EU's underdeveloped venture capital (VC) industry holds back productivity and growth. VC investments in the EU averaged 0.3 percent of GDP per year over the last decade, less than one-third of the US average, with US VC funds raising \$800 billion more than EU VC funds to invest in innovative startups.

The positive effects of VC transmit to the broader economy through several channels. VC firms bring not only financing, but knowledge, advice, and professional networks. When this gives rise to fast-growing, innovative “superstar” firms, the contribution to aggregate job creation and growth can be disproportionate through the diffusion of ideas and other positive externalities. Through better entry-exit dynamics and better firm selection, VC can improve resource allocation. This supports innovation and productivity.

Without a dynamic VC ecosystem, Europe cannot harvest such benefits to their fullest. The ecosystem requires knowledge, risk appetite, scale, and patience, bringing together angel investors, startup incubators, and VC firms, in turn raising capital from different types of investors with long investment horizons.

The bank-based structure of the EU's financial system is one factor behind the relatively low volume of startup funding. Banks are not well suited to financing high-tech startups given the limited tangible collateral on offer, the poor fit of bank risk models and debt-service and loan-maturity requirements to fast growing but initially unprofitable firms, and regulatory and supervisory factors that do not favor risky exposures.

Another hurdle is the national fragmentation of the EU's economic and financial system. Frictions in the single market for goods, services, labor, and capital impose barriers on startups seeking to grow. Home bias in asset allocations as well as regulatory, legal, and tax issues limit cross-border activity and consolidation, reduce private risk sharing, and impede the formation of the deeper pools of capital and more liquid markets needed to support VC. Funding constraints leave the EU with fewer and smaller VC funds than the United States, and “exit” options for successful startups through initial public offerings (IPOs) or acquisitions are similarly constrained. The result: many fast-growing EU startups fundraise abroad, and then move.

Actions can and should be taken at the national level to support the VC industry. Preferential tax treatments for equity investments in startups and VC funds can help kickstart VC where it lags, and there is potential for national public financial institutions (PFIs) to do more to help develop the VC ecosystem. In both cases, schemes must be carefully designed—PFIs, for instance, should invest on commercial terms and aim to crowd-in private capital, especially from institutional investors such as pension funds and insurers. Reducing regulatory and tax frictions and developing private and pillar II pension funds could also expand capital pools.

There is also important scope to improve policies and tools at the EU level. The first-best solution to increasing innovation would be to further integrate and deepen the single market, but this will take time. Fine-tuning rules for larger VC funds as well as for insurers to invest in them would also help, especially to support growth financing. Reducing stock market fragmentation—a key part of the Capital Markets Union (CMU) agenda—seems more challenging politically, but remains essential. In the near term, expanding the capacity and instruments of the European Investment Fund (EIF) and the European Investment Bank (EIB) could help channel more resources to VC growth funds. The EIF, in particular, could develop funds-of-funds aimed at bringing EU institutional investors into cross-border financings of large VC funds with a pan-EU focus.

I. Introduction

1. Frictions in the single market for good, services, labor, and capital make it more costly and complex for EU firms to scale up.

While the EU has achieved considerable economic integration between member countries, the single market is still far from complete. Several studies find significantly higher barriers to trade in goods across national borders within the EU than within countries ([Comerford and Rodriguez Mora 2019](#); [Gallego and Llano 2015](#); [Santamaria et al. 2024](#)). Integration in services is even lower (Figure 1). Labor mobility is much lower than in the US, while the estimated cost of moving between EU countries is significantly higher than moving between US states ([Head and Mayer 2021](#)). Financial integration is also far from complete (see below). Likely reflecting barriers for scaling up, the distribution of firms is weighted more towards small and medium enterprises (SMEs) than in the United States (Figure 2). This is particularly problematic when it comes to firms at the technological frontier, those with the greatest growth potential. As a result, the EU only accounts for 10 percent of the world's top high-tech companies by market capitalization (Figure 3).

2. Europe's limited capacity to grow innovative firms is a drag on productivity. Several studies find that innovative, young fast-growing firms that go on to be “superstars” contribute disproportionately to aggregate jobs and growth ([Rosen 1981](#); [Haltiwanger et al. 2013](#); [Adelino et al. 2017](#); [Autor et al. 2020](#)). Such firms typically invest heavily in R&D and ICT, two key areas where the EU lags significantly behind the United States (Figure 4a). One report attributes about 70 percent of the transatlantic gap in R&D to the US lead in “tech-creating industries” ([McKinsey Global Institute 2022](#)). All of this contributes to Europe trailing behind the United States in aggregate productivity, with real output per hour worked 26 percentage points lower in the EU than if it had evolved in line with US productivity since 2000 (Figure 4b; [Gordon and Sayed 2020](#); [Schivardi and Schmitz 2020](#)). As we explain below, the economic and financial market fragmentation within the EU underlie many of the challenges Europe has in financing and scaling up innovative startups.

3. The structure of the European financial system, dominated by banks, contributes to this financing problem (Figure 5). European households generally exhibit greater risk aversion than US households ([Bekhtiar et al., 2019](#)). This is one factor behind why they place a much larger proportion of their savings in bank deposits and a much lower proportion in equities, investment funds, and private pension schemes (Figure 6a). Partly as a consequence, the nonfinancial corporate sector is more reliant on bank loans and unlisted equity for its financing in Europe than in the United States, where listed equity in particular plays a central role (Figure 6b). Other reasons for these observed patterns include Europe's relatively robust public social safety nets and larger preponderance of small- or medium-sized enterprises ([Bhatia et al. 2019](#)).

4. Banks are ill-suited to financing startups for at least four reasons. First, the important role of collateral in bank risk management works against new firms with predominantly intangible assets—R&D, patents, and intellectual property more broadly—because such assets are not easily attached, seized, or sold. Second, many bank risk models are not well attuned to the knowledge intensive and subjective task of gauging the future prospects of high-tech fast-growing but initially unprofitable firms. Third, the time it takes startups to develop products, scale up, and generate sufficient revenue is generally not consistent with banks' maturity and debt-servicing requirements. Fourth, regulation and supervision require high-risk exposures to be amply buffered by capital and provisions, which can significantly reduce banks' rates of return on loans to startups.

5. A second important contributor to the financing problem is the national fragmentation of Europe's financial system. In banking, cross-border integration is lower today than pre-GFC (Figure 7). In the capital markets, pools of private capital sit in national silos. Most occupational pension schemes do not offer

pension products across borders because of the differences in national social benefits and labor laws and the attendant costs, complexity, and operational risks ([EIOPA 2023](#)). Pension funds and insurers exhibit strong home-country bias in their asset allocations (Figure 8a). There are regulatory, legal, and tax frictions that impede the cross-border activity—especially investing and trading—and consolidation that would deliver deeper pools of capital and more liquid markets (Figure 9). Long and complicated procedures for reclaiming withholding taxes are a key disincentive to cross-border investment within the EU ([European Commission 2023](#)). Fragmentation limits private cross-border risk sharing, with a previous IMF study estimating that “consumption smoothing” through the capital markets is four times stronger across the 50 US states than in the EU (Figure 8b; [Bhatia et al. 2019](#)).

6. **The resulting shallowness of European private capital pools, in turn, holds back Europe’s VC industry—which is a fraction of the size it is in the US.** This undermines growth because VC, a high-risk, high-return form of *private equity*, sits at the heart of the ecosystem that finances innovative startups. As a share of GDP, VC financing in the EU is less than one-third as large as in the United States, with the European VC industry characterized by fewer funds and smaller funds. The fragmentation of private pools of capital in Europe makes it difficult to create larger VC funds. At the same time, the paucity of large high-tech firms, the smaller private equity sector, and the smaller size and depth of stock markets in the EU limit “exit” options for successful startups, which ultimately impacts valuations and returns to investors. That, in turn, reduces incentives to invest in startups throughout their lifecycle.

7. **The under-development of the VC industry has important negative implications for Europe’s competitiveness, growth prospects, and green ambitions.** As long as the EU fails to sufficiently nurture innovative, fast-growing firms, the structure of its economy will remain overly concentrated in lower productivity, slower growing sectors (Figure 10a). Not only does this hold back potential growth, it also fundamentally reduces European competitiveness. Moreover, VC financing is critical for developing new technologies and scaling up firms in the so-called “clean tech” sectors, which the EU in its Green Deal Industrial Plan has identified as strategically important. European VC investments in these sectors are a fraction of US levels (Figure 10b). If more VC financing were available to scale up clean-tech firms, it would reduce the Green Deal Industrial Plan’s reliance on costly subsidies to do so, an approach that also risks distorting the single market.

8. **Along these structural features of the EU’s financial system, VC activity also depends on lending activity and overall macroeconomic conditions.** Private equity and VC markets go through upswings and crises which affect lending conditions, borrowing costs, liquidity in IPO markets and exit prices ([Kraemer-Eis and Croce 2023b](#)). Overall, macroeconomic conditions are detrimental to startups’ ability to secure financing and invest, as well as to the exit environment.

9. **This paper explores the importance of VC and the state of the innovation financing ecosystem in the EU, making a number of specific policy recommendations.** Section II reviews the literature on VC financing, R&D, and firm dynamism and their importance for aggregate growth. Section III explains the generic startup lifecycle and the ecosystem. Section IV assesses the state of the VC industry in Europe and the factors that shape it, building a case for action. Section V offers a number of policy recommendations at the national and EU levels for the near term and medium term. Section VI links VC to the broader CMU effort.

II. The Economic Effects of Venture Capital

10. **A wealth of literature finds that VC financing has significant positive effects on innovation and growth at the firm level.** VCs funds are especially important for the financing of the startups with the highest growth and employment creation potential ([Puri and Zarutskie 2012](#)). A number of studies have shown that VC is important for innovation and patenting by startups ([Kortum and Lerner 1998](#); [Arqué-Castells 2012](#); [Signore and Torfs 2017](#); [Pavlova and Signore 2021](#); [Greenwood et al. 2022](#)). VC is also found to have a positive impact on firm growth and size, both globally and in the EU ([Bertoni et al. 2011](#); [Pavlova and Signore 2019](#); [Bellucci et al. 2021](#); Fendoglu and Xu 2024a,b). With initial firm features such as early patenting and size seen to strongly influence subsequent growth dynamics and differences in outcomes, VC-backed firms are found likely to outperform their non-VC-backed peers over time ([Sterk et al. 2021](#)).
11. **Part of the impact venture capitalists have on startups is through the knowledge, advice, and networks that they bring.** The effects of VC on innovation and growth stem importantly from the value-added venture capitalists provide by nurturing, advising, monitoring, and providing a support network to their chosen firms and projects ([Akcigit et al. 2022](#)). These effects, more than access-to-finance alone, make VC firms better than banks at growing startups' output and job creation ([Cole et al. 2016](#)). Some growth models linking firm-level performance to aggregate outcomes ascribe a special role to VC. The model of [Akcigit et al. \(2022\)](#), for instance, which is calibrated to US data, finds that if startups were matched only with banks, which provide less expertise, aggregate annual growth would decrease by 0.5 percentage points.
12. **The positive effects of VC financing and ancillary support on R&D investment and innovation are one channel through which VC can benefit aggregate growth.** The theoretical rationale for the link between R&D, innovation, and aggregate growth is developed in a body of endogenous-growth literature ([Romer 1990](#); [Grossman and Helpmann 1990](#); [Aghion and Howitt 1992](#)). [Jones \(2005\)](#) then examines the implications of the “non-rivalrous” nature of ideas and the need for institutions (e.g., universities and patents) to help exploit positive externalities. A number of empirical studies, too, have found a link between R&D and growth ([Gulmez and Yardimcioglu 2012](#); [Gumus and Celikay 2015](#); [Das and Mukherjee 2020](#)). As a caveat, given their focus on generating returns within a fixed investment horizon, VC firms may skew their portfolios toward sectors whose innovations are easier or faster to commercialize or where uncertainty about demand can be quickly resolved, such as software ([Lerner and Nanda 2020](#)).
13. **VC can also impact aggregates through other channels such as better entry-exit dynamics and superior selection that together generate a stronger overall population of startups.** Isolating the impact of VC on aggregate growth is empirically challenging. Nonetheless, two studies using US firm-level data have shown that resources being allocated to less-dynamic firms, as well as slower rates of firm entry and churn—the so-called startup deficit—contribute to aggregate productivity slowdowns ([Alon et al. 2018](#); [Decker et al. 2017](#)). Factoring in firm heterogeneity and the observation that well-capitalized and larger startups tend to perform better, one study focused on the EU finds that improving the ex-ante composition of the startup set through more VC can generate aggregate employment and productivity gains ([De Haas et al. 2022](#)). There is also evidence that VC helps to create more firms than it funds, increasing entrepreneurship and growth ([Samila and Sorenson 2011](#)). This is particularly important as EU business dynamism has declined (IMF 2024).

III. Startup Financing Stages and the Ecosystem

14. **Properly financing innovation requires an ecosystem that brings together knowledge, risk appetite, scale, and patience, attuned to the startup lifecycle.** At the early stages when risk is at its highest and financing needs are small, identifying promising ideas requires expertise while furnishing equity requires a level of risk tolerance best suited to lightly regulated, sophisticated investors that can diversify their bets across many startups. In the later stages when risk is lower (yet still high), after many bad bets have been weeded out, financing needs can grow exponentially, and the mix may include debt. These later stages bring in bigger players that can support larger financing rounds while maintaining diversification, including heavily regulated entities such as pension funds, insurers, and banks, and often involves a cross-border element. The end goal for startup investors and many founders is to exit at the best possible value, with proceeds often plowed back into new startups and VC funds. With the startup lifecycle easily spanning a decade, patient capital is key.

15. **The riskiness of innovative startups, coupled with the paucity of tangible capital and expertise needed to invest in them, makes such firms best suited to private equity financing.** Both public debt and listed equity markets have substantial reporting requirements, which can be costly to satisfy, and usually require issuance of a minimum size to ensure liquidity, that make them a less-appropriate source of financing for startups. On the other hand, the riskiness of investing in startups tends to make such investments ill-suited to the average individual retail investor. As discussed above, while banks can and do screen companies, the riskiness of and lack of tangible capital to offer as collateral make banks less well suited to lending to early-stage startups. In general, debt, which should be relatively information insensitive, is not ideal for financing early-stage high-tech startups ([Holmstrom 2015](#)).

Startup Financing Stages

16. **The lifecycle of a startup can be divided into five stages, with risk decreasing and scale increasing along the way** (Figure 11). Using industry terminology, these five stages are:

- **Pre-seed.** This is the earliest and riskiest stage of funding a startup, when founders conduct market research, develop a business plan and product prototype, and start building a team. Financing typically comes from personal resources and friends and family, as well as potentially crowdfunding and so-called angel investors, startup incubators, and pre-seed VC funds. Angel investors, incubators, and VC funds focused on this stage also provide advice on business plans, products, and markets. Funds raised at the pre-seed stage in Europe can range from €10,000 per venture to as much as several million euros, but typically average a few hundred thousand euros ([Pitchbook 2024a](#)).
- **Seed.** At this stage startups seek to refine their initial product, grow their team, begin marketing efforts, and attract early customers. They actively seek professional equity investors to help finance this stage, including angel investors, startup incubators, and seed-stage VC funds. Startups are still very risky at this point, with estimates from different analyses finding that only 10–15 percent of those that attracted seed funding during 2010–13 were able to achieve a successful exit ([Crunchbase 2021](#); [Dealroom 2016](#)). Investors usually demand a sizable equity share, in the range of 15–40 percent ([Pitchbook 2024b](#)). Financing raised at the seed stage can range from less than €100,000 to over €5 million.
- **Early stage.** This stage occupies the space after the seed stage but while the company is still relatively young, typically five years or less. It is where startups are usually generating revenue,

looking to develop their product, investing more in marketing, expanding their teams, and potentially entering new markets. This stage can include so-called Series A initial funding and Series B second-round funding, both typically provided by VC funds along with angel investors and incubators that expect the firm to grow rapidly—say, three- to five-fold over the next two years. Euro amounts range from a few million to tens of millions. Only about one-third of startups that receive seed-stage financing raise funds in a Series A round, and only about half of those in a Series B round ([Dealroom 2016](#)).

- **Later stage.** At this stage the startup is more mature, typically over five years old, is generating revenue, and is expanding its customer base. It is usually looking to scale up further, launch new products or expand into new countries, fund R&D, and potentially make strategic acquisitions. It may also be preparing for a potential exit, whether through an acquisition or an IPO. This stage usually includes Series C and Series D rounds, as well as growth funding in the form of a Series E round and beyond. Both for funding efficiency and to limit dilution, these rounds may include debt. Financing in the later stage is usually still led by VC funds, but they in turn may solicit funding from institutional investors and banks. Corporate VC, private equity, and hedge funds may co-invest. Overall financing amounts can range from several million to hundreds of millions of euros.
- **Exit.** Founders and investors look to exit their investments eventually in order to realize the valuation gains on their equity stakes. The three most common forms of exit are strategic acquisition by a larger firm, acquisition by a private equity firm, or a stock market listing. Successful exits need to generate sufficient returns not only to compensate for failed bets, but also to provide sufficient risk-adjusted returns to make VC funds an attractive investment prospect, especially for institutional investors.

The Startup Financing Ecosystem

17. **Critical elements of the startup financing ecosystem include angel investors, incubators, and VC firms, all of which also provide knowledge and advice** (Annex I). These actors play a vital role in screening startups, selecting the most promising ones, and providing financing. As noted, they also add value by providing advice and access to professional and financial networks and by helping ensure capital discipline ([Ekeland et al. 2016](#)). VC funds are typically structured with a 10-year horizon and invest in a diversified portfolio of startups. After raising a fund, the VC firm will allocate a portion of the capital to its portfolio, and over the next years will winnow out underperformers and channel the unallocated portion to the successes.

18. **VC funds, in turn, raise their financing from a broad set of so-called limited partners.** Given VC funds' long investment horizons, investors in them must have similarly long investment horizons. Investors range from wealthy individuals, family offices, and endowments to institutional investors, including pension funds, investment funds, and insurers. Wealthy individuals, family offices, and endowments, as sophisticated investors, tend to be unregulated or very lightly regulated, often subject only to minimal data-reporting requirements. Institutional investors, in contrast, as managers of retail savings with fiduciary duties, tend to be heavily regulated, subject to rules on eligible investments, leverage, disclosure, and more. The larger VC funds become, the more reliant they tend to be on financing from institutional investors. As such, the average regulatory intensity of the VC funding base generally increases with scale.

19. **Banks and venture debt firms are important sources of debt financing, especially for more mature startups.** Debt can be attractive to startup founders and to VC funds, including because it avoids ownership dilution. Startups that are generating revenues and growing rapidly, especially if backed by VC funds willing to provide follow-on equity financing, can often borrow directly from banks or venture debt firms. That

said, bank risk models may struggle with startups' uncertain revenue and growth prospects, while banking regulation and supervision tend to reduce rates of return. Venture debt firms are typically faster and nimbler than banks but charge relatively high interest rates and typically require equity warrants.

20. **Government agencies and PFIs can play a catalytic role by both providing capital and helping broaden the investor base for VC firms.** PFIs help VC funds achieve scale both by providing capital themselves and by attracting broader participation as anchor investors ([Kraemer-Eis and Croce 2023b](#)). They thus help expand the range of financing options available to startups. In an under-developed VC industry, many VC funds may be too small to attract institutional investors (Axon 2019). PFIs can help bridge this gap by creating funds of funds for institutional investors to invest in at greater scale, with the PFIs doing the due diligence and allocating the capital to the VC funds. This helps institutional investors gain familiarity with VC funds, until they eventually feel ready to invest in them directly.

21. **PFIs can also help to expand the types of financing available to startups and act as a steadier form of financing over the startup lifecycle.** PFIs can not only lend to startups, but also help them attract debt financing by guaranteeing loans from banks or venture debt firms, with multipliers through the effect of these guarantees in delivering lower risk-based capital requirements at banks. Lastly, PFIs can help reduce the cyclicity of VC funding markets, which can be problematic for startups that need to raise financing every 12–18 months ([Kraemer-Eis and Croce 2023a](#)).

22. **Government VC is effective when mixed with private sources of finance.** In general, studies find that firms receiving solely government VC tend to perform worse than those receiving private funds ([Brander et al. 2015](#); [Breschi et al. 2021](#)). Firms supported by public VC only appear to benefit from fewer investments overall, and to have less successful exits with higher probabilities of failing. It can be that governments do not screen companies with the same criteria as they may seek other objectives than pure performance (public goods, inclusiveness, externalities for example), such that they support companies which are less attractive to private investors. Another possible explaining factor may be the public sector lacks the selecting capabilities to support the most promising firms ([Lerner 2002](#)). Even controlling for this selection effect (e.g., controlling for the quality of selected firms), a mix of private and public VC translates into a higher overall amount of investments compared to pure government VC. In terms of additionality, there is evidence of more investments both at the extensive margin (more investors) and the intensive margin (more investment per investor) compared to pure private funding, at least in the first funding rounds, with a more nuanced picture in later rounds ([Brander et al. 2015](#); [Breschi et al. 2021](#)).

23. **Strategic buyers and stock exchanges become important in shaping exit options, which in turn affect incentives throughout the lifecycle.** Rates of return from investing in innovative startups rest heavily on valuations at exit. Having a variety of exit options strengthens the negotiating position of founders and incumbent investors, helping lift exit valuations. Hence, having a wider set of large high-technology firms as strategic buyers, more large private equity growth funds, and deeper, more liquid stock markets to list on are all beneficial. As noted, exits also matter because founders and VC firms often reinvest their gains in new startups, or VC firms use the gains to expand the size of their next funds, creating a virtuous circle.

24. **Cities or regions where many different parts of the ecosystem cluster together play a central role, which also means that hub-and-spokes networks are vital.** Innovation thrives on agglomeration effects, both in terms of generating ideas and in financing and developing them. Given the time- and skill-intensity of selecting startups and supporting them through the lifecycle, the VC industry is very “people-centric” and thus concentrated in clusters ([Crisanti et al. 2023](#)). As hubs form, it becomes very important for other cities,

regions, and countries where startups may sprout to develop their own angel investors and early-stage VC funds, to both provide the necessary early-stage financing and to tap into professional networks that serve as links to the VC hubs.

IV. The State of Venture Capital in the EU

25. **The VC industry in the EU is much less developed than in the United States, with considerable intra-EU heterogeneity** (Figures 12 and 13a). Annual VC financing in the EU averaged 0.2 percent of GDP in 2013–23, a fraction of the US average of 0.7 percent of GDP (Figure 13b). The EU has fewer VC funds than the United States, and its largest funds account for a much smaller share of aggregate capital raised (Figure 13c). Notably, some member states' shares of the EU's total VC activity greatly exceed their shares of total EU GDP (Figure 13d). Member states where households invest a larger portion of their savings in the capital markets and that spend more on R&D relative to GDP tend to have higher VC investment ratios (Figure 14). The latter observation attests to the key role of universities, research centers, and high-tech firms as sources of innovation. VC funds in the EU also rely much more on PFIs for capital than their US peers.

26. **This state of affairs stems in large part from the structural economic and financial features of the EU, most notably national fragmentation, with history also playing a role.** The EU is composed of 27 sovereign states, only 20 of which share a currency, speaking 24 languages, with significant legal, regulatory and tax differences that impact the structure of their economies and their degree of economic integration with other EU members. The Association for Financial Markets in Europe finds that intra-EU integration in capital markets has declined since 2019 ([AFME, 2023](#)). Fragmentation of financial markets reduces the pools of capital available to invest in VC funds, direct sources of growth financing, and exit options for startups ([Asdrubali 2023](#), [Kraemer-Eis and Croce 2023b](#)). Historical factors include the European VC industry having taken root much later than its US peer and the EU having lost its largest financial center and VC hub—London—with Brexit.

27. **Markets for goods, services, and labor in Europe are less integrated than in the United States, for both legal and more-intrinsic reasons.** Despite the remarkable success of the EU Single Market to date, the process of European integration remains far from complete ([Pelkmans 2024](#)). Legal and regulatory differences across EU countries, in both product and labor markets, still impede and impose costs on the cross-border expansion of businesses ([Ebeke et al. 2019](#)). Labor market rigidities that make it harder to wind up underperforming companies, for instance, may make VC funds in the EU more risk averse than in the United States ([Financial Times 2024a](#)). Similarly, differences in insolvency regimes make it more costly and time consuming to wind up failing firms in some EU countries. Europe's legal, regulatory, and tax heterogeneity reflects in part the fact that some competences lie at the national level (e.g., taxation), others lie at the EU level (e.g., trade policy), and many are mixed (e.g., banking, insurance, energy). Even where the competence is primarily at the EU level, divergence in the transposition of EU directives into national law, but also, more subtly, differences and gaps in member states' application of the law, can create fragmentation. Linguistic and cultural differences also serve as natural barriers.

28. **As noted, pools of private capital are much smaller in Europe than in the United States, with national fragmentation playing a major contributing role.** The fact that the EU financial system is bank-based limits the aggregate size of the European capital markets. Assets held in private pension funds and insurance companies collectively amount to some \$11.9 trillion in the EU, a small fraction of the United States' roughly \$42.5 trillion (Figure 15). National fragmentation, exacerbated by home-country bias at pension funds

and insurers, then splits these already-much-smaller aggregate capital pools into national silos (Figure 16; [Bhatia et al. 2019](#)). As a result, a far smaller share of VC funds' capital in the EU comes from institutional investors than in the United States (Figure 17). The smaller size of individual VC funds in the EU, in turn, means that very few of them are able to finance individual startups' later-stage financing needs—ranging from several million to hundreds of millions of euros—while maintaining a proper diversification of risk exposures.

29. **National borders are less of an impediment for VC funds as they invest in startups than when they raise capital, particularly as they seek to scale up.** More than one-third of investments by EU VC funds in Europe are cross border ([Asdrubali 2023](#)). Even post-Brexit, UK-based VC funds still invest substantially in the EU (Figure 18). Creating VC funds large enough to provide later-stage growth financing, however, requires raising larger sums of capital, particularly from institutional investors. Given the relatively small size of most EU countries and the limited pool of capital available from institutional investors in any one country, raising larger VC funds often requires raising funds across borders, which can be more difficult.

30. **Familiarity with the VC asset class, costs of due diligence, perceived riskiness, regulatory restrictions and other factors contribute to the difficulty in raising funds.** In many EU countries, institutional investors' familiarity with the VC asset class, and thus their willingness to invest in it, is limited, which can be exacerbated by the perceived riskiness of VC ([Atomico 2023](#)). Another is that they may not know VC firms from other EU countries and may not be willing to incur the screening costs. Yet another is that there may be quantitative limits on how much they can invest in VC, making it harder for them to invest in larger VC funds. The importance of investment restrictions is underlined by the experience of a 1979 reform that enabled US pension funds to invest into risky assets, including VC. In the following eight years the share of pension funds in US VC capital increased from 15 percent to more than 50 percent ([Kortum and Lerner 1998](#)). Institutional investors' home bias, in turn, can stem from informational frictions (e.g., knowing their own market best), tax issues (e.g., withholding tax costs), and regulatory constraints (e.g., on foreign investments or on assets denominated in a foreign currency). Moral suasion and political pressure to invest in domestic firms should not be discounted either. Generally, as regulatory intensity increases, so too do cross-border frictions.

31. **The resulting scarcity of scale-up financing in Europe is a costly weakness.** Because the number of large VC funds, with more than €500 million in financing, is small—less than 35 such funds have been raised in the EU in last decade—there are few funds able to meet individual startups' calls for €30–50 million of growth financing per round in the later-stage financing rounds. Over 2013-23, EU VC funds have raised about \$130 billion versus \$924 billion raised by US VC funds (Figure 19). Hence, when startups reach the point of needing large amounts to scale up quickly, they often turn to US funds. Given the need for repeated funding rounds and the benefits of the stronger agglomeration of ancillary services in the United States, European startups then face material incentives to migrate abroad, and often do ([Testa et al. 2022](#); Fratto et al. 2024).

32. **The outward migration of European ideas continues at exit, where options are similarly more limited in the EU.** With fewer large high-tech firms to act as potential acquirers, Europe often sees its most promising startups sold to firms elsewhere. So-called “third country” non-EU acquirers accounted for nearly half of the acquisitions of EU startups in 2023 ([Kraemer-Eis and Croce 2023a](#)). Stock markets in the EU are also smaller and less liquid than their US competitors, which hurts valuations and thus the attractiveness of IPOs at home (Figures 20 and 21). Looking at EU startup exits through IPOs, two-thirds occurred outside the EU in 2023. Often, larger startups firms' seeking financing abroad move significant parts of their operations abroad as well ([Testa et al. 2022](#)). Fewer domestic exit options and lower valuations reduce incentives to invest in VC and often see startups sold or listed at immature stages ([Botsari et al. 2021](#)). Well-funded startups tend to have a

better chance of a successful exit, especially via an IPO, in settings where tolerance for uncertainty is higher. This suggests greater risk aversion in the EU may also play a role (Fendoglu and Xu 2024a,b).

33. **As mentioned, behind the shortage of growth financing sit important legal and regulatory factors** (Annex II). The rules governing institutions for occupational retirement provision (the EU regulatory term for private pension funds) are purposefully qualitative, leaving many important aspects to national authorities, which ultimately results in considerable heterogeneity across the EU. For instance, the ease with which pension plan participants may withdraw funds before retirement is governed by rules set at the national level, yet can greatly affect pension funds' ability to invest in illiquid, long-term assets such as VC (Atomico 2023). Insurers, in turn, are constrained by the Solvency II rules, which attach relatively high risk weights to VC. An option to lower these risk weights by classifying assets as "long-term equity" is little used due to its complexity, its interaction with national regulations, and geographic restrictions on investments.

34. **Fragmentation is also a major reason why stock markets in Europe are smaller and less liquid than in the United States.** Including the United Kingdom, Europe has 35 listing exchanges, 41 trading exchanges, and 18 central securities depositories, compared to three listing exchanges, 16 trading exchanges, and one central securities depository in the United States ([Financial Times 2024b](#)). This fragmentation is driven primarily by differences in national legal and regulatory frameworks, including corporate, securities, insolvency, accounting, and consumer protection regimes. Long and complex procedures for reclaiming withholding taxes also disincentivizes cross-border investments in EU equity markets, keeping capital more siloed at the national level. Nasdaq in Sweden has been disproportionately successful in attracting IPOs though, which suggests there may be lessons there for other EU countries.

35. **As a result of all of this, the EU loses out on many of the growth benefits and positive externalities of seeing startups achieve scale and exit at home.** Instead, many of its most promising startups migrate away, often to the United States ([Testa et al. 2022](#)). When this occurs, even if some operations stay in the EU, many of the growth and employment benefits accrue abroad. This also deprives Europe of the positive spillovers from innovation and R&D that such firms generate. Finally, if startup founders and VC funds exit prematurely, they realize less of the ultimate value of the firm, reducing proceeds reinvested into the domestic startup ecosystem, as was done, with notable success, after the exit of Skype in Estonia.

36. **More positively, PFIs at both the national and EU levels, the latter led by the EIF, have largely proven impactful.** European VC practitioners generally welcome the role played by PFIs, including the significant footprint of the EIF, in bringing more financing into the industry ([Kraemer-Eis et al. 2016](#)). In some countries, PFIs have helped not only with money but by increasing institutional investors' familiarity with the VC asset class, including by creating funds of funds that have reduced the marginal cost of investing in VC. Tesi in Finland, having given Finnish pension funds and insurers a cost-effective way to invest in VC with controlled risk through its [KRR family](#) of funds of funds, is one prominent example. Dansk Vækstkapital, a partnership between the Danish state and pension funds, plays a similar role. In the Netherlands, Invest NL has also helped attract pension funds to invest in VC funds focused on deeptech startups. On the credit side, the EIF's venture debt instruments have been shown to crowd in private investments ([Gatti et al. 2022](#)).

V. Some Practical Reform Proposals

37. **Creating a true single market for goods, services, labor and capital is the first-best solution to the EU's scale, productivity, and growth issues, but this is politically difficult and will take time.** Greater

economic and financial integration would make it easier and less costly for the most productive firms to grow, find the necessary talent, reap economies of scale, and deepen the pools of capital they can tap. A number of studies find that reducing barriers to integration could substantially increase aggregate output ([Comerford and Rodriguez Mora 2019](#); [Freeman et al. 2022](#); [Baba et al. 2023](#)). Efforts to deepen the single market should continue, but second-best policy measures will be needed in the interim.

38. **Investments in education, R&D, and ICT are necessary for innovative startups to thrive.** Estonia is a good example of a case where an emphasis on digital skills in education along with public and private investment in digital infrastructure has helped create fertile ground from which innovative startups can sprout and grow. Facilitating commercial spinoffs of innovations developed at universities and research institutes, or licensing such innovations to entrepreneurs, can help commercialize research and expand the startup pool. Similarly, existing high-tech firms and their employees are often important sources of ideas, with clusters of startups developing around them. Well-designed R&D tax incentives can also help to increase R&D investments and patenting, especially by smaller and more financially constrained firms ([Dechezleprête et al. 2023](#); [Ernst and Spengel 2011](#); [European Commission 2014](#); [Minniti and Venturini 2017a,b](#)). At the EU level, a recent assessment of the EU's innovation policy instruments, including the European Innovation Council, suggests there may be scope for improving their governance, design, and resources to increase their impact ([Fuest et al. 2024](#)).

39. **In addition, startups need access to skilled employees and the flexibility to adjust as they grow.** Strategies to encourage innovation therefore need to include assessments of how laws on immigration and labor can impair the ability of startups and other firms that are scaling up quickly to attract the necessary talent or to change strategy when needed. Stock options are an important form of compensation for employees of startups. Ensuring the tax treatment of stock options does not discourage their use and is more harmonized across EU countries could make it easier for startups to hire and expand across Europe. Similarly, developing portable private pension schemes for the EU as a whole would make it easier for firms to attract skilled workers from other EU countries. Overly restrictive and costly rules on shedding staff, many of whom may be highly skilled and able to find work elsewhere, can be a deterrent to both entrepreneurs, investors, and firms to invest in and adopt risky technologies ([Bartelsman et al. 2016](#)). Efficient insolvency regimes can also help investors to more quickly reallocate capital from failed startups.

40. **In the financial sector, VC should be a strong focus of policy efforts, with consideration given to further expanding public support to the industry.** Strategies should start from a recognition of the core role of VC in Europe's broader market for financial services. Reflecting consultations with practitioners and regulators, a critical assessment of what works and what does not, and an organizing framework built around the startup lifecycle, this paper proposes a reform agenda. Recommendations, with timelines to the extent possible, are split between those aimed at member states and those addressing policies at the EU level.

Reforms at the National Level

41. **Where the VC sector is underdeveloped or non-existent, tax incentives can be an important lever to stimulate VC investments.** VC is characterized by high risk and information asymmetries, but also brings strong positive externalities not internalized by individual investors. This market failure may justify preferential tax treatment to help jumpstart VC activity where it lags. A more favorable treatment of capital gains and losses for angel or VC investments, for instance, could help reduce risks and raise expected returns, thereby incentivizing investments in startups. But such schemes, if considered, would need to be appropriately

designed, limiting tax benefits to equity investments beneath a certain size and requiring minimum holding periods ([European Commission 2017](#)). Moreover, venture capitalists that invest across borders in the EU highlight the importance of harmonization as well as simplification of tax regimes ([Botsari et al. 2019](#)).

42. **Another lever under member states' control is national PFIs, which in many cases already support VC activity, yet may have the potential to do more.** A guiding principle here should be additionality, meaning actions by PFIs must complement and crowd-in private investors rather than crowd them out. PFI investments should generally be made on commercial terms alongside private sector co-investors, for instance by acting as anchor limited partner in a VC fund while contributing less than half of the total. Such investments can provide a positive signal to more risk-averse investors that helps overcome information asymmetries. PFIs can also provide a conduit for institutional investors to access and become familiar with the VC asset class, as Tesi does in Finland, thereby expanding the available pool of private capital. The EU competition framework provides useful checks and balances, including approval by the European Commission of a PFI's design and post-approval checks on its operations, although a faster approval process would be desirable.

43. **There may also be room for national PFIs to partner more closely with EU institutions.** National PFIs can and often do work with the EIB and the EIF to develop their own strategies, design their financing instruments, and identify their networks of investible VC funds. New PFIs that are still building capacity can choose to channel resources to domestic startups through dedicated national funds under the EIF umbrella. Monitoring and control systems for national PFIs, in turn, can learn from best practice at the EU level, such as through the EIF-NPI Equity platform. Importantly, national and local initiatives must acknowledge the hub-and-spokes network nature of the EU VC ecosystem. Consequently, initiatives that develop or strengthen a local early-stage VC ecosystem and focus on providing a bridge to more developed VC hubs elsewhere in the EU are likely to be more beneficial for local startups than initiatives that aim to develop a full-scale VC ecosystem nationally. For instance, geographical investment limitations can hinder the developments of networks and synergies with other more advanced VC hubs. Similarly, the hubs invest in each other, with larger hubs connecting smaller hubs to hubs in other countries thereby forming a network of national and international investments ([Kraemer-Eis et al. 2016](#)).

44. **Finally, reducing regulatory and tax frictions at the national level and developing national private pension fund options are well worth pursuing.** As noted, national rules play an important role for pension funds. For example, when Estonia changed its rules on participation in pillar II pension funds, including to allow participants to withdraw funds early, one unintended effect was to reduce the willingness of the funds to invest in long-term assets such as VC ([Bank of Estonia 2020](#)). As VC activity, especially later-stage growth financing, tends to concentrate in a few hubs, tax, legal, and regulatory frameworks should avoid discouraging cross-border investments, whether inbound or outbound, in VC funds and startups. For example, favorable tax treatment for domestic private equity investments can disincentivize cross-border investments ([European Commission 2019](#)). This is why such incentives should be aimed at early-stage VC and limit the overall size of the tax benefits. Restrictions on foreign assets or tight limits on VC assets can also discourage cross border investments. Over the medium term, developing private pension schemes in countries where they are small or non-existent would also expand the domestic pool of capital available to finance VC funds. Larger pension funds tend to invest more in equity and are less risk averse than smaller ones ([Kakes 2006](#); [Bikker et al. 2012](#)).

Reforms to Common EU Policies

45. **At the EU level, perhaps the most impactful near-term action would be to enhance the capacity of the EIF and EIB to increase the capital available for scaling up fast-growing EU firms.** As affirmed by a cross section of industry experts, the EIF—part of the EIB group—is already playing a welcome role in supporting the development of the European VC ecosystem. The EIB has also played a supportive role through guarantees that support the provision of bank lending and venture debt to startups. The EIB is also growing its venture debt lending to later stage startups. In the absence of a true Single Market, there is a case for providing more resources to the EIB and EIF to help accelerate the development of the VC ecosystem and partially address the scale-up funding gap faced by many later-stage startups. Increasing EIB group resources could come from (i) shareholders contributing more capital, (ii) funds from the EU budget, or, (iii) remove the gearing ratio that limits lending to 2.5 times its subscribed capital, as proposed by the EIB President ([Calviño 2024](#)).

46. **The EIF could develop a new instrument to address the scale, fragmentation and information frictions that make it more difficult to raise larger VC funds.** To maximize catalytic effects, the EIF could develop a sizable fund-of-funds aimed at institutional investors across Europe to invest in large (>€500 million) pan-EU focused VC funds. This would be somewhat like the European Tech Champions Initiative (ETCI), but funded by the private sector, not member states, and build on its experience with its Asset Management Umbrella Fund platform. By pooling capital from institutional investors across the EU, the fund-of-funds could achieve a greater scale while improving cross-border integration. The EIF's experience across Europe with VC firms gives it the capacity to do the due diligence and make the capital allocation decisions for institutional investors, while providing greater diversification. This would help to overcome information frictions that might prevent them from making such investments otherwise and helps familiarize these investors with VC firms across Europe. To complement such EIF initiatives, the EIB could expand its instruments to support credit provision to more-mature startups, including venture debt.

47. **Turning to the regulatory framework, although the EU rules on VC are generally well received, there may be scope for some fine-tuning.** The EU Venture Capital Funds Regulation (EuVECA), which provides an optional EU passport to managers of small VC funds of below €500 million, functions well. To invest in EuVECA regulated VC funds requires a minimum investment of €100,000 and self-attestation of awareness of the risks. The Alternative Investment Fund Managers Directive (AIFMD), however, imposes stricter criteria to qualify as a “professional investor” eligible to invest in VC funds of €500 million or larger, limiting the investor base. It can be prohibitive, for instance, for the CEO of a biotech startup to invest in a large VC fund focused on biotech. Given that the risks and informational asymmetries inherent in VC funds do not materially change as fund sizes grow above €500 million, the eligibility criteria for investors in VC funds should be aligned across fund sizes. In this case, it might be better to apply the lighter-touch standard in EuVECA.

48. **The more-pressing regulatory reform priority concerns the EU rules on insurers.** Insurers are some of the largest long-term financial investors in Europe, yet they invest little in VC. According to surveys of market practitioners, regulatory constraints and frictions contribute to this ([Kraemer-Eis and Croce 2023a](#)). The review of the Solvency II regulatory regime for the EU insurance industry, for which a political agreement was reached in December 2023, is expected to ease some constraints. Among other changes, the review has streamlined some of the requirements related to insurers' long-term investments in equity. However, further specifications are needed to ensure that no undue regulatory obstacle to investments in VC funds remains, as the existing requirements have been identified as a key regulatory friction (see Annex II; [Invest Europe 2021](#)).

49. **For pension funds, identifying remedies is more challenging as the rules are set largely at the national level.** The OECD survey of investment regulations of pension funds suggests a number of EU countries have quantitative limits that may constrain investments in private equity and VC ([OECD 2021](#)). For example, Poland has a number of restrictions not only on asset allocation shares, but also fees charged by alternative investment funds that effectively discourage investing in VC. Here, the Commission could document current national frameworks and provide recommendations based on best practices in member states where private pension funds invest in VC.

50. **Reducing stock market fragmentation could help to improve EU exits options for startups.** As discussed, this fragmentation reduces market liquidity, hurts valuations, and prompts many promising EU startups to list abroad. Causes of the fragmentation involve a mix of political, legal, regulatory, and supervisory factors. The fragmentation of stock markets suggests potential efficiency gains as common stock exchange platforms tend to improve information for the average firm, reduce cross-border trading costs and increase market liquidity ([McAndrews and Stefanadis 2005](#); [Hellström et al. 2018](#); [Giofré 2021](#)). But merger of the underlying exchange platform does not necessarily translate into a merger of the different markets in which they operate, as national barriers remain in place ([ECMI 2022](#)). For example, a company listing in a joint platform may still face different national investor protection laws.

51. **Some important initiatives have been agreed, though it remains to be seen how effective they will be.** The new European Single Access Point for listed firms' financial information will be helpful, as is the Listing Act, which aims to make it easier and more cost efficient for firms to list in the EU. Streamlined procedures for cross-border withholding tax refunds, as recommended by the IMF in 2019, would also help. Fortunately, EU member states have recently agreed on the FASTER initiative, which introduce a common EU digital tax residence certificate that will allow taxpayers to benefit from fast-track procedures on withholding taxes, as well as aim to more closely harmonize procedures. If this significantly reduces the time and complexity of withholding tax procedures, it could have a positive impact on intra-EU cross-border investing.

52. **Greater consolidation and deeper integration of equity markets will likely be politically challenging.** While the recent initiatives are welcome, they do not reduce the heterogeneity across Europe in important areas, such as securities regulations and supervision. Greater harmonization of the oversight of the EU's stock markets—possibly through creating a common rulebook and more common supervision—could help, but is politically difficult and would require many legal, regulatory, supervisory, and tax changes, including at the national level. Ultimately, policymakers need to accept that not every EU country can or should have its own independent stock exchange, and that in many cases the optimal solution is simply a national “door” to a few large, consolidated listing and trading platforms.

53. **The closest existing example of what more integrated stock markets might look like is Euronext, but it remains a far cry from a truly integrated cross border market.** Euronext owns listing exchanges in seven EU countries that operate on a single central order book system, which improves liquidity. Though even here fragmentation remains, as Euronext maintains separate subsidiaries for each listing market operating under a mix of EU and national laws and regulations, while being supervised by national authorities in each country. This is exacerbated by disincentives for cross-border trading created by different procedures for reclaiming holding taxes in each country Euronext operates in.

54. **Finally, the EU could consider a broad review of laws and regulations affecting the high-tech sectors, to identify unintended consequences that may impede the growth of innovative firms.** The EU has introduced a raft of such laws and regulations in recent years. These include the General Data Protection Regulation, the Digital Markets Act, the Digital Services Act and, most recently, the Artificial Intelligence Act. Such laws generally improve competition in the digital sector, but reportedly also create some inconsistencies

and complications vis-à-vis pre-existing provisions for high-tech startups ([Bruegel 2022](#)). A comprehensive review, focused in particular on how the laws interact, could help identify areas for reform.

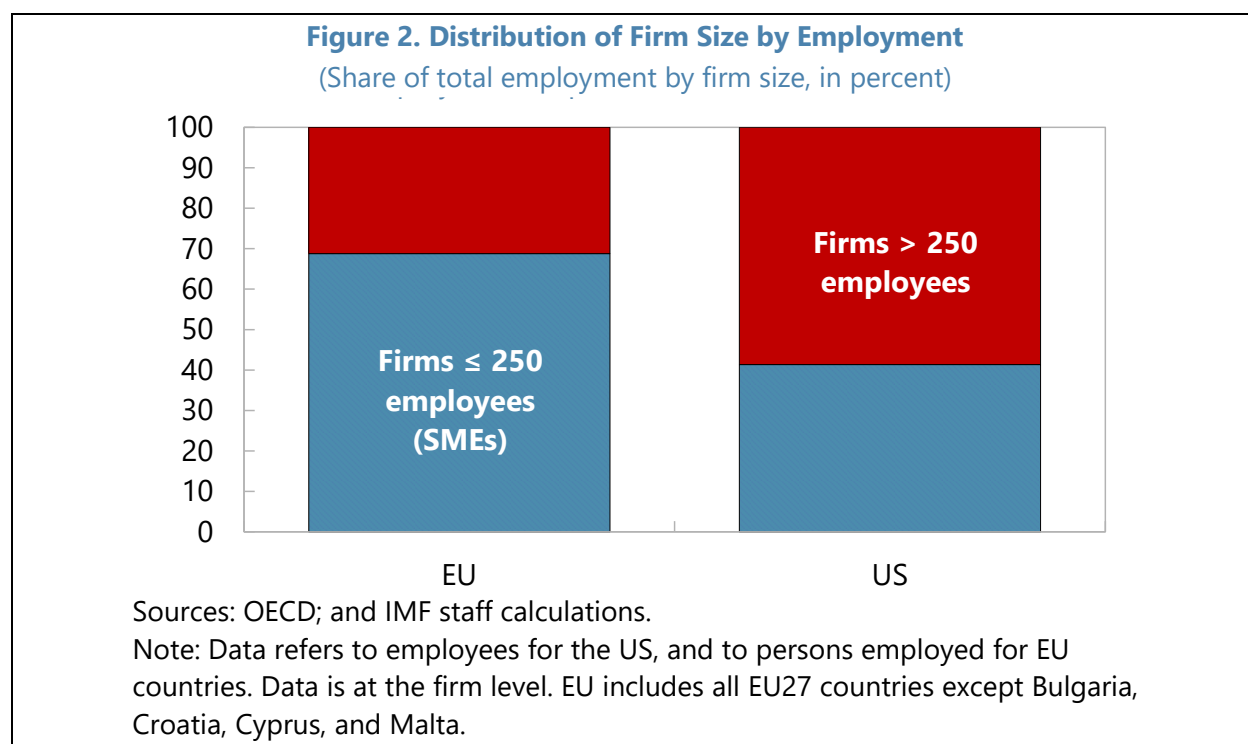
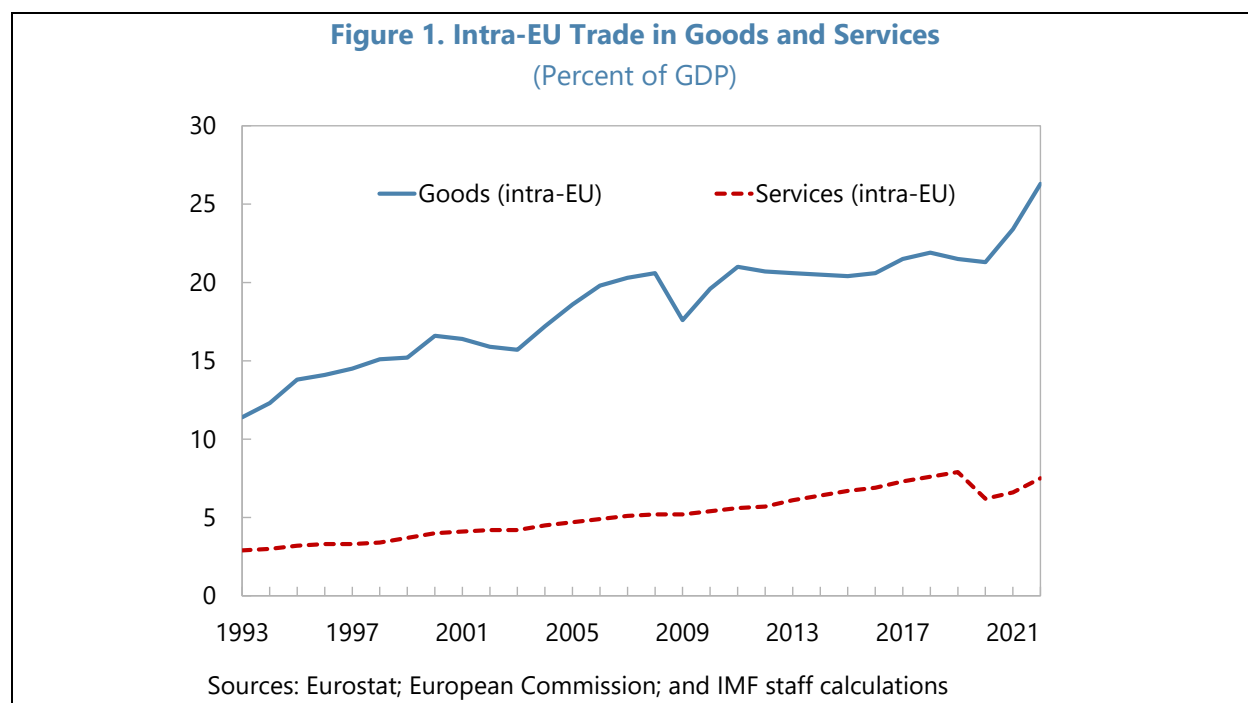
VI. Conclusion

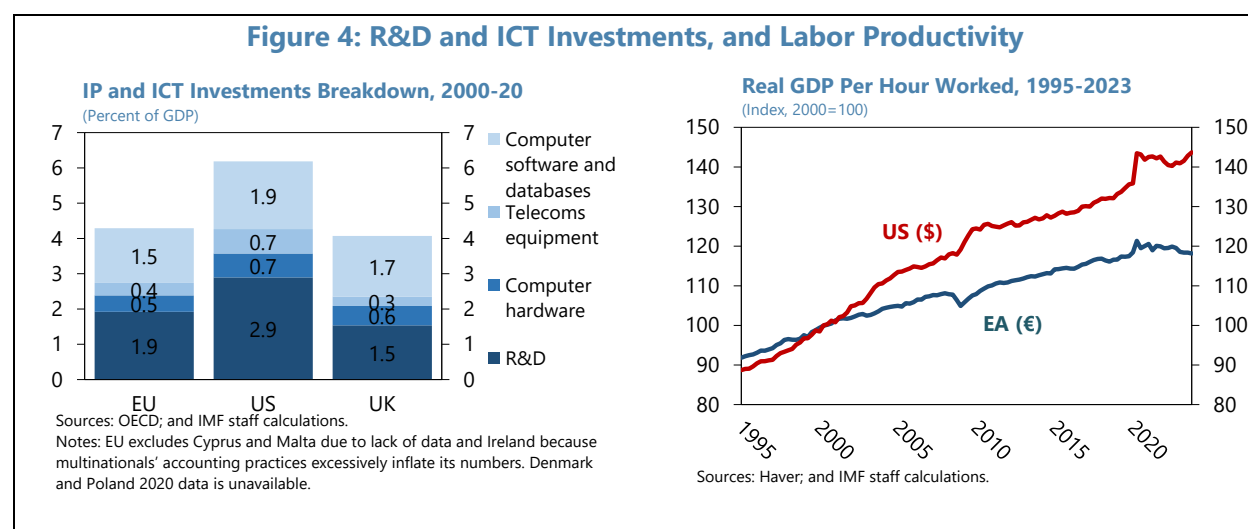
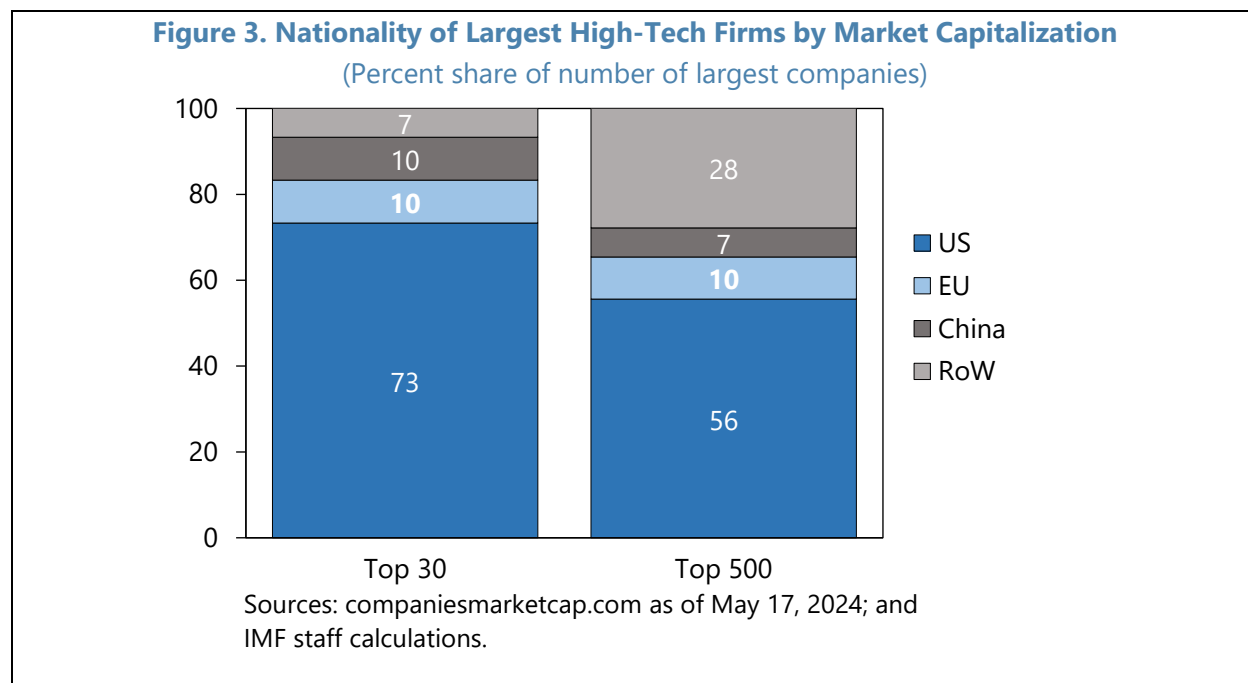
55. **Developing the startup financing ecosystem, with VC at its core, is important for Europe’s future growth, competitiveness, and green transition.** This paper therefore focuses on the European VC industry and how to develop it. The first-best solution would be to improve the Single Market through deeper integration of markets in goods, services, labor, and capital, along with the prudent use of tax instruments, and targeted and judicious regulatory changes. But much of this will be difficult and take time. Hence, we identify near-term second-best steps that can be taken at the national and EU levels to develop the VC sector, including an expanded role for PFIs. Increasing private financing to scale up innovative firms on commercial terms is preferable to relying on fiscally costly subsidies. Over the medium term, investing more in education and R&D, developing private pension schemes, and, increasing economic and financial integration are key.

56. **Startup financing sits as a key piece in the broader context of Europe’s CMU endeavor, where the U for union speaks to the crucial cross-border dimension.** While relatively lightly regulated European VC firms do not find it excessively difficult to invest across borders in the EU, raising capital at scale across borders from institutional investors can be difficult, including because of lack of familiarity with the VC firms and regulatory frictions (e.g., Solvency II). These include differences in national legal, regulatory, and tax regimes and, in a few specific instances, excessively strict regulation (e.g., quantitative and foreign asset restrictions in national pension fund rules). As these issues are tackled, another priority to pursue will be stock market consolidation, which is needed to improve exit options for successful startups. Achieving this would represent a significant step forward for the CMU.

57. **While some steps will be politically challenging, others more technical in nature can be taken now.** The Eurogroup’s [March 2024 statement](#) on priority actions to advance the CMU contains a number of ideas worth developing in greater detail, including on supervisory convergence, harmonizing insolvency and accounting frameworks, improving conditions for cross-border investment in equity, consider developing new instruments at the EIF to facilitate VC exits, and developing occupational and private pension schemes. And while progress has been made in some areas, such as the ESAP and FASTER initiative, many of the recommendations put forward by the IMF five years ago in the three areas of transparency, regulation, and insolvency, remain valid today. Finally, suggestions by some member states that “coalitions of the willing” should press forward in areas where unanimity is elusive may also warrant serious consideration. For VC specifically, this paper has listed several actionable suggestions.

Figures





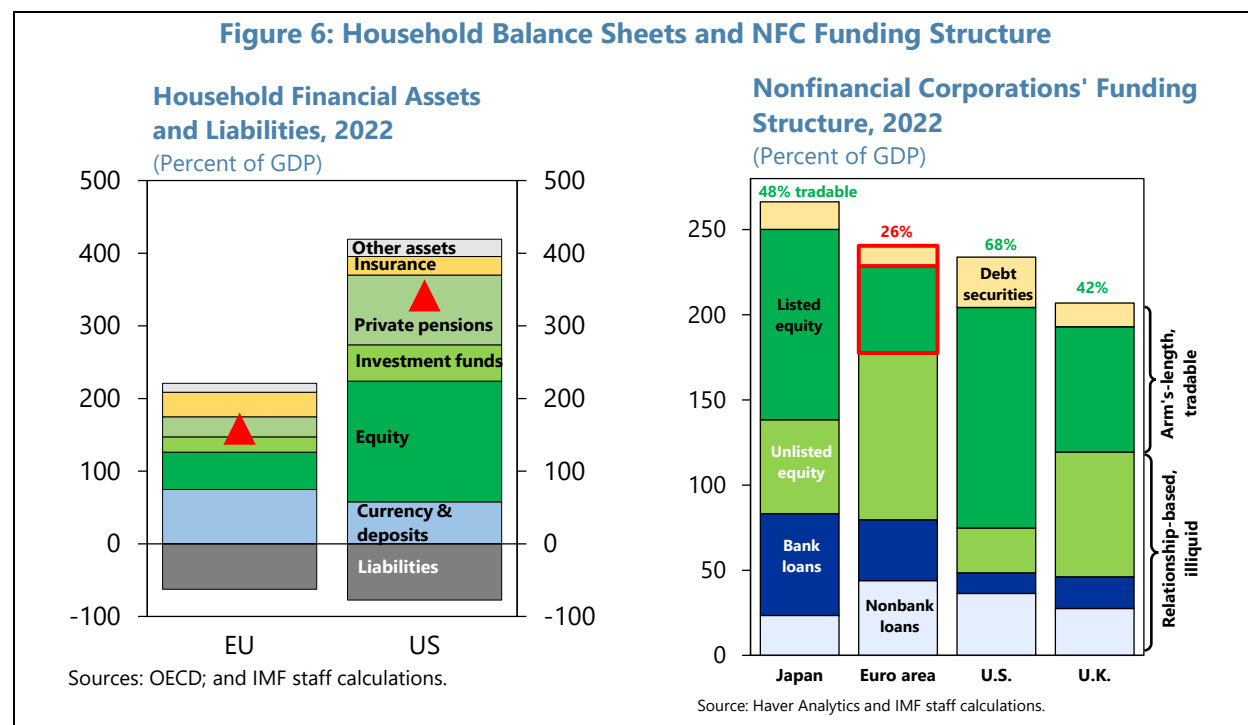
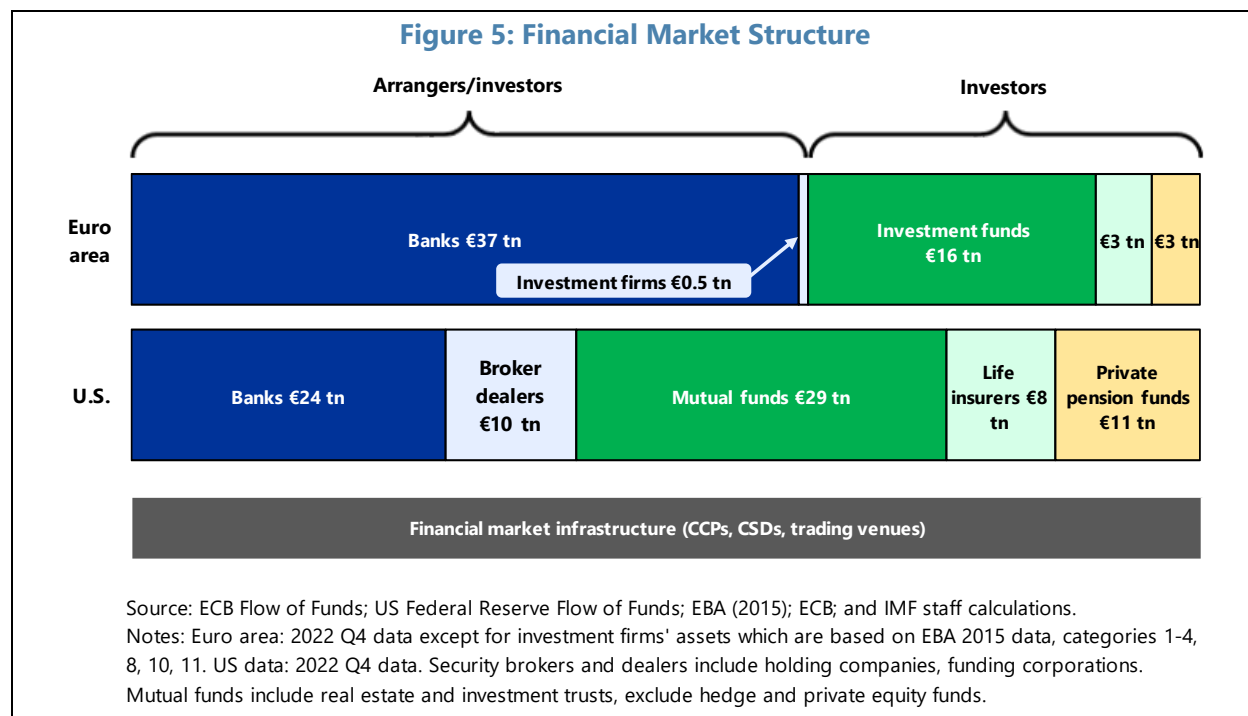


Figure 7. Intra-EA12 Cross-Border Bank Claims, 1999-2023 (Percent of GDP)

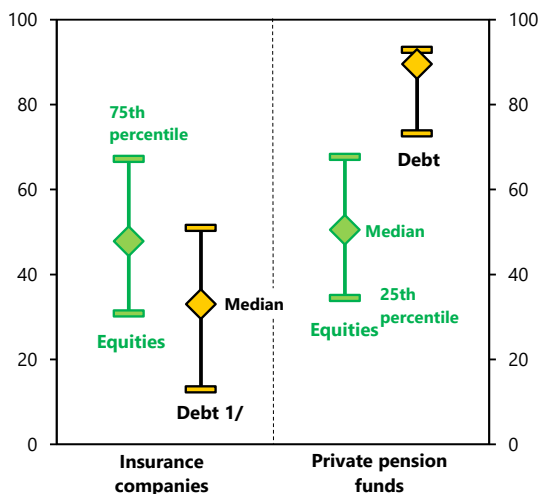


Sources: BIS Consolidated Banking Statistics - Immediate Counterparty Basis; and IMF Staff calculations.

Figure 8. Financial Sector Fragmentation

Domestic Securities in EU Investment Portfolios

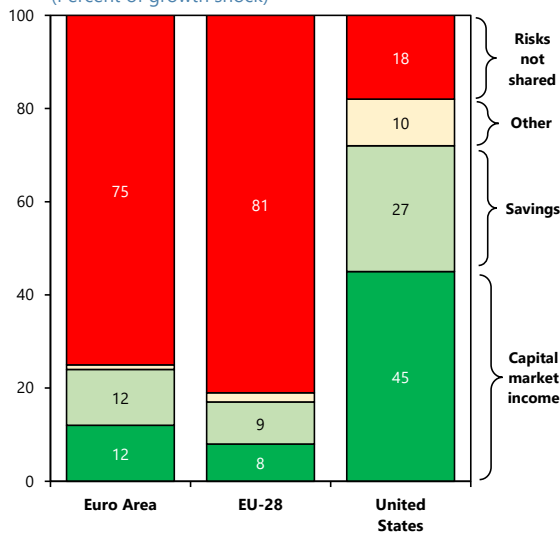
(Percent share of total EU securities, 2020)



Sources: European Insurance and Occupational Pensions Authority; Mercer European Asset Allocation Survey; and IMF staff calculations. 1/ Excludes sovereign paper.

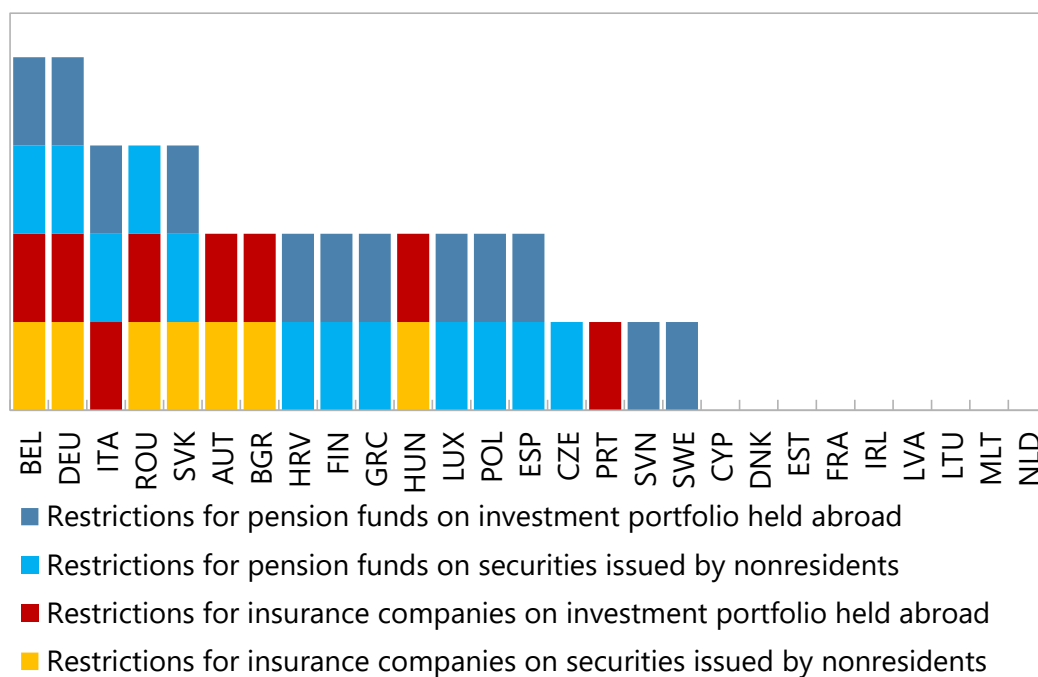
Risk sharing channels

(Percent of growth shock)



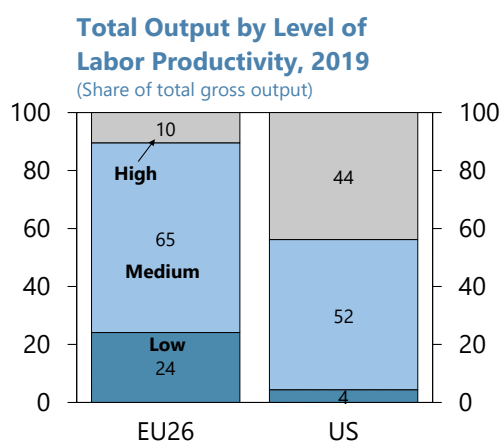
Sources: European Commission (2016); Balli et al (2012); IMF staff calculations.

Figure 9. Restrictions on Investments in Foreign Assets, 2021



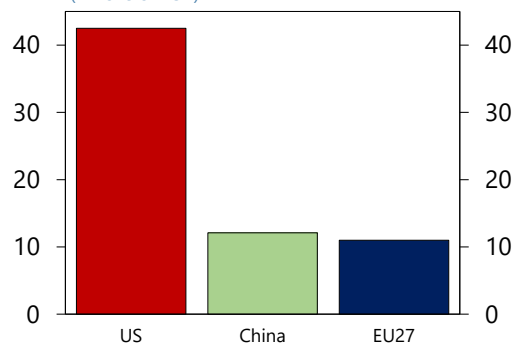
Sources: AREAER database; and IMF staff calculations.

Figure 10. Sectoral Productivity Distribution and Cleantech VC



Sources: EU KLEMS and IMF staff calculations.
 Note: High VA > 72€ per hour worked, Low VA < 31€ per hour worked. Data for Malta is not available.

Venture Capital Cleantech Investments, 2021
 (Billions of EUR)



Source: Cleantech for Europe.
 Note: EU27: seed, series A, series B, growth investments. US, China: VC investments.

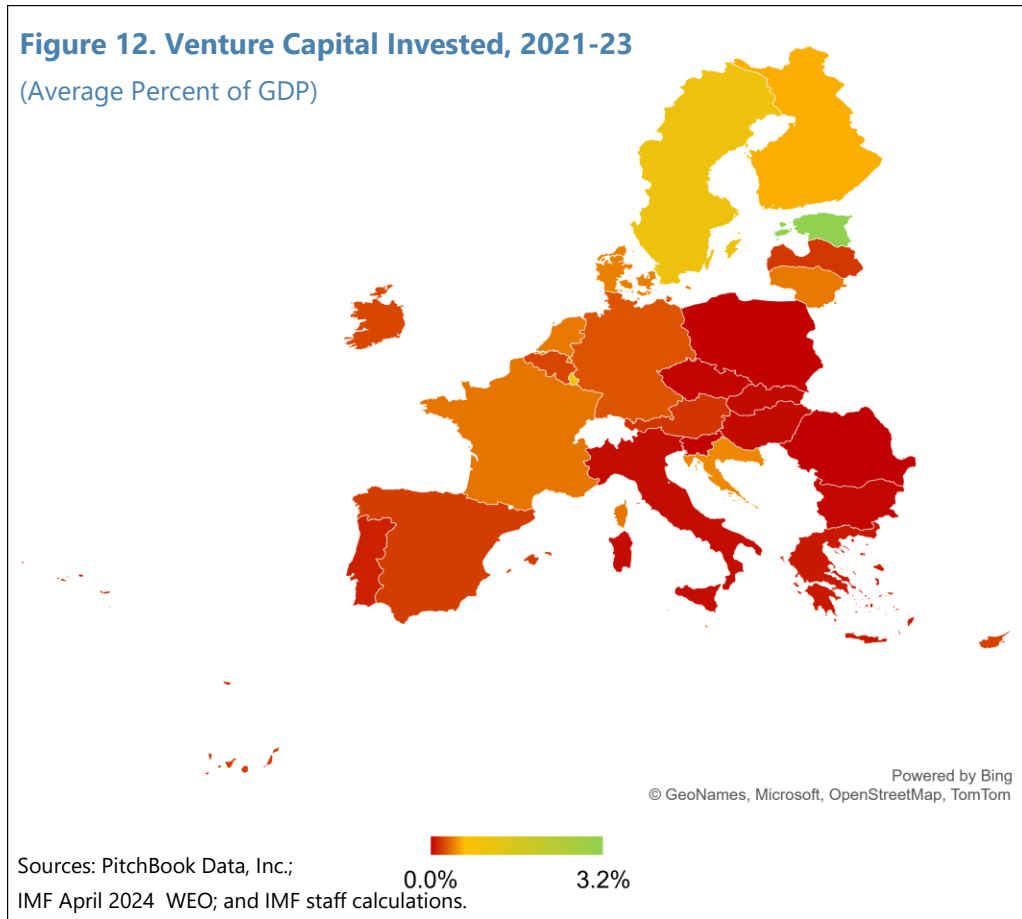
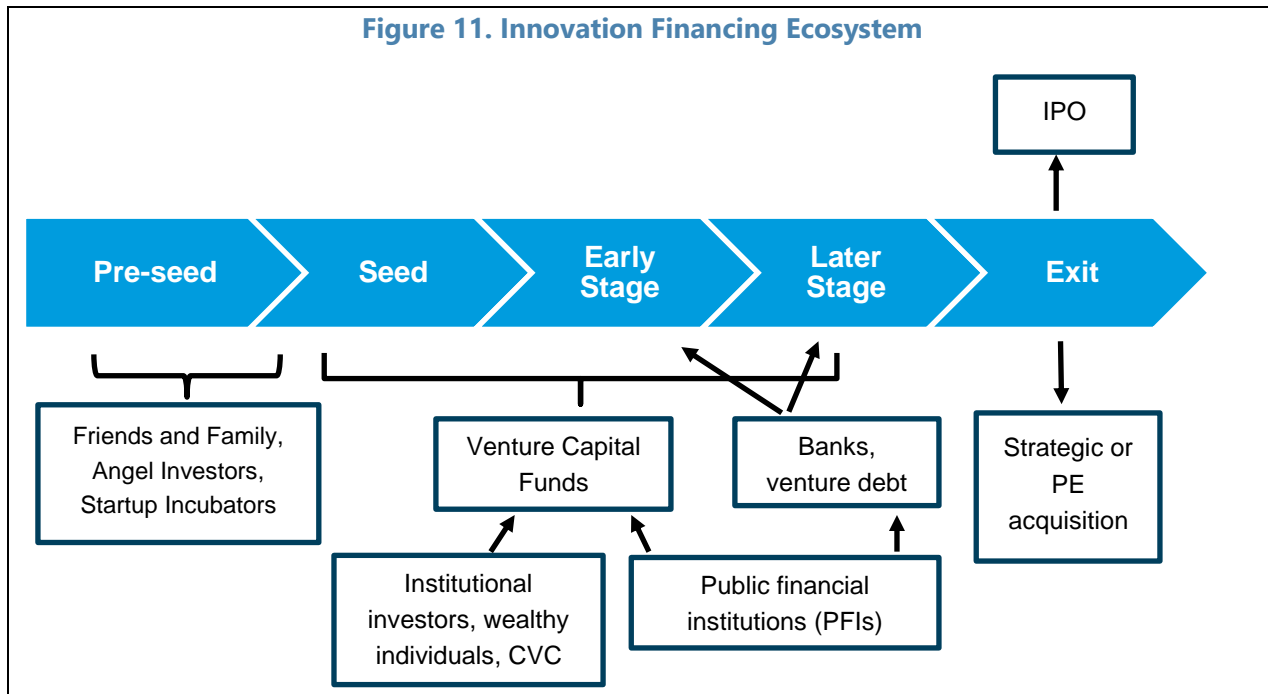
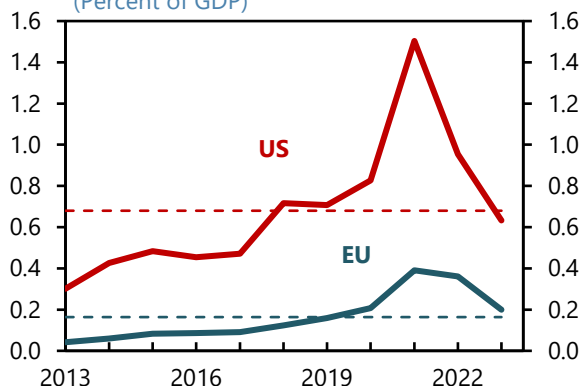


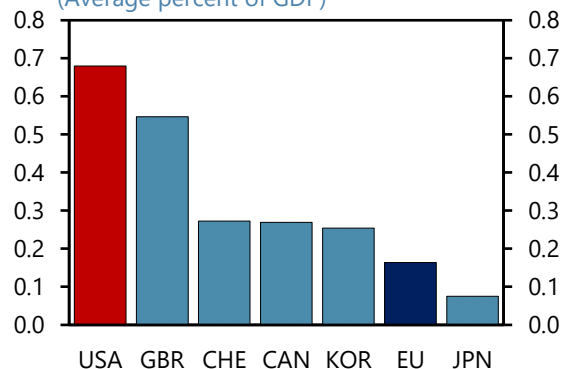
Figure 13. International VC, Fund Size, and Member States' VC Intensity

Venture Capital Investments, 2013-2023
(Percent of GDP)



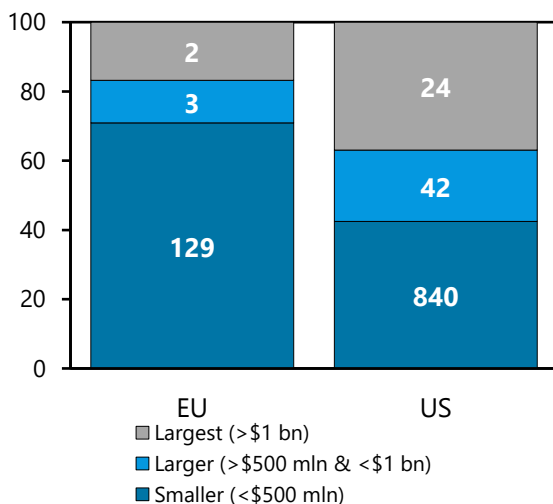
Sources: PitchBook Data, Inc.; IMF WEO April 2024; and IMF staff calculations.

Venture Capital Investments, 2013-23
(Average percent of GDP)



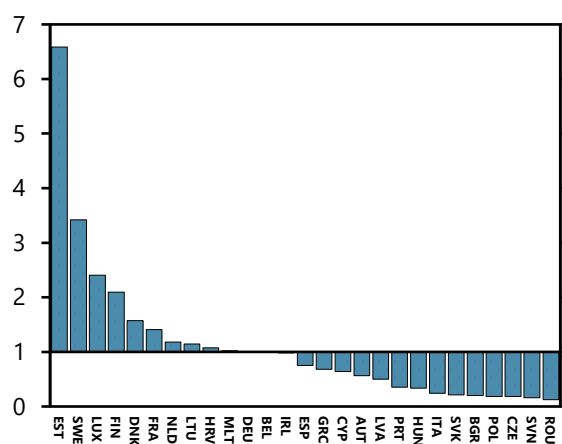
Sources: PitchBook Data, Inc.; IMF WEO April 2024 database; IMF staff calculations.

VC Raised by Fund Size, 2020-2023
(Average in percent of total VC raised)



Sources: PitchBook Data, Inc.; IMF staff calculations.
Note: Numbers on each bar is a fund count for each size category (averaged 2020-2023).

VC Intensity, 2019-2023
(Average share of total VC over share of total GDP)



Sources: PitchBook Data, Inc.; IMF WEO April 2024; and IMF staff calculations.

Note: Countries above 1 contribute to EU27 VC disproportionately compared to their share of EU27 GDP.

Figure 14. Correlation of VC with R&D and HH Investments

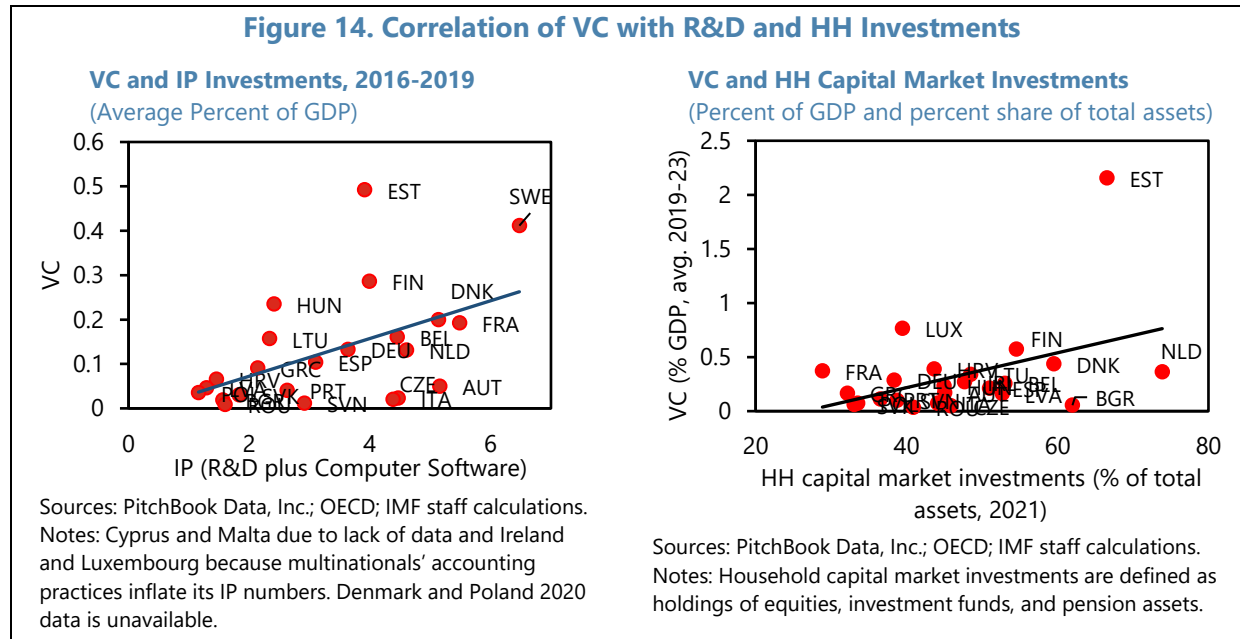
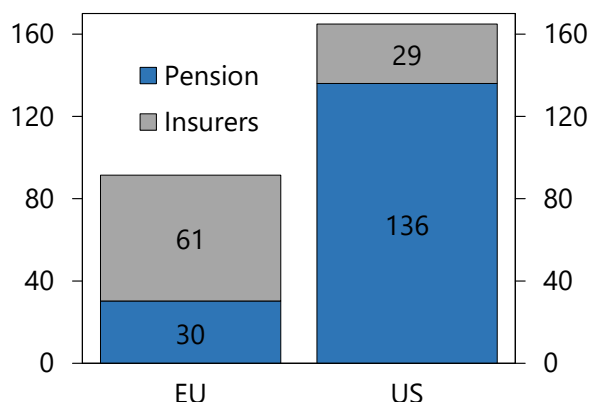
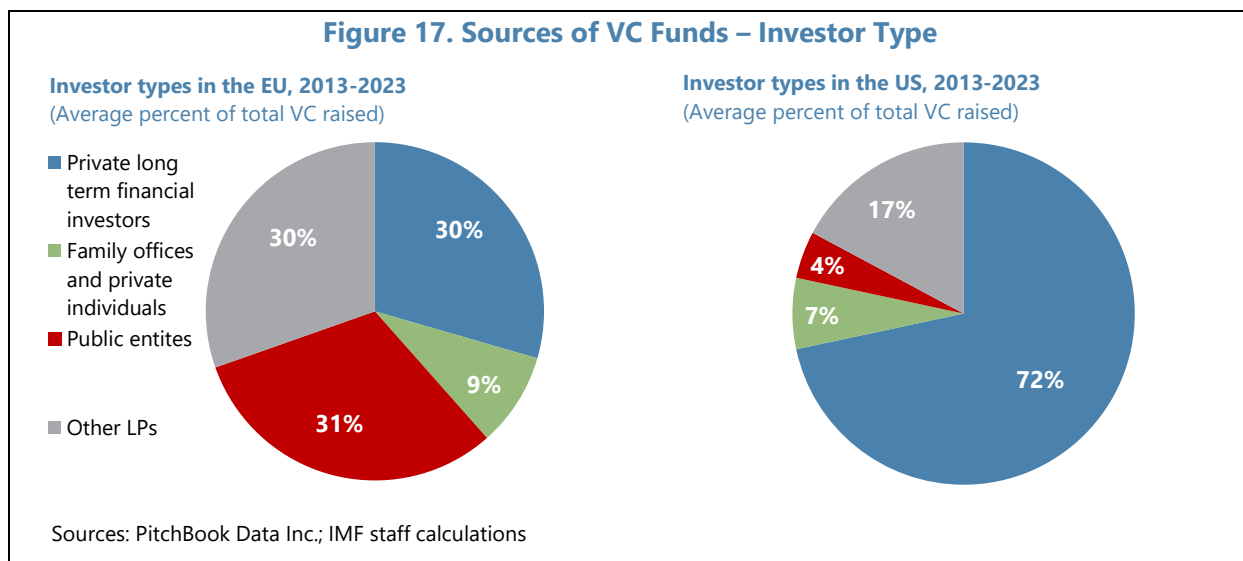
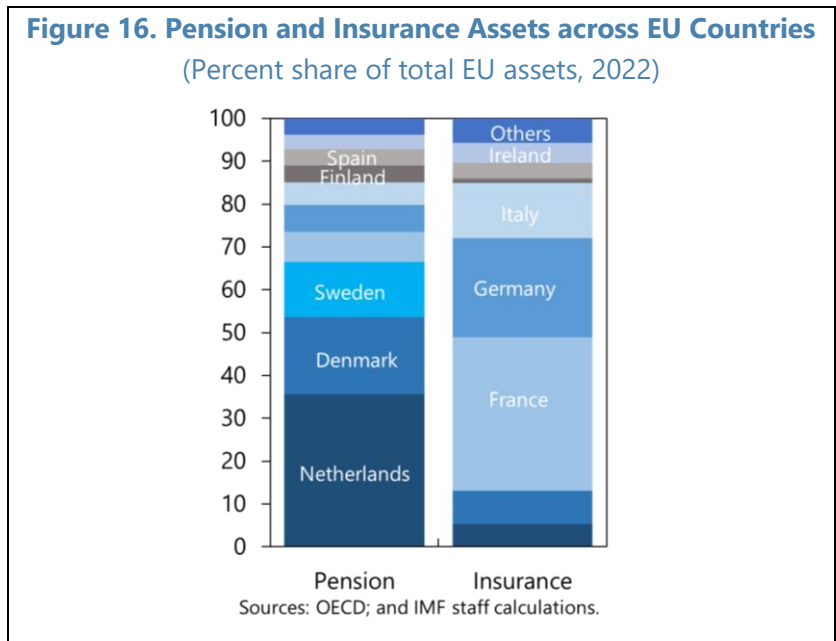


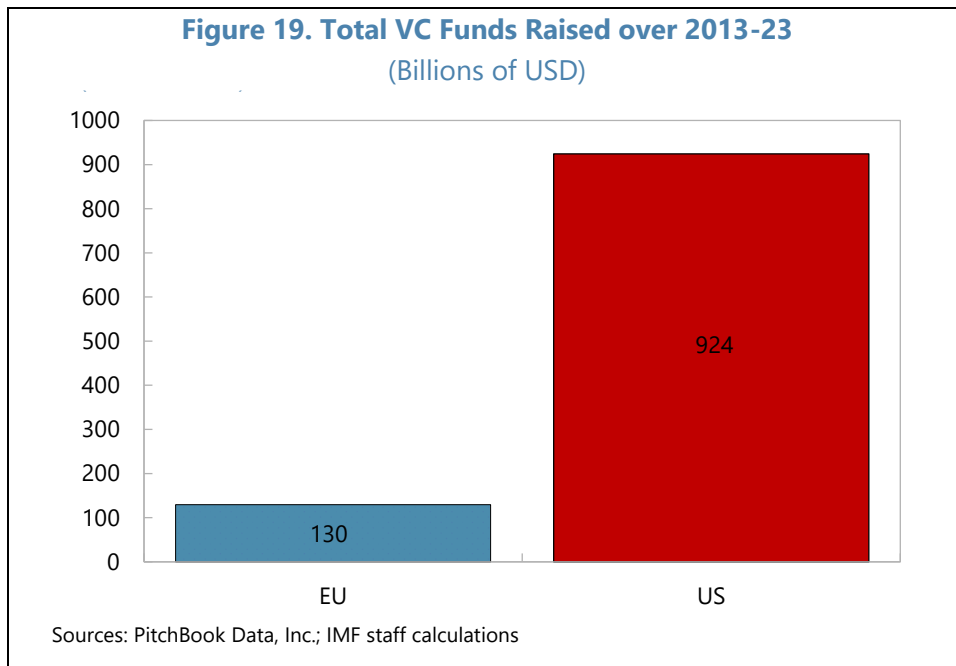
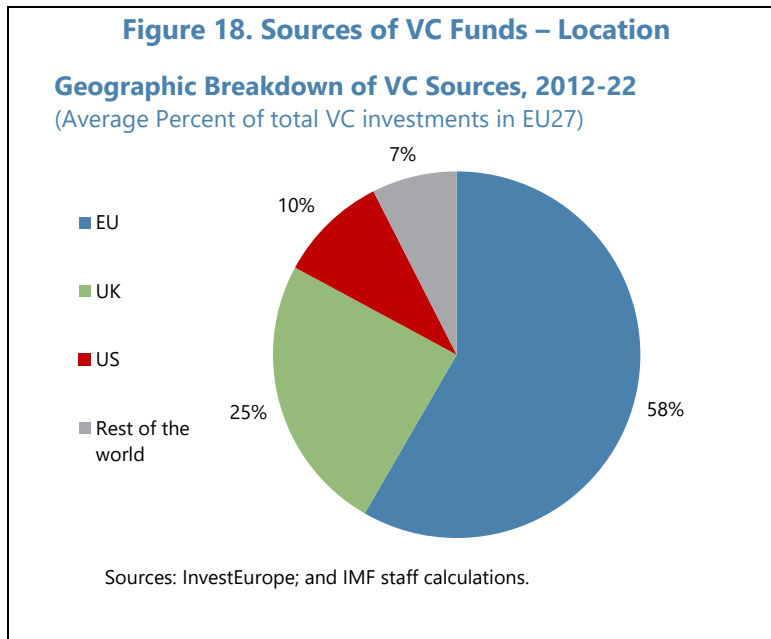
Figure 15. Pension Funds and Insurers Assets

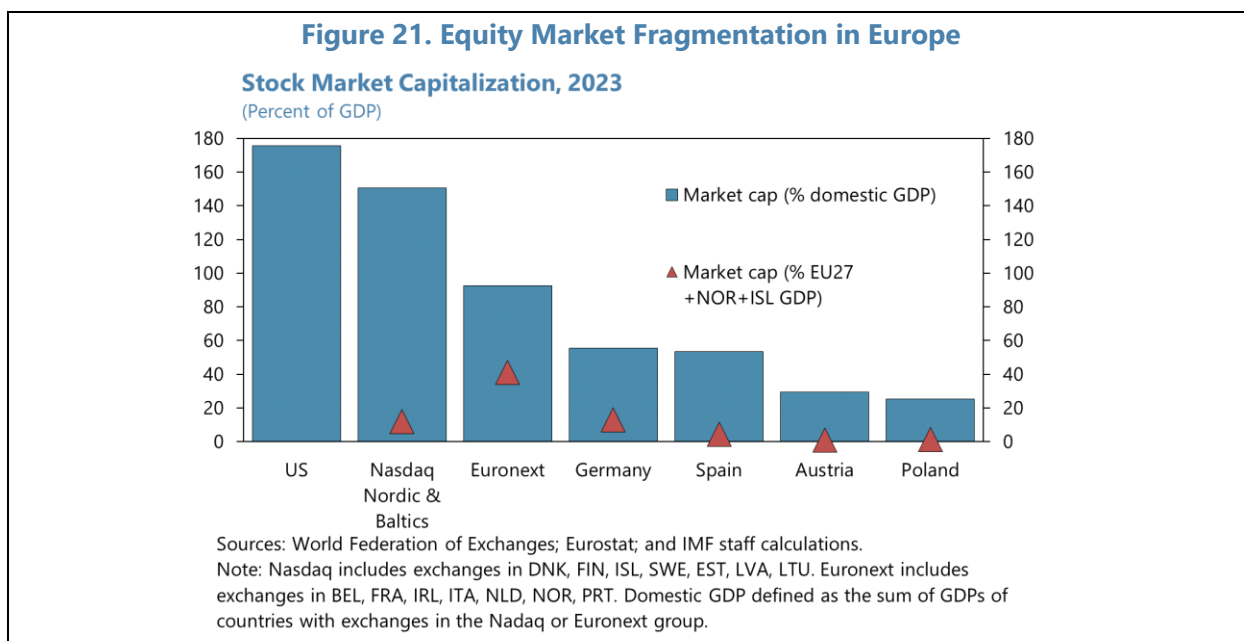
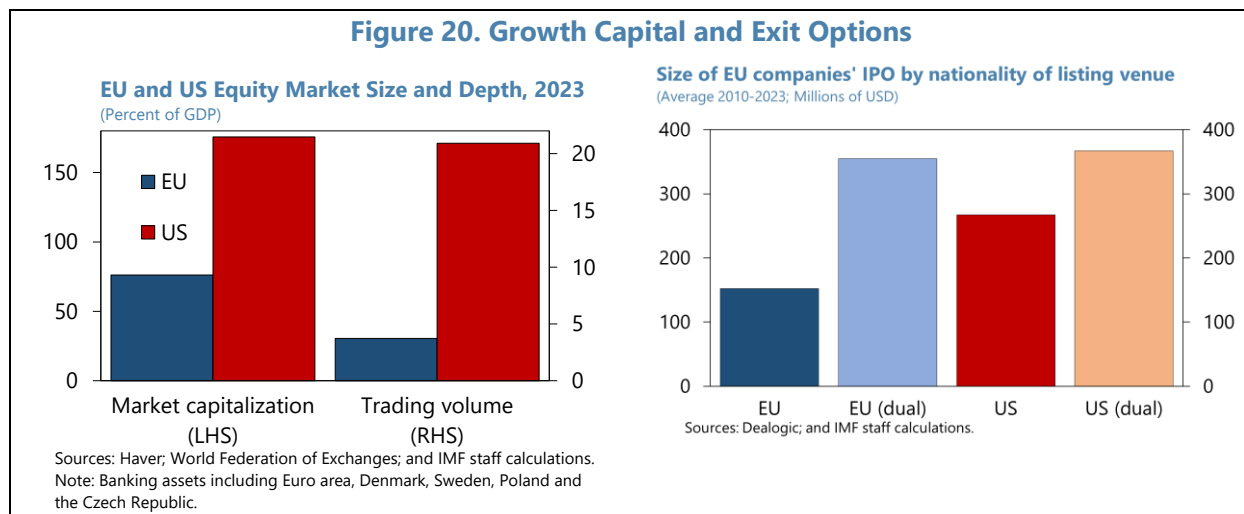
(Percent of GDP, 2022)



Sources: EIOPA, ECB, FRED, US Congressional Research Service; and IMF staff calculations.
Note: EU excludes AUT, BEL, BGR, CYP, HRV, MLT, ROU. Insurance data for SWE is not available.







Annex I. Key Players in the VC Ecosystem

The key players in the ecosystem include:

- *Innovators and entrepreneurs.* At the heart of the ecosystem are innovators, typically working in universities, research institutes, or high-tech companies. Translating their ideas into new products and creating start-ups based on them requires innovators to also be entrepreneurs or to be able to pair their ideas easily with entrepreneurs (e.g., through university intellectual property licensing offices).
- *Angel investors.* Often successful entrepreneurs themselves, these investors make equity investments at the earliest stages of a start-up. They also frequently play an important role in introducing start-up founders to other potential investors, including VC firms.
- *Venture capital firms.* These firms create specific VC funds (usually with an investment horizon of 10 years) to invest in a portfolio of start-ups with high growth potential, but typically substantial risk of failure. The goal is for the successful start-ups financed by a VC fund to return many multiples of the amount invested, which provides a sufficient risk adjusted return and compensates for the losses from investments by the fund in start-ups that fail. VC firms provide a small part of the capital in their VC funds and pool investments from outside investors, including wealthy individuals/family offices, institutional investors, public financial institutions, corporations, and others. VC firms also often provide advice and other services (e.g., help with recruiting) to start-ups they invest in, which can be important as the firm grows quickly. The VC fund will usually deploy a portion of the funds raised in the first few years its selected group of start-ups. Then over the next few years the VC fund will see how the firms perform, investing further in the better performing start-ups, and cutting their losses in failing ones. The size of VC funds will determine how far they can support start-ups as they scale up. As financing rounds become larger, VC backed start-ups will often seek financing from a broader group of investors, including other VC funds.
- *Institutional investors.* This includes pension funds, insurers, academic endowments, sovereign wealth funds, and other long-term financial investors. These are a key source of private capital for VC funds, increasingly so as the industry evolves and the size of VC funds rises. The extent to which different institutional investors allocate part of their portfolio to VC funds depends on a number of factors, including their experience with the asset class, the scale of VC funds, the risk-return profile, and regulatory constraints. The willingness and ability of institutional investors to invest in VC funds is an important determinant of the size of the pool of private capital available to finance innovative firms.
- *Public financial institutions.* Public financial institutions (PFIs) (e.g., national or multinational development banks like the EIB or funds like the EIF) often play an important role in jump starting and supporting the VC financing ecosystem. On the equity side, when the VC industry is small or sufficiently deep pools of private capital are not available, PFIs can help increase the pool of capital for VC funds to draw from, investing in VC funds alongside private investors on commercial terms or directly co-investing in start-ups. Moreover, when the VC industry (and fund sizes) is small, larger institutional investors may not allocate funds to it because the costs of due diligence are large relative to the size of investment that can be made in each VC fund. PFIs can help overcome this by creating a “fund of funds” that institutional investors can more easily invest in at larger scale, with the fund of

funds doing the due diligence and allocating investments in different VC funds. PFIs can also play an important role in either providing credit directly to growth firms that may have difficulty securing a traditional loan from a bank or de-risking private sector lending, such as through guarantees of a portion of the loan (often requiring the loan be provided at lower cost). It is important though that such instruments are carefully designed not to encourage lenders to provide excessive credit to start-ups or the firms to overleverage.

- *Venture debt and banks.* As start-ups scale-up, debt financing becomes attractive, as it allows them to finance investments without diluting equity holders. Venture debt funds will often lend alongside VC funds providing equity to more mature start-ups (i.e., with revenues to service debt even if still making losses as they invest to grow quickly). Venture debt funds often provide relatively soft loan terms (e.g., flexibility on start of interest and principal payments, etc.), but at relatively high interest rates along with equity warrants. Banks risk models are not designed to account for unprofitable, but fast-growing firms with limited tangible assets. However, they can play an important role in financing start-ups, particularly more mature ones investing in scaling their business with tangible investments. Guarantees or other risk mitigation instruments provided by PFIs at the national and European level are important both for increasing the availability of venture debt and bank credit, as well as lowering the cost of credit for start-ups.
- *“Exit” options.* As VC funds have a pre-defined investment period, at some point they will need to sell their stakes in start-ups in order to return capital to investors, which is referred to as an “exit.” Generally speaking, there three types of exits (besides the start-up failing): (i) sale to another private equity (PE) fund, often a larger “growth fund” that focuses on investments in more mature but still growing firms; (ii) acquisition by a larger firm, often in the same industry; or (iii) publicly listing on a stock exchange through an initial public offering. The returns from exits are often plowed back into new VC funds, with VC firms typically increasing the size of each subsequent fund. Exits are also how founders of start-ups translate their stake in the firm into more fungible financial assets (e.g., cash, stocks). Successful start-up founders often go on to become serial entrepreneurs, angel investors or VC firm partners, thereby helping the ecosystem to develop.

Annex II. Key EU Legislation and Regulations Relevant to VC Financing

European Venture Capital Fund Regulation (EuVECA)

EuVECA is the voluntary EU passporting regime for smaller venture capital funds. EuVECA sets minimum requirements in terms of supervision, own funds, use of capital and eligible investors. In turn it offers an EU-wide marketing passports for registered funds. Venture capital investors can choose to register as an EuVECA if they have less than €500 million in assets under management (AUM). EuVECA comes with lower authorization and compliance costs compared to AIFMD, which is the mandatory legal framework for funds with AUM above €500 million. With most EU VC funds below the threshold, European venture capital funds are primarily captured by the EuVECA.

The EuVECA regulation establishes three criteria that a fund must fulfill to qualify. First, at least 70 percent of capital must be used to support eligible companies. Eligible companies are companies that at the time of the first investment are either not admitted to trading on a normal trading venue and employ up to 499 persons, *or* it meets the SME criteria of the Markets in Financial Instruments Directive (MiFID II)¹ and is listed on an SME growth market. Also, loans are limited to a maximum of 30 percent of committed capital of the fund to any given company, the remaining investments must be in the form of (quasi-)equity. EuVECA funds must not be leveraged.

EuVECA sets tight limits on venture capital activity. Eligible investors are so-called *professional clients* as defined in MiFID II or investors that commit a minimum of €100,000. The European Commission's department Financial Stability, Financial Services and Capital Markets Union (FISMA) and ESMA are currently evaluating the EuVECA framework.

Alternative Investment Fund Managers Directive (AIFMD)

AIFMD is the mandatory regulatory framework for large fund managers. AIFMD introduced a harmonized framework for EU-established managers of alternative investments funds. It covers any funds that are not mutual funds sold to retail investors, such as *inter alia* venture capital, private equity, real estate, and hedge funds. It captures any fund manager that manages more than €500 million in assets.

AIFMD covers a wide range of issues but does not have detailed restrictions on eligible investments such as EuVECA. AIFMD covers areas such as authorization, capital requirements, conduct of business standards, remuneration, valuation of assets, delegation, depositaries, transparency, and marketing. It introduces procedures for the independent valuation of assets, enhances transparency (AIFMD have to report on their leverage) and give competent national authorities powers of inspection and intervention.

However, AIFMD does set important limits to the investor base. The AIFMD restricts the eligible investor base of alternative investment funds to so-called *professional investors* (Article 31). Investors may apply to be recognized as professional investors, if they meet two of the following three criteria (as laid down in the Markets

¹ SMEs are companies that had an average market capitalization of less than EUR 200mn on the basis of end-year quotes for the previous three calendar years.

in Financial Instruments Directive (MifID II): execution of on average 10 financial transactions per quarter of significant size, have a portfolio of more than €500,000 and/or have relevant work experience in the financial sector of at least one year. Alternatively, member states may allow the marketing of alternative investment funds to retail investors *in their territory only* (Article 43(1)).

Solvency II Directive

The Solvency II Directive sets out requirements for insurance and reinsurance companies in the EU.

Solvency II harmonizes various aspects around capital requirements, risk management and governance. It also harmonizes supervision, which remains primarily at the national level. Solvency II covered (re)insurers had €8.4 trillion in assets under management.

Of particular interest for venture capital (and private equity) is the “long-term equity (LTE) category”.

Solvency II allows insurers to set up a LTE category, which benefits from lower risk weights. Giving long-term equity exposures a separate treatment from daily traded equities was the objective of the creation of the LTE category. The lower risk weights reflect the long-term nature of the investments (such as VC, where investors usually don't have early redemption rights). However, many insurance companies have not made use of the LTE category (Article 171a of Solvency II Delegated Acts) since it was introduced.

Industry representatives highlight two key issues with the LTE category. The complexity and in some cases contradictory nature of the asset-liability management (ALM) requirements, as well as the geographic criterion.

- **Need to streamline and reduce asset-liability management (ALM) requirements.** The purpose of the ALM requirements (Article 171a para1 (a)-(e)) is to make sure that the insurer will clearly separate the portfolios. These provisions are unnecessarily complex and costly, particularly for smaller insurers. In some cases, the requirements interact with national regulation and are next to impossible to apply in some member states.
- **The geographic criterion is too constraining.** Currently, equities in the LTE bucket must be either listed in the EEA, or in the case of unlisted companies the headquarter must be in the EEA (Article 171a para1 (f)). The focus on the EEA makes the portfolio less diversified and hence riskier.

Review of the framework. In the context of the review of Solvency II, initiated as part of the 2015 Capital Markets Union (CMU) agenda, the Commission proposed to reduce the risk weight on certain private equity investment to 39 percent. Meanwhile, industry representatives have argued that the risk weight should be more in the range of 20 – 30 percent ([Invest Europe 2017](#)). Political agreement on Solvency II has been reached on 14 December 2023. At the time of the writing of this text, the final agreement was not public yet.

Institutions for Occupational Retirement Provision Directive (IORP II)

IORP II covers occupational pension funds, so called pillar 2 (private, normally pre-funded, supplementary pension plans linked to an employment relationship). Institutions which operate on a pay-as-you-go basis are excluded from the scope of IORP. There are over 125 000 IORPs (2014), but many of these will be smaller schemes with fewer than 100 members and member states can exempted them from the Directive. Asset under management of IORP regulated funds stood at close to €2.5 trillion at end 2022. Funds in the

Netherlands account for 60 percent of that. Germany accounts for about 10 percent, Sweden for 9 percent and Italy for 6.5 percent.

The Directive sets out basic requirements for IORPs, together with some rules for their supervision.

The requirements cover such things as the ring-fencing of assets, information provision, prudent investment of assets, rules for operating cross-border etc. In almost all cases there are no detailed requirements, especially on the part covering the quantitative requirements (e.g., technical provisions). Instead, reference is made to the responsibility/prerogative of the MS to define the details.

Investment rules (article 19) are broad but biased against VC and private equity. IORP prescribes that *the assets shall be predominantly invested on regulated markets*. Other investments must be kept to prudent levels; (article 19 para 1(d)) at the same time MS shall not prevent IORPs from: investing in instruments that have a long-term investment horizon and are not traded on regulated markets (article 19 para 6(c)). The impact on the investment of IORP will then depend on for instance how *prudent levels* are defined at the national level.

Review of the directive ongoing. The Commission started preliminary work on the IORP II directive review and will issue its proposal during the 2024-2029 EC mandate.

Annex III. Description of Data

Pitchbook

The data obtained from Pitchbook for VC investments consists in completed deals from 2013 to 2023. Those deals cover the following VC stages: Pre/accelerator/incubator, angel, seed, early stage, and later stages. In terms of location, they are restricted to HQ only. The data for VC raised consists of LP commitments to Venture Capital funds limited by the fund HQ location. Data as of March 26, 2024.

Invest Europe

The data used to compute the geographic breakdown of VC sources consists in venture investments by location of private equity offices investing in European companies.

OECD – [Capital formation by activity](#)

The database presents gross capital formation, gross fixed capital formation, changes in inventories and acquisition less disposals of valuables broken down by detailed industries according to the classification ISIC rev.4. Gross fixed capital formation is also available broken down by type of assets. It has been prepared from statistics reported to the OECD by countries in their answers to annual national accounts questionnaire.

[EU KLEMS \(National Accounts\)](#)

EU KLEMS is an industry level, growth and productivity research project. EU KLEMS stands for EU level analysis of capital (K), labor (L), energy (E), materials (M) and service (S) inputs. It provides detailed data for 27 EU Member States, the US, Japan and the United Kingdom, across 40 industries (although coverage may vary over time and across countries), 23 industry aggregates, over the period 1995-2020.

[Dealogic](#)

The private database covers primarily transaction in fixed Income and equity capital markets, as well as mergers & acquisitions. The equity capital markets section of Dealogic cover Initial Public Offerings (IPOs).

[World Federation of Exchanges](#)

The World Federation of Exchanges (WFE) is an industry association of trading venues which provides a database based on data reported by their members. All major EU and US stock exchanges are WFE members.

Bank for International Settlements – [Consolidated Banking Statistics](#)

The database classifies quarterly data on resident banks' international financial claims on non-resident banks by debtor country, remaining maturity, and sector of the borrower. For data reported on Immediate Counterparty Basis positions are allocated to the primary party to a contract.

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