INTERNATIONAL MONETARY FUND

STAFF DISCUSSION NOTE

Deeper and More Integrated Financial Markets to Foster Growth and Resilience in Europe

Prepared by Luis Brandao-Marques, Damien Capelle, Diego Cerdeiro, Adriano Fernandes, Alexandra Fotiou, Yueling Huang, Claire Yi Li, Rui C. Mano, Alberto Musso, Ese Onokpasa, Richard Varghese, and Maryam Vaziri

SDN/2026/002

2026
JUN

 SDN/2026/002

IMF Staff Discussion Notes
European and Research Departments

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Authorized for distribution by Helge Berger, Oya Celasun, and Pierre-Olivier Gourinchas
June 2026

ABSTRACT: Persistent fragmentation and limited depth in European Union (EU) financial markets constrain firm growth, innovation, and cross-country risk sharing. This IMF Staff Discussion Note documents policy-induced barriers that impede cross-border bank lending and suppress the scale of venture capital, alongside broader real-sector frictions that restrict the amount of investable projects. Obstacles examined in the Note include heterogeneity in banking regulation and safety nets (notably deposit insurance), insolvency regimes, and rules that limit the provision and allocation of risk capital by pension funds and insurers. Financial reforms could raise long-term EU GDP by about 3 percent, with two-thirds from deeper banking integration and the remainder from reducing cross-border barriers to and expanding the supply of risk capital. In addition, these financial reforms would magnify the gains from a broader set of domestic structural reforms that improve business dynamism and innovation by an additional percentage point of GDP. Smaller EU economies and younger firms benefit disproportionately.

RECOMMENDED CITATION: Brandao-Marques and others. 2026. “Deeper and More Integrated Financial Markets to Foster Growth and Resilience in Europe.” IMF Staff Discussion Note SDN2026/002, International Monetary Fund, Washington, DC.

ISBN:	979-822904-833-0
JEL Classification Numbers:	F36, G21, G24, O16
Keywords:	banking union, capital markets union, cross-border banking, venture capital, capital allocation, firm growth, risk sharing
Author’s Email Address:	lmarques@imf.org, dcerdeiro@imf.org, afernandes@imf.org, afotiou@imf.org, yhuang5@imf.org, yli13@imf.org, rmano@imf.org, musso2@imf.org, oonokpasa@imf.org, rvarghese@imf.org, mvaziri@imf.org

* Acknowledgments: The authors thank Helge Berger, Oya Celasun, Giovanni Dell’Ariccia, Pierre-Olivier Gourinchas, and Sole Martinez Peria for guidance and feedback. They are also grateful to participants in the interdepartmental surveillance meeting for helpful comments. Luisa Charry contributed to Box 3. Daniela Rojas and Agnesa Zalezakova provided editorial assistance.

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Acronyms

BU—banking union
CMU—capital markets union
CSD—Central Securities Depository
ECB—European Central Bank
EC—European Commission
EIB—European Investment Bank
EIF—European Investment Fund
EU—European Union
EuVECA—European venture capital fund
EUR—euro
GDI—gross domestic income
GDP—gross domestic product
GNP—gross national product
NBFI—nonbank financial institution
NFC—nonfinancial corporation
OECD—Organisation for Economic Co-operation and Development
ONA—outstanding nominal amount
O-SII—other systemically important institution
PIT—personal income tax
R&D—research and development
RIS—Retail Investment Strategy
SIU—Savings and Investments Union
SME—small and medium enterprise
SRM—Single Resolution Mechanism
SSM—Single Supervisory Mechanism
US—United States
VC—venture capital
WB-BRSS—World Bank-Bank Regulation and Supervision Survey

Executive Summary

Financial markets in the European Union (EU) remain fragmented and shallow, despite recent progress. Fragmentation in credit, equity, and venture capital (VC) markets along national lines can constrain firm growth, particularly for young and innovative companies, as could the limited depth of long-term risk capital.

This IMF Staff Discussion Note identifies barriers impeding the efficient allocation of bank credit across borders and the scale of VC in the EU and quantifies the GDP gains from reducing them. The overwhelming reliance of EU firms on bank funding calls for a greater understanding of the potential gains from further progress in the banking union. As for VC, where issues extend beyond cross-border impediments to include the supply of capital and the development of an innovation-friendly business environment, a number of policy papers have recently highlighted its importance for growth; however, a comprehensive analysis is still lacking.

The Note presents new empirical evidence on the most important financial policy and broader barriers to cross-border banking and to the scale of VC. Some barriers reflect nonactionable informational frictions, but many are policy-induced and therefore amenable to reform. Within the financial system, two actionable types of barriers are found to matter: (1) cross-country differences in banking regulations, safety nets, including deposit insurance schemes, and corporate bankruptcy (insolvency) regimes; and (2) barriers constraining the supply of risk capital by pensions and insurers and the cross-border allocation of these funds, including due to legal fragmentation. That said, a broader set of domestic real-sector structural barriers that limit the availability of investable innovative projects are found to form the most serious impediments to a more vibrant VC landscape.

Model simulations suggest that a moderate reform effort targeting the identified financial policy barriers could raise EU GDP by about 3 percent in the long term, with additional gains from complementarities with real-sector reforms. Two-thirds of these gains come from reducing barriers to cross-border banking, with the remainder due to strengthening the supply of VC and the reduction of cross-border barriers to VC. The effects of the VC layer are small because the sector is small to begin with. Smaller EU economies and younger firms benefit disproportionately. In addition, these financial reforms would also magnify by an additional percentage point of GDP the gains from a broader set of domestic structural reforms that improve business dynamism and innovation. These reform efforts do not fully close the identified policy gaps and leave out some financial reforms (notably, equity market integration). Although the Note quantifies GDP gains, further integration could also strengthen resilience and improve risk sharing across countries, thereby providing additional welfare gains.

The conclusions of the Note support an array of reforms: (1) advancing the banking union, while safeguarding financial stability, in particular by introducing a European deposit insurance scheme and harmonizing macroprudential frameworks, which could reduce home bias in bank lending; (2) harmonizing corporate insolvency law, including by introducing a 28th regime for corporate legal frameworks, which could increase the demand for cross-border funding by firms; (3) expanding the supply of long-term risk capital through pension and insurance reforms; and (4) reducing barriers to cross-border equity investment by enhancing pension portability, harmonizing procedures for tax withholding and ensuring that market participants can operate in all trading venues in the EU. These financial reforms should be pursued alongside national and EU-level real-sector reforms to ensure a strong pipeline of innovative firms. Together, such reforms would help Europe mobilize its abundant savings to build a stronger, more resilient economic union.

I. Introduction

Recent International Monetary Fund work points to substantial gains from further EU- and national-level real-side structural reforms. Although the single market has delivered important benefits, it remains incomplete (IMF 2024). A growing body of evidence suggests that further real-side integration—alongside national reforms—could yield large productivity and competitiveness gains. Just halving domestic structural policy gaps and EU-US gaps in internal trade and labor mobility barriers can raise EU GDP in the long term by 15 percent, although fully closing all these gaps can lead to estimated gains of 35 percent (IMF 2025a; Kammer and others 2026).

The benefits from these reforms may be enhanced by a financial system capable of mobilizing savings and allocating capital efficiently within and across borders, particularly as reforms and market integration raise the demand for risk capital (see Box 1 for recent EU initiatives). Fragmentation in credit, equity, and venture capital (VC) markets along national lines and the lack of depth of VC markets can constrain firm growth, particularly for young and innovative companies. Barriers depress output by misallocating savings across firms and countries, raising the dispersion in investment returns, and weakening productivity (Draghi 2024). They also shrink the pool of financial intermediaries, reducing firms' chances of securing favorable financing matches and increasing intermediation margins through weaker competition, further depressing innovation, investment, and output.

Banking union and the overall development of VC markets have been the focus of renewed attention. The overwhelming reliance of EU firms on bank credit, which accounts for 26 percent of nonfinancial corporations' liabilities, compared with only 10 percent in the United States in 2024 (EC 2025), calls for a greater understanding of the potential gains from further progress on the banking union. For the VC market, issues are likely to go beyond cross-border impediments and relate more importantly to the supply of long-term risk capital and the development of an innovative business environment. Several policy papers have recently highlighted the importance of equity markets and VC for the growth of innovative start-ups (Arnold and others 2024; Kukies and Noyer 2026), which have difficulty accessing traditional bank funding because of their short credit histories and lack of tangible collateral. These firms could benefit from a vibrant European VC market, but this market remains fragmented and, above all, small at approximately one-fourth the size of the US market (Arnold and others 2024).

Deeper and more integrated financial markets can also increase resilience, provided adequate policies are in place. Financial depth and integration improve savers' welfare by enhancing risk sharing—households have greater direct access to public financial markets, which allows them to smooth consumption by shielding them from their home country's shocks (Box 2)—and promotes resilience to domestic shocks by diversifying sources of funding. Moreover, the recent Euro Area Financial Sector Assessment Program noted that the euro area's financial system has proven resilient and the authorities have made significant progress since the 2018 Financial Sector Assessment Program but stressed that completing the euro area financial architecture remains critical (IMF 2025b). The case for sound policies to foster financial stability becomes even more important as Europe's financial markets become more integrated. This is because greater depth and interconnectedness of financial systems can lead to excessive risk-taking by financial institutions, whereby collective moral hazard and interconnectedness reinforce each other (Altinoglu and Stiglitz 2023), and may

then result in cross-country financial spillovers.[1] This calls for adequate prudential policies to reap the benefits while minimizing financial stability risks.

This IMF Staff Discussion Note investigates impediments to cross-border bank credit and the scale of VC in the European Union by answering the following questions: (1) What are the main policy frictions that impede cross-border bank lending? (2) What are the main policy frictions that limit the development of VC? (3) How large are these frictions and how do they distort financial flows? (4) What are the macroeconomic implications of removing these frictions for economic growth? To answer these questions, the Note builds on previous IMF work (for example, Bhatia and others 2019) that covers the benefits—in terms of productivity and risk sharing—of a deeper and less fragmented corporate financing environment, by focusing on cross-border banking and VC.

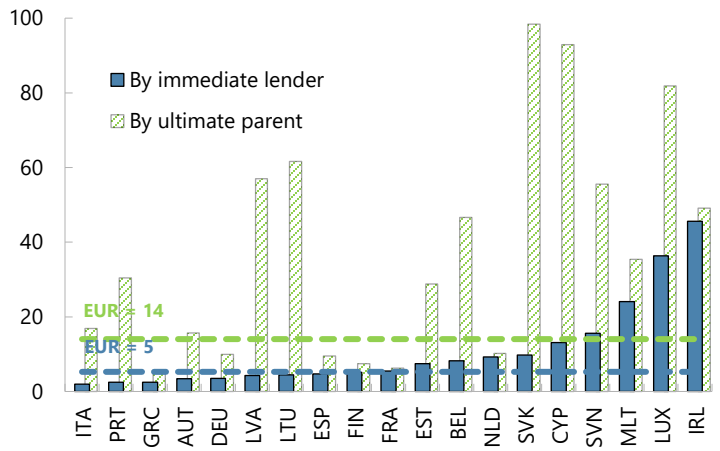
Road map. After presenting stylized facts on fragmentation (Section II) and providing a conceptual framework about the types of financial barriers and their macroeconomic implications (Section III), the Note describes the findings from gravity-based empirical analyses on the partial equilibrium effects of removing barriers to bank credit and VC (Section IV). Section V uses a structural model to quantify macroeconomic effects. Section VI concludes with policy implications.

[1] According to Altinoglu and Stiglitz (2023), integration, by increasing the scale of financial institutions, raises the incentives for risk-taking when governments insure too big to fail financial institutions against downside risk. Moreover, increased integration results in stronger financing from systemic institutions to smaller financial players, which then increases their risk-taking.

II. Stylized Facts

Bank credit to firms is strongly biased toward domestic borrowers. Cross-border loans by immediate lenders constitute around 1 percent of all bank-firm relationships in the European Union, and around 5 percent of total loan volumes to firms. Although there is sizable variation across member countries, ranging from 2 percent in Italy to 49 percent in Ireland, home bias remains a reality in all EU countries (Figure 1).[2] Only a few large European firms maintain cross-border exposures; all others still rely primarily on domestic lending. Cross-border loans by ultimate banking parents, which include lending through subsidiaries and branches, account for a higher share, at 14 percent of total loan volumes. Cross-border lending through branches and subsidiaries is especially strong in eastern European countries. Total cross-border bank flows within the European Union are also lower than those observed across states in the United States, where interstate banking has become dominant since the deregulation of the 1970s.

Figure 1. Share of Cross-Border NFC Loans
(Percent)



Sources: ECB; and IMF staff calculations.
Note: The chart shows the percentage of firm-level borrowing that comes from cross-border banks across European countries (denoted by ISO-3 letter codes). Data cover 2023 Q3. ECB = European Central Bank; NFC = nonfinancial corporation.

The strong home bias in bank credit is due to large frictions faced by entities looking to start a cross-border bank lending relationship. Using the universe of bank lending to firms and applying a gravity econometric model (see Annex I), it is estimated that forming a new cross-border credit relationship is subject to a 99 percent implicit tax relative to a new domestic relationship.[3] But once relationships are formed, the estimated frictions are negligible, with an implicit tax of only 0.2 percent when a foreign bank rather than a local bank lends to a given firm and an average difference of only 25 basis points in interest rates. Because of their greater quantitative importance, the rest of the Note focuses on barriers to forming new bank-firm relationships.

At the same time, the EU's VC ecosystem remains underdeveloped and fragmented. EU VC markets are approximately one-fourth the size of those in the United States (Arnold and others 2024). The EU's underdeveloped VC market is an important factor holding back productivity and innovation (Draghi 2024; IMF

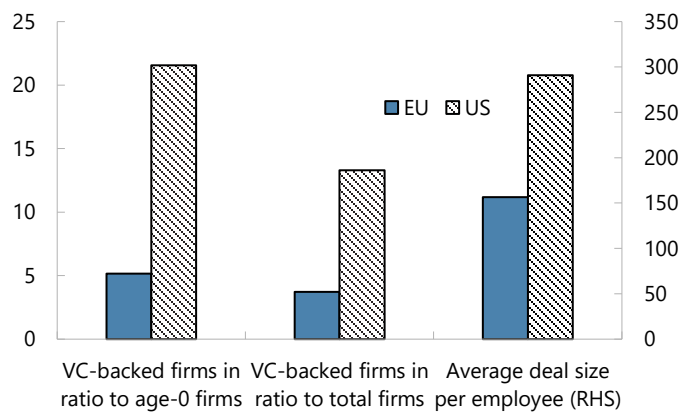
[2] Countries with high shares of cross-border nonfinancial corporation loans tend to be financial centers, geographically small, or with a high degree of foreign bank penetration.

[3] The implicit tax is defined as the additional cost firms face when borrowing from abroad to rationalize the small share of cross-border loans shown in Figure 1 through the lens of the model introduced in Section V and explained in Annex III.

2024; Adilbish and others 2025). Indeed, the fraction of young firms receiving VC funding in the European Union is about one-fourth the ratio for US young firms (Huang and others forthcoming). Even when EU firms do secure VC, they receive half what US firms receive on average (Figure 2).

In addition to a shallower domestic VC market, cross-border barriers could also play a role. The more fragmented VC market in the European Union relative to the US constrains funding availability for EU start-ups and hinders the efficient allocation of capital. VC investments among EU countries are more home-biased than those among states in the US. Sixty percent of investors are from the start-up's home country in the EU, compared with about 30 percent from the home state in the United States. By contrast, fewer than 20 percent of investors in EU start-ups are from other EU countries, well below the 50 percent of investors from other states in the United States, underscoring lower regional integration in the European Union (Huang and others forthcoming).

Figure 2. Venture Capital in the EU versus the US
(Left scale: per 10,000 firms; Right scale: US$1,000)



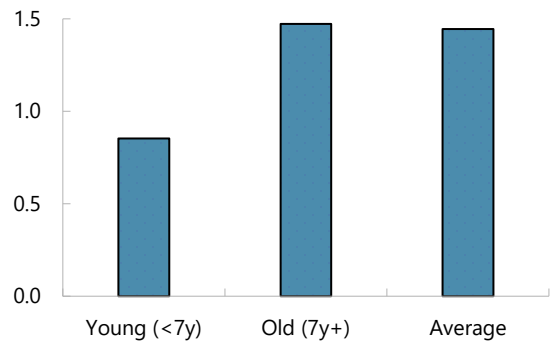
Source: Huang and others (forthcoming).
Note: Data cover 2015–24. EU = European Union; US = United States; VC = venture capital.

The dearth of long-term risk capital particularly affects young and innovative firms, which appear to be credit-constrained. The extent to which EU firms are financially constrained can be gauged through an empirical strategy that exploits corporate tax changes to identify credit constraints (Brandao-Marques and others 2026). An increase in the corporate tax rate raises firms' incentives to borrow as interest payments are tax-deductible. Accordingly, a larger response in firm leverage following a corporate tax hike suggests less binding credit constraints. The analysis finds that younger firms adjust leverage far less than older firms when the corporate tax rate increases (Figure 3, panel 1).[4] This reflects younger firms' limited collateral and shorter credit histories. Moreover, innovative firms are also more credit-constrained (Figure 3, panel 2).

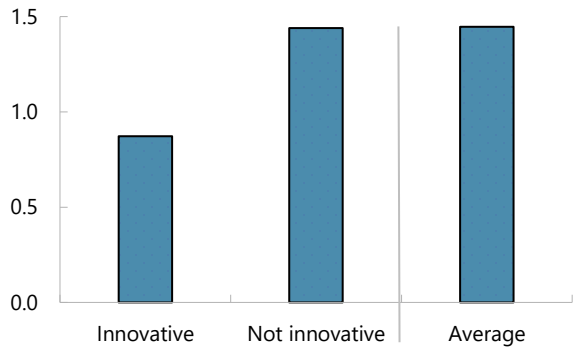
[4] The analysis builds on Heider and Ljungqvist's (2015). This identification strategy is well suited to identifying credit constraints facing European firms because traditional proxies for financial constraints—such as firm size or standard index-based measures—perform poorly in a corporate environment dominated by unlisted small- and medium-sized enterprises.

Figure 3. Debt Following a Tax Rise

1. Split by Age
(Percent change in debt levels)



2. Split by Innovation Intensity
(Percent change in debt levels)



Source: Brandao-Marques and others (2026).
Note: Panel 1: "Young" = firms younger than 7 years. Panel 2: "Innovative" = firms in a country-industry pair classified in the top quartile of innovativeness by the OECD Oslo Manual. Estimates are computed under the assumption that total assets remain unchanged after the tax increase, consistent with Farre-Mensa and Ljungqvist (2016). OECD = Organisation for Economic Co-operation and Development.

III. A Conceptual Framework: Barriers and Their Macroeconomic Effect

A. Types of Barriers

Many factors impede the free allocation of capital across borders and the development of VC (Table 1). This section introduces a conceptual framework for understanding various barriers, highlighting the most relevant ones in the European context.

There are three main types of barriers: those that affect the match between investors and firms, the supply of funds, or the demand for funds. Barriers arising from mismatches between savers and firms are typically related to differences between the origin and destination countries (for example, language and cultural distance, differences in regulatory environments that may make banks prefer to favor lending in their own country). Supply-side barriers or "push factors" prevent savers and financial intermediaries from directing savings to their most productive use (for example, regulations on investment to risk capital, lack of information on investment opportunities, and investment mandates). Demand-side barriers or "pull factors" affect firms' willingness and ability to raise external finance (for example, collateral requirements, domestic impediments to innovative projects). In particular, younger firms hold less collateral, resulting in higher financing costs.

Although some of these barriers are directly tied to policy—prudential and supervisory rules, tax systems—others are not. Nonpolicy barriers include language, geography, natural informational frictions, differences in business culture, or behavioral biases. Language, culture, and geography have been shown to be important barriers (Coeurdacier and Rey 2012; Pellegrino and others 2025). Informational frictions stem from the fact that investors have superior information about local assets. These can be compounded by their limited information-processing ability and rational inattention (Van Nieuwerburgh and Veldkamp 2009) and behavioral biases, such as familiarity, regret risk, and ambiguity aversion (Uppal and Wang 2003; Solnik and Zuo 2012). Importantly, these are slow-moving and challenging to tackle with policy reforms. Policies can and should address policy-induced barriers but also recognize the persistence of deeper structural barriers, which may also be great impediments to growth.

In addition to barriers across member countries, there are also barriers within countries across regions, and barriers specific to segments of financial intermediation: regional segmentation of credit markets, local banking relationships, and tax incentives that privilege housing and sovereign bonds over corporate funding. Similarly, there are barriers specific to nonbank financial intermediaries, including pension fund regulations, insurance companies, and VC funds, which prevent the efficient supply of risk capital.

This Note focuses on and quantifies the affect of three sets of barriers (dashed bubbles in Table 1).

1. **First, it looks at cross-country differences in banking regulations.** There has been recent significant progress in harmonization of banking regulation, supervision, and resolution, though there is room to further harmonize rules in a few areas (for example, licensing, qualifying holdings, governance, fit and proper assessments of bank managers, and related parties transactions). Moreover, differences in corporate insolvency regimes, tax treatments, deposit-guarantee schemes, and securities and consumer protection regulation add further complexity.

Table 1. Barriers to the Free Allocation of Capital within and across Borders

	Policy	Not Policy-driven
Barriers between investors and firms	1 Differences in corporate bankruptcy regimes, prudential policies, bank supervision and resolution, and deposit insurance schemes Restrictions to bank lending across regions 2 Differences in dividend withholding taxes procedures, legal systems	Geographic distance, cultural and language differences, and local banking relationships
Supply of funds	Regulations on pension funds and insurers tilting investment away from risky capital and start-ups Political economy impediments to bank entry and cross-border branching, ring-fencing	Lack of information on investment opportunities, preference for investing in real estate or sovereign bonds as savings vehicles
Demand of funds	3 Impediments to innovative business environment (for example, lack of human capital and public R&D), top personal marginal rate Corporate tax rates, barriers that reduce the size of product markets	Preference for domestic lenders, lack of collateral for young firms

Note: R&D = research and development.

2. **Second, it considers barriers that affect VC activity.** These include cross-border barriers, such as dividend withholding tax procedures and differences in legal regimes (Arnold and others 2024), and within-country barriers to the supply of risky capital, such as regulations on pension funds and insurers that tilt investment away from long-term risk capital.

3. **Third, it investigates the interaction of the aforementioned barriers with broader real-sector barriers that impede the development of new start-ups and new ideas.** Even in the absence of constraints on the supply of risk capital, a thriving VC ecosystem requires investable projects. Barriers to the availability of investable projects include domestic structural policy gaps holding back business dynamism and innovation (from tax systems to business environment regulations and the lack of investment in R&D and in tertiary education) as well as real-sector cross-border barriers to the mobility of labor, capital, and output (Budina and others 2025; IMF 2025a).

Macroeconomic Effect of Barriers

It is useful to think about the macroeconomic effects of the barriers to financial integration and to the deepening of nonbank financial institution (NBFI) activity in the euro area through a multi-country framework with heterogeneous firms and financial intermediaries. In such a framework, countries are populated by households, mature firms, and start-ups that differ in productivity and the cost of accessing external finance. Firms obtain funding from both banks and NBFIs, which differ in their ability to evaluate and finance different types of projects. In particular, NBFIs tend to be relatively more efficient than banks at financing innovative start-ups. Both types of intermediaries have market power, which raises the cost of funding. The euro area can also be viewed as a large open economy within the global financial system, so that capital can flow both across euro area countries and between the euro area and the rest of the world. Barriers to financial integration and to the development of NBFI—both regulatory and nonregulatory—can restrict these flows by raising the cost of cross-border investment or limiting firms' access to some financial intermediaries (Figure 4, left panel).

Barriers depress output, first by hindering the efficient allocation of savings. Cross-border fragmentation and the barriers to NBFI activity limit the mobility of savings across firms and countries. As a result, some firms face artificially high costs of capital, whereas others face artificially low costs. Limited cross-border integration implies that firms located in countries with ample savings relative to investment needs face a lower cost of funding than in countries with scarce savings. Barriers to NBFI imply that start-ups cannot access households' savings. This generates a wide dispersion in returns, reflecting capital misallocation across firms and jurisdictions. This misallocation lowers aggregate productivity and output relative to a case with no barriers. Lowering cross-border barriers and lowering barriers to NBFI would dissociate investments from local savings and allow start-ups to access households' savings, thus guaranteeing that projects with the highest returns are funded. In addition, the overall increase in productivity would encourage investors, both inside and outside the region, to invest in the euro area, further boosting output.

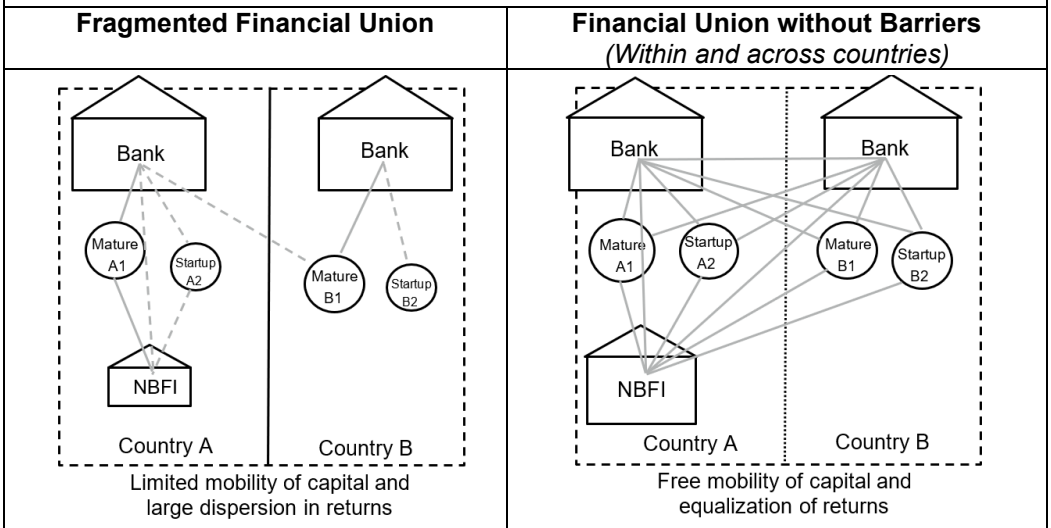
Second, barriers limit the pool of intermediaries that firms can borrow from, thereby reducing profitable investments and depressing output. Limiting the pool of investors is economically costly because intermediaries are specialized and possess sectoral expertise and networks that are valuable for firms. A smaller pool of potential investors reduces firms' ability to find a productive financing match. Cross-border barriers limit access to valuable expertise and financial services located in other countries. Barriers to NBFI limit access to specific sectoral knowledge and networks.

Third, fragmentation may weaken competition among intermediaries and increase intermediation margins. Cross-border barriers protect domestic intermediaries from the entry of foreign branches and cross-border lending from foreign intermediaries. Similarly, barriers to NBFIs limit the competition that traditional banks face. In turn, this gives financial intermediaries market power, which they exploit through higher margins and restricted funding. Instead, if barriers to cross-border capital mobility and to NBFI fall, that would reduce intermediation margins where they are highest, deepening credit markets and compressing excessive spreads.

The quantitative analysis in Section V implements these mechanisms in a multi-country model calibrated to the euro area. The right panel of Figure 4 shows an ideal environment without financial barriers, in which savings are efficiently allocated across firms and jurisdictions, firms have access to a large set of intermediaries, and competition across investors is enhanced. Although this benchmark cannot be realistically implemented, it provides a useful conceptual reference, and the counterfactuals considered in Section V partially close the gap between reality and this theoretical benchmark. In addition, this benchmark focuses on

medium-term GDP and abstracts from the important issue of financial stability, which remains an important complementary consideration. Integration may enhance risk sharing across countries, but it may also lead to excessive risk-taking by financial institutions, whereby collective moral hazard and interconnectedness reinforce each other (Altinoglu and Stiglitz 2023; see footnote 1 as well), and may then result in cross-country financial spillovers.

Figure 4. Fragmented versus Integrated Financial Union



Source: IMF staff.
Note: NBFI = nonbank financial institution.

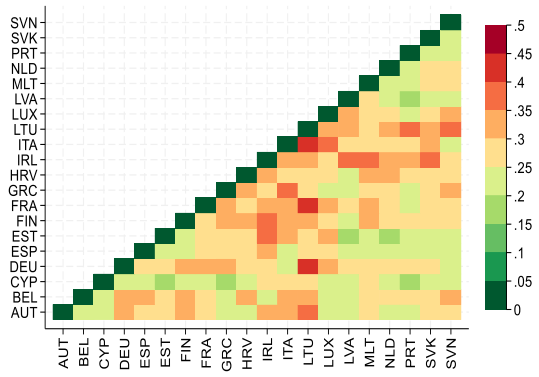
IV. Barriers to Bank Lending and VC: Gravity-based Empirical Analyses

This section estimates how the three types of barriers discussed in the previous section affect financial flows using gravity-based econometric frameworks. It first looks at how cross-border barriers—differences in corporate and banking regulations across countries—affect bank lending across countries. Then it investigates how financial barriers—cross-border barriers and barriers to the supply of risky capital—shape the development of VC in the euro area. Finally, it investigates broader barriers to creating an innovative business environment that limit the development of VC activity. These estimates should be interpreted as partial equilibrium effects, holding the amount of domestic credit fixed, and thus do not allow for an evaluation of welfare effects. Estimates shown in the charts of this section include only those that are based on statistically significant coefficients, unless explicitly noted. The following section will translate these estimates into general equilibrium GDP gains using the conceptual framework introduced in Section III.

A. Cross-Border Barriers to Bank Credit

The analysis of the affect of cross-border barriers to bank lending to firms leverages Analytical Credit Dataset and a new data set of banking regulation distances across European countries (Capelle and others 2026).[5] Analytical Credit Dataset covers the near universe of euro area bank lending to nonfinancial corporations from September 2018 onward (Israël and others 2017). In the first step, a panel gravity model at the bank-firm level is used to extract cross-border barriers that prevent firms and banks from forming relationships—see also a discussion of results from this step in Section II. The model is estimated with Poisson Pseudo-Maximum Likelihood (Santos Silva and Tenreyro 2006), controlling for bank and firm fixed effects. In the second step, the cross-border frictions estimated at the country-pair level are correlated with measures of bank policy distances across countries, holding fixed nonregulatory barriers such as geographic, language, and cultural distances, and controlling for origin and destination fixed effects.

Figure 5. Financial Policy Distances
(Index)



Sources: IMF staff calculations; Capelle and others 2026.
Note: Data cover 2010−25. X-axis and Y-axis labels are ISO-3 letter country codes.

The newly constructed data set of policy distances points to regulatory fragmentation in Europe, despite substantial progress in harmonizing banking supervisory and resolution frameworks in recent years (IMF 2025b). Figure 5 illustrates how financial regulations differ across member countries. The index is an average of eight categories: deposit insurance, macroprudential, microprudential, resolution, supervision,

[5] The analysis of barriers to cross-border lending focuses on the euro area, as it is the relevant perimeter for the banking union.

governance, entry, and corporate bankruptcy.[6] On average, there are large differences in regulation across country pairs: The median distance is about 0.25, suggesting one in every four policies differ, but values range from 0.15 to 0.39. Individual categories also differ in their degree of fragmentation: microprudential and deposit insurance are more harmonized, whereas policies on bank entry and governance feature greater fragmentation.

Differences in legal frameworks, tax rules, bank regulation, and financial safety nets can discourage cross-border bank lending mostly by raising legal and regulatory uncertainty and compliance costs. Different corporate insolvency and creditor protection laws can reduce cross-border lending by making it more costly for foreign lenders to understand and navigate local legal frameworks and lowering the risk-adjusted expected value of recoveries in insolvency. Fragmentation in deposit insurance creates a tight link between bank stability and national sovereign risk, which incentivizes banks to hold more domestic government bonds (sovereign-bank nexus) and lend more to firms domestically because of correlated risks between sovereigns and corporations (Andreeva and Vlassopoulos 2019). Differences in bank entry or governance regulations could affect cross-border lending by deterring the opening of subsidiaries and branches.

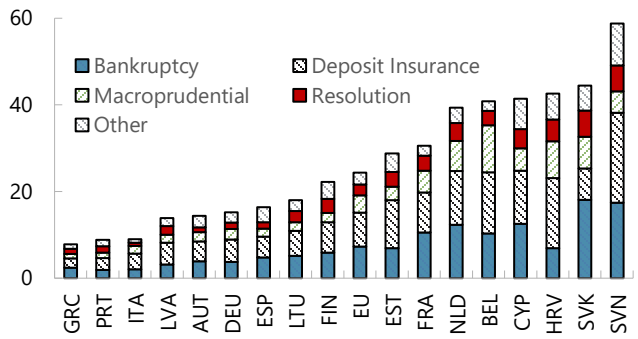
A reduction in bilateral policy distances in corporate regimes and banking regulations could significantly increase cross-border credit. Policy distances appear to be a significant driver of cross-border barriers, accounting for a majority of their variance. Using the regression estimates, we simulate a 30 percent reduction in policy distances, which is akin to fully harmonizing one in three policies across every country pair. Such a reduction in policy distances could increase the share of cross-border credit from 5 percent to 24 percent. The model in Section V will translate these estimates into a general equilibrium effect.

Harmonizing corporate bankruptcy laws and deposit insurance schemes offers the greatest gains, each accounting for one-third of the total effect on credit. Harmonizing bank resolution frameworks and macroprudential policies would have smaller effects. The remaining four policy subcomponents are statistically insignificant.

Effects of harmonizing corporate and banking regulations vary across countries (Figure 6). Two factors are important to understand the dispersion of effects across countries when it comes to harmonizing bilateral differences in regulation. First, cross-border credit increases more for country pairs with larger policy distances before the harmonization. Second, some countries have more overall home bias in their banking sectors (Figure 1), so even large increases in cross-border credit may have a limited effect on total credit. This second effect dominates, and thus countries toward the left in Figure 6 are precisely those currently with small shares of cross-border credit in total credit.

[6] The policy distance index draws on multiple sources, including the European Systemic Risk Board, European Banking Authority, World Bank, International Association of Deposit Insurers, and Organisation for Economic Co-operation and Development. Much of the World Bank data are from end-2016, so components of the index may not reflect subsequent regulatory harmonization. Distances are computed using the Gower distance, which standardizes and averages differences across policy variables. More details can be found in Annex I.

Figure 6. Partial Equilibrium Effect of Bilateral Harmonization on Bank Credit
(Percent)



Sources: EBA; ECB; ESRB; IADI; WB; OECD; and IMF staff calculations.
Note: Other = microprudential, governance, supervision, and entry regulations. EBA = European Banking Authority; ECB = European Central Bank; ESRB = European Systemic Risk Board; International Association of Deposit; OECD = Organisation for Economic Co-operation and Development; WB = World Bank. X-axis label denotes ISO 3-letter country codes.

Barriers to VC Supply and Cross-Border Flows

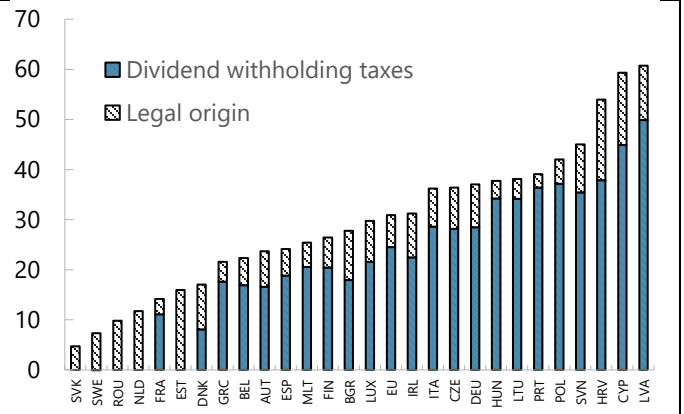
This section examines the effect of barriers constraining the development of the VC market. These include cross-border barriers that prevent VC supply from flowing to the EU's most promising start-ups and impediments to the supply of risk capital.

The analysis is based on a panel gravity model that extracts the cross-border and supply components of VC investment flows within and across countries (Huang and others forthcoming). The gravity model is also estimated using Poisson Pseudo-Maximum Likelihood, controls for observable bilateral factors, and decomposes bilateral VC investment flows into investor country-time (origin) and firm country-time (destination) fixed effects (see Annex II). The analysis focuses on: (1) the bilateral frictions that limit cross-border VC investment flows among EU countries, and (2) the supply ("push" factors) of VC and the effect of institutional investors in providing funding to start-ups. Although the sample of countries is global in coverage, this section focuses on EU countries.

The analysis combines detailed VC deal-level data with a rich set of macroeconomic, institutional, and bilateral indicators to study VC investment patterns in the EU. VC data are from PitchBook and cover VC-backed deals globally over 2015–24 for firms born after 2010. These data are complemented with bilateral measures capturing geographic, language, and legal distances, as well as international taxation affecting cross-border investment, thus allowing the analysis to isolate structural determinants of VC flows. To capture the supply and demand drivers of VC investments, the analysis exploits country-time variation in macro-level indicators such as pension systems, human capital, innovation capacity, and business regulations, among others.

Cross-border VC flows within the European Union remain constrained by bilateral frictions, including differences in legal systems and tax regimes (Figure 7). The analysis strips out the effect of nonregulatory factors (for example, distance and language) and helps quantify the effect of policy-actionable factors on VC flows. Legal harmonization, captured through a variable that measures whether the investor and firm countries share a common legal origin and thus can proxy elements of a 28th corporate regime, could broaden investors' cross-border search for funding opportunities. Similarly, withholding tax procedures have been identified as hampering investors' willingness to pursue opportunities in certain destinations (Arnold and others 2024). Based on these proxies, intra-EU cross-border flows could rise by 6 percent (through legal harmonization) and 25 percent (through withholding tax reforms). These country-level effects depend on the composition of existing inflows and withholding tax levels.

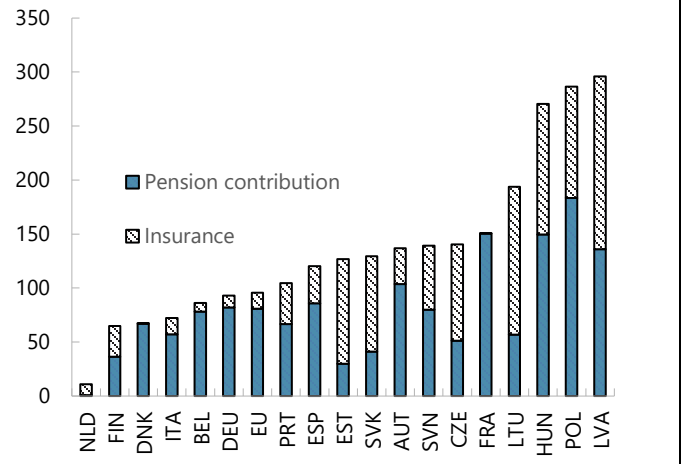
Figure 7. Partial Equilibrium Effect of Bilateral Harmonization on VC Inflows
(Percent increase in VC activity)



Source: Huang and others (forthcoming).
Note: VC = venture capital. X-axis label denotes ISO 3-letter country codes.

The country-level availability of long-term risk capital is a relevant driver in explaining the shallow VC market in the EU. Investor fixed effects, recovered from the gravity framework, are correlated with country-level pension contribution measures (Khan and others 2025) and insurance assets, controlling for GDP. The results indicate that raising contributions to funded and private pensions and insurance assets to close half of the gap with the two countries in the European Union and the United States, with settings most conducive to increasing the supply of VC, are associated with an increase in EU VC supply by around 96 percent[7] (Figure 8). This suggests that lowering financial frictions for pension funds and insurers could expand funding for high-potential start-ups and support productivity gains (Arnold and others 2024). This partial

Figure 8. Partial Equilibrium Effect of Reforms to the Supply of VC on VC Inflows
(Percent increase in VC activity)



Source: Huang and others (forthcoming).
Note: VC = venture capital. X-axis label denotes ISO 3-letter country codes.

[7] The advisability of expanding funded second-pillar pension systems depends critically on country-specific fiscal space, existing implicit pension liabilities, demographic pressures, and the broader structure of the social protection system. Where a shift or increases in funded contributions are not advisable, strengthening voluntary long-term savings vehicles could provide a complementary channel to support VC supply, though the effect would naturally be smaller.

equilibrium estimated increase would still only partially close the VC gap with the United States, as EU's VC investment is roughly one-fourth of the US levels as a share of GDP (Arnold and others 2024).

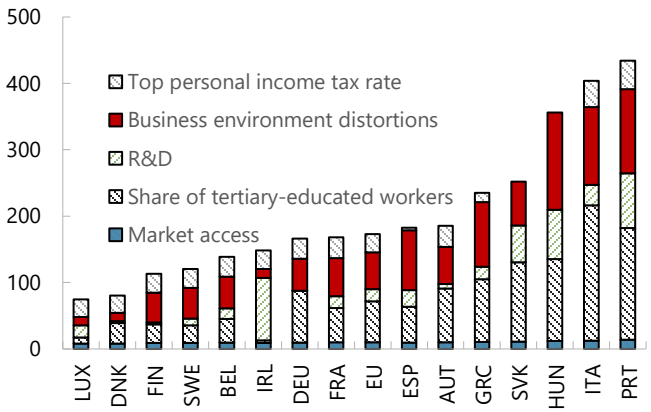
Enabling a More Innovative Environment

Beyond reducing cross-border and supply barriers to VC, it is important to consider more general reforms that could significantly deepen VC by enabling a more innovative environment in Europe. These would tackle barriers to the availability of investable innovative projects, which would raise the demand for financing in general, including from banks. However, these reforms would affect most particularly VC given its comparative advantage in financing young and innovative firms.

Real-sector reforms that raise the availability of investable projects, through investing in skills, public research and development (R&D), and improving the business environment, seem much more important for the development of VC than removing barriers to VC supply and cross-border flows. As before, firm-country fixed effects recovered from the gravity framework are correlated with variables that aim at measuring the appeal of the country as a destination for VC—from the generation of ideas to the ease of firm creation and scaling up, and investors and entrepreneurs' ease of appropriating gains. In practice, measures included are related to human capital, public R&D spending, business environment distortions, the size of markets at home and abroad to which firms have access, and tax rates. Illustrative, partial equilibrium exercises based on coefficient estimates suggest that reducing member states' structural policy gaps across all pull factors modeled here is associated, on average, with increases in EU VC demand by around 173 percent. Among individual factors, investing in higher education and improving the business environment have a larger effect (Figure 9). Overall, these results point to the importance of looking at the entire entrepreneurial ecosystem (see Box 3 for a discussion of the ecosystem in Sweden).

Figure 9. Partial Equilibrium Effect of Real-Sector Reforms on VC Inflows

(Percent increase in VC activity)

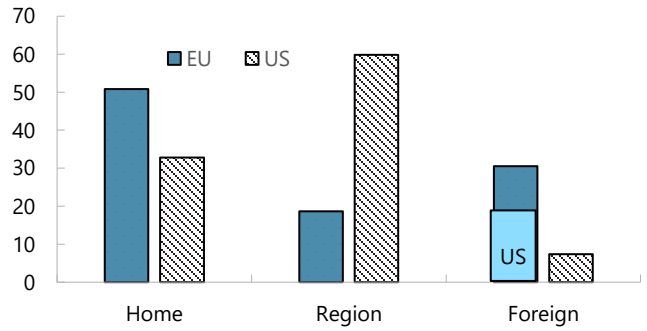


Source: Huang and others (forthcoming).

Note: R&D = research and development; VC = venture capital. X-axis label denotes ISO 3-letter country codes.

Figure 10. Share of Acquisitions by Region

(Percent)



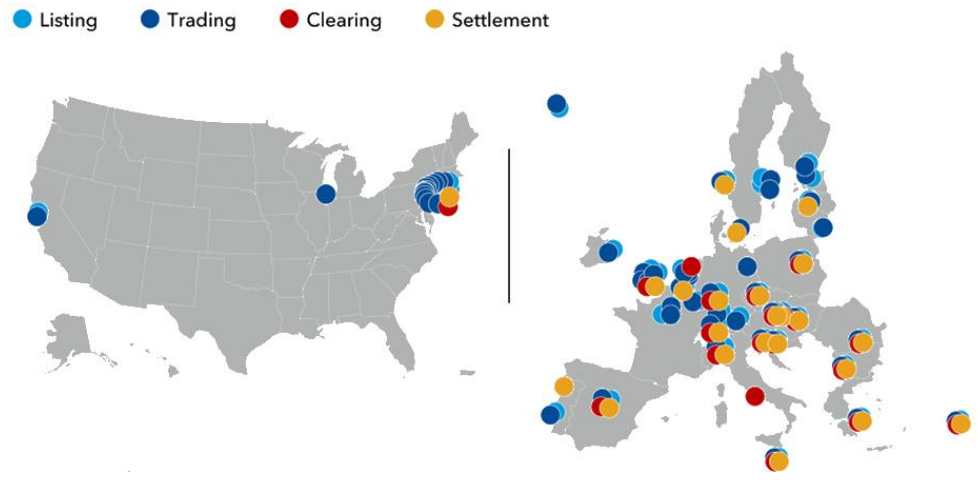
Source: Huang and others (forthcoming).

Note: Data cover 2010–24. EU = European Union; US = United States.

Addressing these structural gaps would lift the demand for VC early-stage funding, but more action will be needed to allow these firms to reach scale. As discussed in the previous section, the results suggest that domestic structural reforms that reduce red tape and increase human capital can significantly boost VC demand by raising the availability of investable projects. When it comes to scaling up, on the other hand, market access is likely to play a much larger role. In fact, among VC-backed firms, the share exiting abroad (mostly the United States) is more than four times larger than for VC-backed US firms (Figure 10). More integrated product and financial markets in the United States appear to be key drivers of these outward exits (European Investment Bank 2026).

Although difficult to capture in our framework, the fragmentation of stock exchanges across the European Union can further undermine VC activity. Equity market depth and liquidity, currently stifled by a proliferation of exchanges, can affect VC activity. Measuring the effect of shallow and illiquid equity markets in our framework is hampered by the fact that these factors act as both push and pull factors for VC funds. On the push side, lower valuations of large listed firms in fragmented markets can reduce their ability to invest in venture deals of start-ups.[8] On the pull side, less liquid national exchanges can depress valuations for start-ups looking to exit, lowering expected returns and reducing the range of investable projects. This fragmentation is further exacerbated by the structure of Europe's post trade infrastructure. Unlike the United States, which relies on a single Central Securities Depository (CSD), the European Union has 28 national CSDs, with cross-border transactions often passing through multiple intermediaries mainly as a result of differences in securities, insolvency, and tax laws (Figure 11). These frictions increase transaction costs, limit investor access to securities issued in other member states, and constrain the effective scale of equity markets (European Stability Mechanism 2025). Reducing stock market and CSD fragmentation can therefore provide benefits to Europe's VC landscape over and above the ones documented here.

Figure 11. Europe's Fragmented Capital Markets, 2019



Source: New Financial.

[8] Firms with high valuations are better able to borrow to fund investment, including acquisitions, because of their higher collateral value (Gan 2007). Moreover, firms with higher valuations have a greater incentive to acquire targets with low valuations using stocks (Shleifer and Vishny 2003).

V. The Macroeconomic Benefits of Reforms in General Equilibrium

This section quantifies the macroeconomic gains from lifting policy-induced barriers to corporate funding markets. Simulations suggest that a comprehensive reform package that makes good progress toward best practices to increase cross-border banking integration and deepen VC activity across and within borders—but falls short of completing the banking and capital markets unions—could raise EU GDP by around 3 percent in the long term, with sizable heterogeneity across countries and firm types. In addition, this reform package raises the benefits of complementary real-sector reforms that bolster business dynamism and innovation, increasing GDP by another percentage point. These benefits would add to estimated long-term gains from closing domestic structural reform gaps and lowering intra-EU barriers in product and labor markets (Kammer and others 2026).[9] Furthermore, the simulated reform efforts do not close the entirety of the identified policy gaps in bank credit and VC, and also leave out some financial sector reforms (notably, equity market integration). Gains from deeper and broader efforts would therefore be larger.

The quantitative assessment relies on a multi-country structural model based on Capelle and others (2026). The model is closely related to the conceptual framework developed in Section III. The model incorporates 20-euro area countries which are populated by mature firms, start-ups, banks, and NBFIs and which allow for both domestic and cross-border barriers to affect the allocation of capital. See Annex III for more details.

In the model, lifting barriers across countries or to the development of NBFI raises GDP by reallocating savings toward firms and sectors with the highest risk-adjusted marginal product of capital, and by diversifying the pool of intermediaries firms can access. With more mobile savings, the dispersion in risk-adjusted marginal returns to capital across firms and jurisdictions reduces. In addition, firms can borrow from a broader set of intermediaries across the euro area and are more likely to match with investors that meet their specific needs, including NBFI. Improvements in productivity in the European Union lead to an increase in net capital inflows from the rest of the world, either by retaining domestic savings or by attracting capital located outside of the European Union, which further increases GDP. In addition, intermediaries hold better-diversified portfolios across countries and asset classes. Although outside the model, better-diversified portfolios could improve risk sharing across borders.[10]

The model matches important facts about corporate funding in the euro area, and the counterfactuals are calibrated to match empirical evidence from the gravity-based analysis of Section IV. In particular, the model matches country-level output and assets for mature and start-ups as well as the number of each type

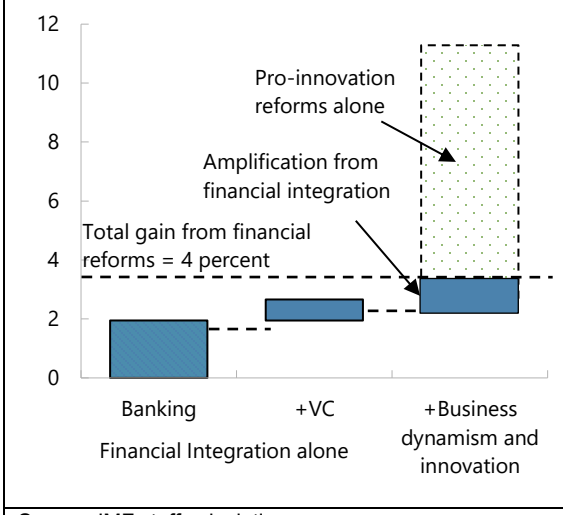
[9] Kammer and others (2026) find that fully closing domestic structural policy gaps and EU-level gaps in terms of labor mobility and internal trade barriers would increase GDP in the long term by 35 percent, virtually closing the EU-US per capita income gap. The gains from closing half these gaps, a counterfactual closer to the ones in this Note (where regulatory distances affecting cross-border banking are reduced by only 30 percent, and domestic policy gaps constraining the availability of risk capital are only halved), are of about 15 percent. As shown in Figure 12, the results in this Note would add, at most, 4 percentage points to these 15 percent gains.

[10] Although the model already incorporates many realistic ingredients and dimensions of heterogeneity, it abstracts from a few important features. In particular, the model abstracts from endogenous changes in intermediation margins by assuming monopolistic competition and, therefore, fixed margins. This implies that the estimated gains from financial integration are likely conservative. In addition, the model abstracts from the effects of barriers of cross-border labor and goods mobility. It also abstracts from increasing returns to scale at the bank level or agglomeration effects at the country level, which could be especially relevant for VC.

of firm in every member country. The model also matches the domestic and cross-border portfolios of banks and NBFIs across members, which identifies the level of barriers across countries in the baseline equilibrium of the model. Elasticities of loan demand and of labor supply, as well as the degree of international capital mobility, are calibrated within the range of parameters in the literature. We then use the model to quantify the effect of partially lifting the three sets of barriers highlighted in Section III. In each exercise, the change in barriers is calibrated to match the empirical estimates from the gravity-based analysis in Section IV (see Annex III for more details).

A set of reforms that lifts cross-border banking barriers could raise EU GDP by about 2 percent in the long term (Figure 12, leftmost bar). This counterfactual considers progress toward harmonizing corporate insolvency regimes, deposit insurance frameworks, bank resolution regimes, and macroprudential practices. In the counterfactual, cross-border barriers are recalibrated so that the model matches the empirical estimates described in the previous sections. The reforms increase EU GDP by 2 percent by improving capital allocation across countries and by expanding the set of intermediaries from which firms can borrow effectively lowering funding costs.

Figure 12. Aggregate GDP Effect of Reforms
(Percent change)



Source: IMF staff calculations.
Note: GDP = gross domestic product; VC = venture capital.

Policies that reduce barriers to VC supply and cross-border investment could generate an additional 1 percent increase in EU GDP (Figure 12, middle bar). These reforms include reductions in legal and tax-related barriers to cross-border investment and expanding the supply of long-term risk capital through pension and insurance reforms. As in the previous counterfactual, domestic and cross-border costs are calibrated to match the corresponding empirical estimates in the previous section. These reforms improve the allocation of VC across countries on the margin and expand the availability of risky capital to start-ups. This set of reforms is predicted to increase GDP by another 1 percent, driven largely by the expansion of the supply of long-term risk capital with comparatively smaller gains from removing cross-border impediments.

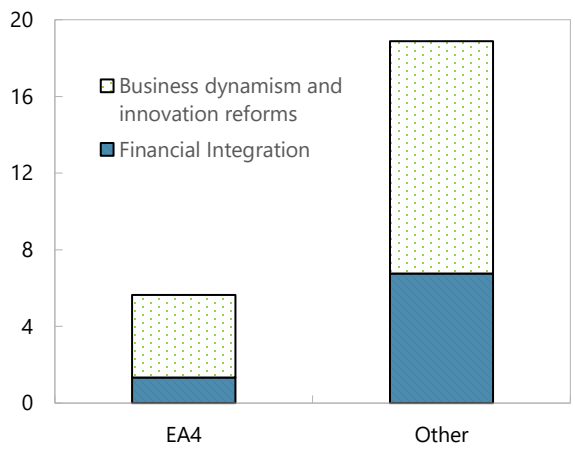
Reducing both types of financial barriers has the added benefit of magnifying the large positive gains from domestic reforms that improve business dynamism and innovation (Figure 12, rightmost bar). Pro-innovation policies expand the pool of high-return projects by increasing firm entry, skill formation, and R&D. In the counterfactual, the number of start-ups is increased to match the empirical estimates of the effect of pro-innovation reforms in the empirical section (Figure 9) as discussed in the previous section. When pro-innovation reforms are implemented without reforms that reduce financial barriers, namely cross-border banking barriers or barriers to VC, EU GDP rises by about 7 percent. In a fragmented financial system, new innovative projects cannot fully scale because capital remains constrained within national borders and funding conditions for start-ups remain limited. These gains are roughly in line with Budina and others (2025) and Kammer (2025), who—despite using a different method—find nearly 6 percent medium-term potential output gains for the European Union from closing half of domestic structural policy gaps to the most growth-friendly settings—a counterfactual similar to the one presented here. Importantly, these gains are boosted by an

additional 1 percentage point when financial reforms are undertaken at the same time. Domestic efforts to improve business dynamism and innovation deliver their largest gains in a financially integrated environment and are therefore complementary with financial reforms.

Smaller countries benefit more than larger countries (Figure 13). This heterogeneity reflects that smaller economies see greater increases in cross-border flows from their larger neighbors, but also partly because some smaller economies (but not all) are further away from the business and innovation environment frontier.

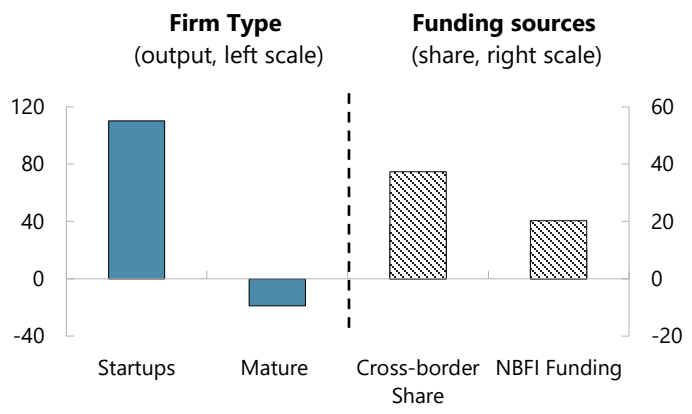
Start-ups benefit the most from reforms (Figure 14). Under the comprehensive reform scenario, output of start-ups more than doubles, whereas mature firms experience a decline. This reflects the entry of start-up firms following the enactment of policies that improve business dynamism and innovation; capital reallocates toward start-ups that are more financially constrained and rely more heavily on equity financing. By creating an innovation-friendly environment, lowering financing costs, and expanding risk capital, reforms disproportionately support firms with the greatest growth potential.

Figure 13. Effect of Reforms and Other
(Percent change)



Source: IMF staff calculations.
Note: EA4 consists of the four largest economies in the EA: France, Germany, Italy, and Spain. Other = all other countries in the Euro Area.

Figure 14. Effect of Reforms by Firm Types and Intermediaries
(Percent)



Source: IMF staff calculations.
Note: NBFI = nonbank financial institution.

Further integration and deepening generate meaningful diversification gains for lenders and borrowers. The share of bank and NBFI lending across borders increases by approximately 37 percentage points, indicating a substantial decline in home bias and financial fragmentation, from a base of 15 percent. As portfolios become more diversified, investors benefit from improved risk sharing and exposure to higher-return opportunities. Deeper integration and greater interconnectedness will naturally increase spillovers in times of financial stress, but this goes hand in hand with reduced concentration in (domestic) exposures. In addition, the share of NBFI financing in the total funding of firms rises by about 19 percentage points from a base of 4 percent, despite bank lending rising on its own as well. As a result, banks lose significant market share to NBFI. This reflects a more developed VC ecosystem, a shift toward a less bank-centric, more diversified and equity-based funding structure.

VI. Conclusion and Policy Implications

Recent EU initiatives, including the Commission's SIU and securitization packages, are welcome steps forward (see Box 1). Delivering material gains will require sustained implementation and greater ambition across both market-based finance and banking integration. It also requires prudential policies and financial sector safety nets that can address the increase in financial stability risks that, under certain conditions (for example, collective moral hazard with increased interconnectedness), could come from deeper financial integration. This section highlights priority areas for an EU-wide reform agenda to boost financial integration and development, also considering the positive complementarities with increasing innovation and medium-term growth.

Financial Reforms to Complement Real-Sector Reforms

Reviving Europe's productivity growth requires ambitious real-sector reforms. Europe's subdued productivity growth primarily reflects long-standing supply-side weaknesses. These weaknesses can be overcome with an ambitious package of reforms to lower barriers in product and services markets, facilitate labor mobility, reduce regulatory barriers to firm entry and scale-up, improve insolvency and restructuring frameworks to facilitate an efficient reallocation of resources across firms and sectors, enhance labor market mobility and skills, and foster innovation through better-designed R&D and innovation policies (IMF 2025a; Budina and others 2025; Kammer 2025).

Measures to further deepen and integrate Europe's financial markets have benefits on their own and can also complement productivity-enhancing reforms by mobilizing private capital and facilitating its reallocation from low- to high-productivity, financially constrained firms. Financial sector reforms can also improve the allocation of savings toward productive investment and strengthen private risk sharing across the euro area (Bhatia and others 2019; Arnold and others 2025; Kammer and Fotiou 2025), making its economy more resilient. At the same time, supply-side reforms would amplify the benefits from EU reforms to deepen its financial system by helping expand the pool of investable projects and thus the firms able to scale across borders, as shown in this Note. Recent EU initiatives, including the Commission's SIU integration and securitization packages, are welcome steps forward, but delivering material gains will require sustained implementation and greater ambition across both market-based finance and banking integration. Initiatives like the 28th regime (Dizioli and others forthcoming) can directly exploit these synergies by combining elements of financial (for example, flexible capital structures) and real-sector (for example, lowering cross-border barriers to trade through commercial presence) reforms. We highlight next the areas that should be a priority for an EU-wide financial sector reform agenda with an eye on increasing medium-term growth.

Removing Barriers to Cross-Border Banking and Advancing the Banking Union while Safeguarding Financial Stability

Reducing structural barriers to cross-border banking is the key to increasing competition among Europe's banks and to improve firms' access to finance. Cross-border bank-firm relationships face large entry frictions, which are linked to regulatory and institutional fragmentation (Section IV). Harmonizing macroprudential capital requirements (for example, harmonizing the methodology for setting buffers on other systemically important institutions—as recommended in IMF 2025b) would reduce ring-fencing along national borders of capital within banking groups, which would make the allocation of bank capital across the euro area

more efficient. Strive for further adoption and consistency across member states in the use of macroprudential toolkits for borrower-based measures and the approaches used by individual member states to activate them would also make the banking sector more integrated by leveling the playing field and reducing regulatory uncertainty and compliance costs, potentially making the sector more competitive and reducing lending costs to firms while safeguarding financial stability. Our empirical evidence further points to differences in bankruptcy regimes as an important factor shaping banks' cross-border lending decisions, by affecting recovery values and legal certainty; in this regard, a voluntary EU-wide 28th regime could also support deeper banking integration while also tapping complementarities with nonfinancial reform areas. In addition, facilitating cross-border bank mergers and acquisitions will help augment bank finance, address long-standing concerns of structurally low profitability and high costs, and spur competition within the euro area's banking sector.

Completing the financial safety net would play a central role in supporting deeper banking integration. Our empirical evidence underscores the importance of harmonizing deposit insurance. Establishing a European deposit insurance scheme, finalizing the European Stability Mechanism backstop to the Single Resolution Fund, and improving access to liquidity in resolution remain important to weakening the sovereign-bank nexus and fostering confidence in cross-border banking activity. Such measures are critical to the completion of the banking union and could be significantly competition-enhancing. Recent progress under the crisis management and deposit insurance framework is welcome but does not substitute for a fully-fledged common backstop.

Strengthening VC and Equity Financing to Support Innovation and Scale-Up

Expanding the pool of investable projects remains critical to deepen the VC ecosystem in Europe. The policy counterfactuals as mentioned in the previous section highlighted that policies such as public R&D, investment in human capital, and strengthening the business environment are important to scale up the demand for risk capital and develop venture capital activity in Europe. Notably, these efforts do not require EU-level coordination and it should be in countries' own interest to pursue them, making sure to design their implementation (for example, through appropriate bundling and careful communication) in a way that makes gains widely shared and encourages take-up (Kammer 2025).

Expanding the pool of long-term risk capital would help mobilize savings toward productive investment in the European Union. A deeper and more integrated market for the intermediation of long-term risk capital in the European Union can be achieved by removing barriers to investment in long-term risk capital by specific types of investors and by encouraging participation in capital markets by European households. There are three broad classes of measures that could help in this respect, some of which have been proposed in the EC's SIU package of December 2025. First, policies that facilitate greater participation in funded pension schemes by addressing behavioral biases or by increasing competition and lowering costs, like the promotion of auto-enrollment schemes or the planned revisions to the Pan-European Pension Product, respectively, could increase the pool of available risk capital. Second, improving the attractiveness of retail investment products by reducing their costs and increasing the intelligibility of disclosure documents, as proposed in the EU's Retail Investment Strategy, could increase the participation of European households in capital markets, thus improving risk sharing. Finally, removing hurdles to equity investment by pension funds and insurers—for example, by implementing the Solvency II review reforms to facilitate insurer equity investments or by revising the prudent person principle underlying the regulation of pension schemes (Institutions for Occupational Retirement Provision II directive) in a way that removes limits to investment in equity and clarifies these investors' long-term horizon—could catalyze long-term investment in Europe similarly to what was achieved in the United States with the Employee Retirement Income Security Act of 1974. However, it is critical to ensure

strong confidence in capital markets through clear and harmonized investor protection safeguards, including robust asset segregation, insolvency protections, and adequate investor compensation arrangements, and by strengthening the role of the European Securities and Markets Authority to ensure adequate and harmonized supervision (IMF 2025b).

Targeted public interventions can play a catalytic role in scaling up VC markets. Such interventions can act either by directly increasing the funds available to VC investment or by drawing in more private capital to VC by increasing its returns. Regarding the first type of intervention, instruments—such as pan-European investment vehicles and co-investment platforms involving the EIB/EIF (see Arnold and others 2024)—can help reduce cross-border fragmentation and deepen VC markets, particularly by helping VC funds reach efficient scale and diversify risks across member states. Such interventions should be carefully designed to crowd in private capital and avoid market distortions. Second, creating a deeper, more integrated, and more liquid equity market can facilitate VC exit from mature start-ups by making initial public offerings and seasoned public offerings more attractive than direct sales. Measures to ensure that market participants can operate in all trading venues and access all central securities depositories could lower operation costs (including duplication costs), catalyze operators with intra-EU cross-border ambitions, and eventually lead to fewer, larger exchanges.

Box 1. Recent EU Reform Efforts to Address Financial Fragmentation

In response to reports prepared by Mario Draghi, Enrico Letta, and Christian Noyer, the EU has launched several ambitious reform packages. Among other things, the reports challenged Europe to improve its venture-capital ecosystem, encourage the consolidation of securities markets infrastructure (Letta 2024), harmonize its insolvency regimes (Draghi 2024), and revive its securitization market (Noyer 2024). Following these and other studies (for example, AFM and DNB 2024; Arnold and others 2025), the EU unveiled in March 2025 the SIU strategy. To address banking fragmentation, the SIU builds on the BU, through which the SSM and SRM provide uniform standards and a common safety net, thereby weakening the bank-sovereign link. Importantly, the SIU aims to move beyond the earlier CMU goals by taking a more comprehensive approach to mobilizing savings and integrating markets.

In December 2025, the European Commission adopted an SIU package of measures to remove barriers, foster innovation, strengthen supervision, and simplify the regulatory framework. The reforms, which still need to be negotiated with the European Council and the European Parliament through the EU trilogue process, seek to facilitate cross-border activity by enhancing passporting for Regulated Markets and CSDs, introducing a new Pan-European Market Operator status, and streamlining the distribution of investment funds. These measures could reduce market participation costs by investors across the EU and lead to efficiency-enhancing consolidation among market operators. To support technological advancement, the package removes regulatory obstacles to distributed ledger technology and amends the DLT pilot regulation to provide greater flexibility and legal certainty. The package also transfers direct oversight of key market infrastructures (for example, major trading venues, central counterparties, CSDs, and crypto-asset service providers) to ESMA.

Other recent EU initiatives centered on capital market functioning are the discussion of introducing a 28th regime for corporate law, VC and listing reforms, and reforms to investment fund regulations. The 28th regime is a proposal for a new legal framework being designed by the European Commission specifically for innovative companies to operate alongside national systems that would provide a unified set of rules to reduce the regulatory costs of navigating 27 different environments, which are especially

significant for young, intangible-asset-heavy firms. Amendments to the EuVECA regulation and the EuSEF framework aim to increase scale in VC, whereas the European Listing Act of 2024 simplifies the process for SMEs to access public markets. The EU is also reviewing the Solvency II Delegated Regulation to encourage long-term investment by reducing capital requirements for certain equity investments. Finally, the EU revised in 2024 the ELTIF 2.0 to encourage both retail and institutional investors to channel capital into private markets and infrastructure. BU = banking union; CMU = capital markets union; CSDs = Central Securities Depositories; DLT = distributed ledger technology; ELTIF 2.0 = European Long-Term Investment Fund framework; ESMA = European Securities Markets Authority; EU = European Union; EuSEF = European Social Entrepreneurship Fund; EuVECA = European venture capital funds; SIU = savings and investments union; SMEs = small and medium enterprise; SRM = Single Resolution Mechanism; SSM = Single Supervisory Mechanism; VC = venture capital.

Box 2. Consumption Risk sharing and Implications for Resilience[1]

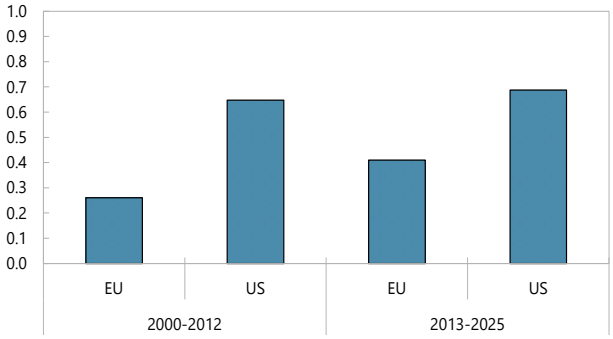
This box discusses and quantifies consumption smoothing in Europe and its implications for resilience.

Beyond hindering the efficient allocation of capital across firms, financial fragmentation limits consumption risk sharing and thus reduces household welfare. Imperfect financial market integration, reflecting, for instance, impediments to cross-border lending and holding of foreign assets, hinders the ability of households to smooth their consumption in the presence of local shocks affecting their income, which in turn reduces household welfare. The extent of financial fragmentation and risk sharing also affects the macroeconomic resilience of EU members, which depends, among other factors, on the ability of households and firms to borrow from financial institutions located in other member countries or to benefit from income and capital gains from holdings of assets held in other economies not affected by local shocks.

A number of initiatives since 2010 moved the EU toward greater risk sharing. Multiple European economic policy measures have gone in the direction of increased risk sharing. These include, inter alia, the announcement of the ECB Outright Monetary Transactions program in 2012 and institutional changes such as the introduction of the European Stability Mechanism in 2012, the establishment of the Single Supervisory Mechanism in 2013, and the adoption of the Single Resolution Mechanism in 2014. More recently, after the COVID-19 pandemic, risk sharing in Europe was supported by EU-level policy measures such as the SURE and the NGEU stimulus package and its principal instrument, the RRF.

However, consumption risk sharing in the EU remains limited—not least compared with the United States. When countries share risks, households' consumption can decouple from what happens to their incomes. An application of this intuition suggests that the extent of risk sharing in the EU, despite increasing somewhat since the mid-2010s, remains about 60 percent that of the United States (Figure 2.1). This evidence is broadly consistent with the findings of other studies, such as Cimadomo and others (2022), who find that the effect of shocks to real output on consumption is reduced by about 70 percent in the United States, compared with only about 30 percent in Europe. Most studies also find that Europe's risk-sharing shortcomings relate to weaker private (for example, cross-border lending and income from holding of foreign assets) and public (that is, fiscal transfers) channels (see Annex IV for more details).

Figure 2.1 Consumption Risk-Sharing in the EU and the US
(inverted correlation index, higher values = higher risk-sharing)



Source: BEA, Eurostat and IMF staff calculations.
Note: Average estimated inverted cross-sectional correlation over sub-periods between real per capita output growth residual and real per capita personal consumption growth residual from panel fixed effect (country and year) regressions across EU countries (excluding Ireland) and across US states, respectively. Inverted correlation= -1*(correlation-1). Values close to 0 (1) point to very low (high) risk-sharing.

[1] Annex IV reports details on the indicator plotted in the chart.
Note: BEA = Bureau of Economic Analysis; ECB = European Central Bank; EU = European Union; US = Unite NGEU = Next Generation EU; RRF = recovery and resilience facility; SURE = Support to mitigate Unemployment Risks in an Emergency.

Box 3. Risk Capital in Sweden[1]

This box outlines several possible drivers behind Sweden's success in scaling up young, innovative firms.

Sweden's success in nurturing young, innovative firms and financing them across all stages of development comes from a combination of deep factors. Deep and accessible equity markets connect household savings to high-growth firms. Stock market capitalization was about 190 percent of GDP in 2025, and Sweden has one of the EU's largest pools of listed companies (953 at end-2024). The investor base is broad: family offices have a large footprint in Sweden's capital market, pension reforms in the late 1990s created large, professionally managed, funded schemes—about 115 percent of GDP in assets under management, almost four times as high as the EU average—and retail participation is high, supported by simple, low-cost investment products like ISK. This depth matters for start-ups, as it lowers the cost of equity, supports analyst coverage and liquidity for small and mid-cap firms, and provides credible price discovery that facilitates successive rounds of growth financing. In practice, these conditions increase the likelihood that start-ups can scale up and transition to public markets, helping to explain why Sweden has one of the highest numbers of unicorns per capita (after Iceland) in Europe, with more than 400 per million inhabitants, according to Dealroom.

Deep equity markets are supported by a virtuous circle linking high levels of R&D spending and a strong entrepreneurial ecosystem (Strömberg 2024). First, Sweden has built a sizable pool of investable projects, reflecting advantages in its education system, a productive labor force, a strong entrepreneurial culture, and sustained high investment in R&D. These factors have enabled the accumulation of expertise in high-growth industries and help explain Sweden's large number of successful start-ups. Second, Sweden has developed a robust IPO pipeline anchored in deep and well-functioning equity markets. An active venture-capital and angel-investor community finances firms through the riskiest early stages and then relies on public markets to scale and exit. Angel investors, often experienced entrepreneurs, provide early funding and mentorship that help young firms refine products, build teams, and reach venture-ready scale. IPO are a common exit route for venture-backed firms, supported by a multi-tier listing structure that lets companies list at an earlier stage on growth markets and subsequently transition to the main market.[1] Third, Sweden's investment-friendly tax and company law features reinforce this advantage. Company law permits flexible share classes, including dual class shares that allow founders to raise capital while retaining control. In some cases, provisions that allow capital gains taxes from selling shares in unlisted companies to be deferred when proceeds are reinvested in other unlisted companies encourage the supply of risk capital.

[1] Contributions from Luisa Charry.

Note: EU = European Union; GDP = gross domestic product; IPO = initial public offering; ISK = investment savings accounts; R&D = research and development.

[1] Sweden's stock exchange—Nasdaq Stockholm—has two venues: the Main Market for large, mature firms (363 listings as of February 2026), and the Nasdaq First North Growth Market for small and medium firms with high growth potential (346 listed companies at the end of 2025). Source: Nasdaq Stockholm.

Annex 1. Empirical Analysis of Cross-Border Banking

The empirical analysis of cross-border banking is based on Capelle and others 2026. This Annex summarizes the data sources and explains the methodology.

A. Data

Data on cross-border bank credit comes from the Analytical Credit Dataset, an administrative credit registry maintained by the European Central Bank (Israël and others 2017). We observe the near universe of euro area bank lending to nonfinancial corporations from September 2018 onward. The data are aggregated from the instrument level to the firm-bank level by taking sums over outstanding nominal amounts (ONA) and ONA-weighted averages of interest rates. Cross-border relationships are defined as relationships where the country of the bank and the country of the firm differ (for example, a German bank lending to an Italian firm). Aggregate volumes of outstanding cross-border bank lending to nonfinancial corporations are obtained by summing over all firm-bank ONAs by country pair. Aggregates at the debtor or creditor countries are obtained by summing over the relevant bilateral positions.

Data used for the policy distance index (for example, Figure 5) are drawn from a variety of sources. Country-level data on macroprudential buffers and borrower-based measures and bank-level data on actual prudential buffers for systemic institutions were obtained from the European Systemic Risk Board from 2016 onward. Country-level data on (1) take-up of Options and Discretions for 2020 and 2024, (2) liquidity and prudential waivers for 2022 and 2023, and (3) capitalization of deposit-guarantee systems over time were obtained from the European Banking Authority. Further data on DGS are obtained from the World Bank's Bank Regulation and Supervision Survey (WB-BRSS) latest wave (data as of end of 2016), and from the International Association of Deposit Insurers. The former provides the most detailed picture of DGS across a variety of countries. The latter is used to track any changes in DGS over time for euro area countries.

Beyond prudential measures and DGS, data are obtained from the WB-BRSS on variables related to bank entry, governance, prudential resolution, and supervision policies as of end-2016. The resolution module covers the existence and scope of resolution powers, bail-in tools and legal authority, resolution authority structure, legal triggers for resolution and liquidation, and aspects of creditor treatment, among others. Data on prudential policies from the WB-BRSS are used to supplement information on macro or microprudential policies obtained from the European Banking Authority or the European Systemic Risk Board. By the time of data collection, the Single Supervisory Mechanism and the Single Resolution Mechanism were already in place and variables on resolution and supervision relate mostly to national authorities' purview over nonsystemic institutions. Within the set of variables obtained from the WB-BRSS, country-level changes since 2016 in policies other than prudential regulation are not reflected in the index. Finally, data on bankruptcy variables for 2010, 2016, and 2022 are available from the Organisation for Economic Co-operation and Development (OECD). The number of variables used to construct the policy distance metrics is listed in Annex Table 1.1.

Annex Table 1.1. Number of Variables by Category

Category	Number of Variables
Bankruptcy	13
Deposit insurance	94
Entry	30
Governance	83
Macroprudential	46
Microprudential	167
Resolution	46
Supervision	53

Note: This table shows the number of variables present within each of the eight subcomponents: Bankruptcy, Deposit Insurance, Entry, Governance, Macroprudential, Microprudential, Resolution, and Supervision.

Variables from the aforementioned data are harmonized across sources. For each variable, bilateral distances between any two countries are computed following Gower (1971). For binary variables, the distance takes the value of 1 if the policy differs across the two countries being compared, and the value of 0 otherwise. For continuous variables, the distance is calculated as

$$d(x_c, x_{c'}) = \frac{|x_c - x_{c'}|}{\max_i x_i - \min_i x_i},$$

where x_c is the value of the policy for country *c*. The policy distance index between any two countries is the average distance across all variables for which data are not missing for both countries. To construct policy-specific indexes, variables are assigned to eight categories: corporate bankruptcy, DGS, bank entry, bank governance, macroprudential, microprudential, bank resolution, and bank supervision. Distances within a category are then averaged to obtain a subindex for each of the eight categories as mentioned in the previous section. When data are available for multiple years, the indexes are then averaged over time to capture persistent heterogeneity across countries.

Last, auxiliary data on nonregulatory barriers are collected from Pellegrino and others (2025).

B. Gravity Model

Bilateral frictions to cross-border banking τ_{ij} are nonparametrically estimated from a gravity model at the bank-firm-time level:

$$y_{bft} = \alpha_b + \alpha_f + \sum_{i,j} \tau_{ij} + \epsilon_{bft},$$

where y_{bft} is an outcome, α_b are bank fixed effects, α_f are firm fixed effects, τ_{ij} are coefficients on dummy variables that take value 1 if bank b is located in country *i* and lends to firm *f* located in country *j*, and ϵ_{bft} is a residual. The pair-specific frictions τ_{ij} are replaced by a single cross-border friction, which is estimated as the regression coefficient on a dummy that takes value 1 if the relationship is cross-border, and 0 otherwise. Standard errors for the pooled cross-border friction are triple-clustered at the bank, firm, and country-pair level.

Three outcomes are considered in Section II. The first outcome is whether a relationship is active. It takes value 1 if bank *b* has outstanding credit to firm *f* in period *t*, and 0 otherwise. This regression is estimated in the extensive margin sample described as mentioned in the following section through Poisson Pseudo-Maximum Likelihood (Santos Silva and Tenreyro 2006). The second outcome is the (log) share of borrowing by firm *f* that comes from bank *b*. In addition, interest rates are controlled for. This regression is estimated in the intensive margin sample described later, that is, in the subset of firm-bank pairs for which the relationship is active. The third outcome is the average interest rate in the relationship. This regression is also estimated only for links with outstanding amounts.

C. Sampling

Estimation of the micro-gravity model with high-dimensional fixed effects is infeasible in the population as a result of computational constraints. Two samples are constructed to allow estimation of the model. The intensive margin sample is created by sampling 10 percent of the bank-firm-time observations in the population, clustering the sampling at the country-pair level. The sample size balances well computational feasibility with identification of the cross-border coefficient under reasonably detectable effect sizes. This sample was used when the outcomes of the gravity model were outstanding credit shares or interest rates.

For the extensive margin, the combinatorial nature of the outcome necessitated a choice-based sampling approach (Horvitz and Thompson 1952; Manski and Lerman 1977). First, a 1 percent random sample of firms is drawn from the population, clustering at the firm's country level. Second, for each sampled firm, all banks with which the firm had an active relationship are retrieved from the population. Third, a risk set for each firm is created by removing active banks from the universe of potential banks in the population. Fourth, about 50 banks per firm are sampled randomly from firm-specific risk sets. Sampling weights are computed as 1 for active links and as the number of sampled inactive banks divided by the size of the firm-specific risk set for the inactive links. All estimation with the extensive margin uses inverse probability weights, which render estimates unbiased with respect to sampling design (Pfefferman 1993; Wooldridge 1999; Solon and others 2015). This sample was used when the outcome of the gravity model was whether the firm and the bank had an active relationship.

D. Correlating Cross-Border Frictions with Regulatory Distances

In Section IV, for the extensive margin of cross-border frictions, estimated wedges are regressed on the policy distance index or on its eight subcomponents through OLS:

$$\tau_{ij} = \gamma_i + \gamma_j + \beta \times Reg_{ij} + \phi \times NonReg_{ij} + \omega_{ij},$$

where the regressions control for country of origin γ_i and country of destination γ_j fixed effects, and for nonregulatory barriers to cross-border finance $NonReg_{ij}$. The latter include average geographical distance,

longitude and latitude distances, geographic contiguity, cultural distance, religious distance, language differences, shared official language, shared legal origin, and bilateral tax rates on capital income.

E. Regression-Based Counterfactuals

In Section IV, a 30 percent reduction in bilateral regulatory distances is considered, leading to a predicted change in bilateral wedges keeping other factors fixed. The changes in wedges are converted to changes in credit flows by predicting the relative ratio of relationships between two countries following the reduction in wedges using the micro-gravity model, keeping all other factors fixed. Predicted credit flows are then summed up and divided by the original bilateral positions (including domestic positions) to obtain the percentage changes.

Annex 2. Venture Capital Empirical Analysis

A. Data

We use PitchBook, a comprehensive source of venture capital information, including detailed deal-level records such as firm location, investor information, deal values, and mergers and acquisitions. Deal-level information is aggregated at the country-investor level to analyze investment flows between countries. For deals with multiple investors, where detailed ownership information is unavailable, we assign an equal share to each investor. The sample focuses on VC-backed firms founded after 2010 and covers deals from 2015 to 2024, excluding firms based in China, Japan, Korea, and known tax haven jurisdictions. In addition to VC information, the analysis incorporates the following complementary indicators:

- **Geopolitical distance**: Measures of language, geographic distance, cultural distance, and common legal system provided by Pellegrino and others (2025).
- **Business dynamism**: Information on firm entry compiled by the Bureau of Dynamic Statistics for the United States and OECD DynEmp for Europe.
- **Tax and investment controls**: Bilateral dividend withholding tax rates and records of bilateral and international investment treaties provided by Pellegrino and others (2025).
- **Human capital**: Share of the working-age population with tertiary education obtained from Eurostat.
- **Market access**: Weighted average of trading partners' income using bilateral trade costs as weights defined as in Redding and Venables (2004), with trade costs from the EU Regional Trade Cost data set and regional income from Eurostat, serving as a proxy for overall market access.
- **Business environment distortions**: Regulatory and bureaucratic burdens using data from the Fraser Institute.
- **Pensions**: Country-level private and funded pension contributions compiled by Khan and others (2025).
- **Insurance assets**: Total insurance company assets from the World Bank Global Financial Development Database.
- **Top personal income tax rates**: Statutory top marginal personal income tax rates used as a proxy for the effective tax burden on entrepreneurs and investors obtained from the OECD.
- **Macroeconomic indicators**: Nominal GDP in US dollars and real GDP in constant international dollars based on the International Comparison Program 2017 benchmark from the IMF World Economic Outlook.

B. Gravity Model

A gravity model is estimated at the investor-origin-time level on bilateral VC investment flows across countries using Poisson Pseudo-Maximum Likelihood:

$$V_{ijt} = exp(\chi_{it} + \xi_{jt} + \beta_{bilat} X_{ijt})\epsilon_{ijt},$$

where χ_{it} captures the investor-time (push) and ξ_{jt} captures the origin-time (pull) fixed effect. The model controls for various bilateral factors X_{ijt} including distance, contiguity, language, common legal system, and capital taxes. The analysis primarily emphasizes policy-relevant factors such as the legal system and capital taxes. The results from the exercise on removing withholding taxes should be interpreted as an upper bound since, in practice, such taxes will not be completely eliminated; rather, they reflect the potential effect of proposals aimed at simplifying withholding tax procedures. The results on the effect of a common legal system could be considered as a lower bound to proxy the effect of the 28th corporate regime, as the proposal moves beyond legal harmonization and covers areas such as taxes and insolvency frameworks. Moreover, the results assume a perfectly elastic VC supply, which implies that all VC demand could be met. Otherwise, to the extent that European investors are not deep-pocketed, existing VC investments may be crowded out. Finally, the exercise does not account for the virtuous general equilibrium feedback loop: Increases in VC inflows boost innovation, growth, and wealth, which makes investors more deep-pocketed and further increases VC supply.

C. Correlating VC Pull and Push Factors with Determinants of Start-up Financing

After estimating the gravity equation as discussed in the previous section, we extract the fixed effects for both investors and origins in Europe and the United States to investigate the structural determinants of VC investment patterns. Specifically, we take the investor fixed effects (push factors) and correlate them with variables that capture the supply of venture capital, such as pension contributions and insurance assets by estimating an OLS regression. Similarly, we extract the origin fixed effects (pull factors) and relate them to variables reflecting the availability of investable opportunities, including human capital, market access, and business distortion and top personal income taxes that capture the availability of investable projects.

D. Regression-Based Illustrative Exercises

We use the estimated coefficients to conduct illustrative exercises that quantify the effects of structural reforms on venture capital activity. On the push side, we estimate the partial equilibrium implications of increasing VC supply by raising contributions to funded and private pensions if half of the gap with the top two countries in the European Union and the United States with the most growth-friendly settings is closed. On the pull side, we assess the partial equilibrium effects of closing half of the gap in public R&D spending, the share of tertiary-educated workers, and business environment distortions relative to the top two performers in the European Union and the United States. The exercise on the top personal income tax (PIT) reduces PIT by 5 percentage points if it is above 45 percent, sets it at 40 percent if it is between 40 and 45 percent, and does not change it if it is below 40 percent. In the case of market access, the implied increase is calibrated in line with the IMF (2025), halving the distance between intra-EU and intra-US estimated trade costs.

The illustrative exercise on legal harmonization in Section IV is based on turning the same-legal-origin dummy variable from 0 to 1, and thus serves as a lower-bound proxy for the 28th corporate regime, which moves beyond legal harmonization and covers areas such as taxes and insolvency frameworks. The illustrative exercise on bilateral withholding taxes is based on assuming these go to zero and should thus be seen as an upper bound on the potential affect of proposals to simplify withholding tax procedures.

Annex 3. A Model of Cross-Border Intermediation

A. Overview

The general equilibrium spatial model of banks and firms is based on Capelle and others 2026. The model is a multi-country general equilibrium model of production and financial intermediation. Each country is populated by heterogeneous firms, households, and financial intermediaries. Firms differ by type—mature firms and start-ups—which captures systematic differences in size, productivity, and reliance on external finance. Financial intermediaries consist of banks and nonbank financial institutions (NBFIs) that may operate domestically or across borders.

B. Firms and Production

Both types of firms s ∈ {M,S} located in country *i* produce output according to a type- and country-specific Cobb–Douglas technology:

$$y_{s,i} = A_{s,i}\, k_{s,i}^{\kappa} n_{s,i}^{\lambda}.$$

Equalizing the marginal product of labor to the wage rate, the optimal demand for labor is given by

$$\lambda\, A_{s,i}\, k_{s,i}^{\kappa} n_{s,i}^{\lambda-1} = w.$$

The optimal demand for capital implies the following equality of the marginal product of capital and the user cost of capital:

$$u_{s,i} = \kappa\, \frac{y_{s,i}}{k_{s,i}},$$

where the user cost is related to the gross borrowing rate $R_{s,i}^{L}$ and the depreciation rate δ: $u_{s,i} = R_{s,i}^{L} + \delta - 1$. The mass of firms of each type *s* ∈ {M,S} is given by N_S and N_M and is exogenous.

C. Financial Intermediation

Firms borrow from a set of intermediaries differentiated by origin country *j* and by type *m* ∈ {B,V}. Banks (B) represent regulated deposit-taking intermediaries with a comparative advantage in screening and monitoring mature, established firms, whereas NBFIs (V) represent market-based intermediaries with greater capacity to finance younger and more innovative start-ups but limited ability to lend to mature firms. This differential access to these two types of intermediaries is the key difference between mature firms and start-ups.

Intermediaries compete monopolistically and optimally set lending rates to maximize their profits, internalizing the effect of rates on quantities. The optimal lending rate is a markup over marginal cost:

$$R^{L} = \frac{\sigma^{L}}{\sigma^{L} - 1}\, R_{W},$$

where R_W is the marginal cost of wholesale funds for banks and venture capital funds. Monopolistic competition implies a constant markup, which is related to the elasticity of demand by firms σ^{L}.

D. Borrowing Decision and Decomposition of Lending Wedges

Their firm's optimal decision to borrow is given by the following logit shares over intermediaries and countries:

$$p_{m,s,i,j} = \frac{A_{m,s,i,j}\,(R^L)^{-\sigma_L}}{\sum_{m',i'} A_{m',s,i',j}\,(R^L)^{-\sigma_L}}.$$

The lending wedge can be decomposed as:

$$A_{m,s,i,j} = A_{m,i,j}\bar{A}_{m,s,i}.$$

The bilateral component $A_{m,i,j}$ captures cross-border regulatory and institutional frictions. The destination-specific component $\bar{A}_{m,s,i}$ captures the comparative advantage of intermediary types in financing different types of firms.

E. Households and Labor Supply

Households choose consumption and labor under Greenwood, Hercowitz, and Huffman preferences, implying no wealth effects on labor supply:

$$L = \left(\frac{w}{\psi_2}\right)^{1/\psi_3}.$$

Labor is perfectly mobile across countries within the euro area. The equilibrium wage clears the aggregate labor market.

F. Capital Markets and the Supply of Savings

The supply of capital comes from households' savings and the rest of the world. Assuming that the capital account with the rest of the world is imperfectly open, the wholesale interest rate is a function of the aggregate demand for capital in the euro area, K

$$R^W = \left(\frac{K}{K_0}\right)^{\chi}.$$

F. Calibration

The model is calibrated to euro area data for 20 countries (Annex Table 3.1). Production parameters are set to standard values. Elasticities of loan demand and labor supply, as well as the degree of international capital mobility, are calibrated within the range of parameters in the literature. Firm-level moments on asset, output, and firm counts are used to discipline productivity, user costs, and the mass of firms in the model. Bilateral lending wedges $A_{m,i,j}$ are calibrated using cross-border banking and NBFI flow data. Within-destination shifters $\bar{A}_{m,s,i}$ are identified using funding shares of banks and NBFI in each country as well as the marginal productivity of capital of different types of firms in each country.

G. Counterfactual Experiments

Counterfactuals evaluate the macroeconomic effect of reducing policy-induced barriers. The first counterfactual lifts policy-induced barriers to cross-border banking, and the parameters $A_{B,s,i,j}$ are recalibrated to match the empirical findings in Section IV. The second counterfactual removes policy-induced barriers to VC activity and the parameters $A_{V,s,i,j}$ and $\bar{A}_{V,s,i}$ are recalibrated to match the increase in VC inflows found in Section IV. The last counterfactual removes domestic policy-induced barriers in destination countries to innovation and the mass of start-ups N_S is recalibrated to match the empirical evidence in Section IV. In each case, the model equilibrium is recomputed and outcomes are compared with the baseline.

Annex Table 3.1. List of Countries in the Model

Austria	Finland	Italy	Netherlands
Belgium	France	Latvia	Portugal
Croatia	Germany	Lithuania	Slovakia
Cyprus	Greece	Luxembourg	Slovenia
Estonia	Ireland	Malta	Spain

Annex 4. Consumption Risk-Sharing Indicator

A. Methodology

The risk-sharing indicator reported in Box Figure 2.1 is the inverted cross-sectional correlation between consumption and output residuals across European countries and the United States, respectively. More precisely, the indicators for each region are obtained first by computing cross-sectional correlations between real per capita output growth residuals and real per capita personal consumption growth residuals from panel fixed effect (country and year) regressions across European countries and across the United States, respectively. Inverted correlations are then obtained by subtracting one from the correlation index and switching signs (that is, multiplying by minus one). As a result, values of the inverted cross-sectional correlation index close to 0 point to very low risk sharing, whereas values close to 1 indicate very high risk sharing. The figure reports averages of annual indices over two subperiods.

B. Data

For the EU, Eurostat annual data from 1999 to 2025 are used for real per capita private consumption growth and real per capita GDP growth for the EU-27 countries (excluding Ireland, because of large revisions to the latter country's GDP growth figure for 2015 and the very high volatility of its macroeconomic aggregates linked to the activity of foreign-owned multinational enterprises not necessarily linked to domestic macroeconomic activity). For the United States, the Bureau of Economic Analysis annual data for the 52 states from 1999 to 2024 are used for real per capita personal consumption expenditure growth and real per capita GDP growth.

C. Interpretation

Under perfect risk sharing, the correlation between domestic consumption and domestic output would be smaller (and the inverted correlation closer to 1) as households can better smooth consumption in the presence of shocks to output and national income.

D. Related Literature

The inverted cross-sectional correlation indicator, obtained following the approach of Giovannini and others (2022), belongs to the correlation-based category of risk-sharing indicators. Other indicators pertaining to this general category include the time series consumption-output correlation approaches proposed by Lewis (1996) and extended by ECB (2024). Given the limited span of available consumption annual data for the United States, there are advantages in comparing the level of risk sharing between the European Union and the United States based on cross-sectional correlations.

The main advantage of the correlation-based approach is its simplicity and the fact that it requires only a small set of variables to estimate the extent of risk sharing, mostly based on variables relatively well measured (GDP and consumption). One main disadvantage is that it does not allow to assess the relevance of the different risk-sharing channels.

An alternative approach to estimate the extent of risk sharing within a specific jurisdiction is based on the national accounts decomposition methodology proposed by Asdrubali and others (1996) and extended to a dynamic setting by Asdrubali and Kim (2004). Such approach, also applied recently by Cimadomo and others (2022) and extended by Cimadomo and others (2023), aims at measuring the degree of shock absorption through an estimation of the degree of consumption smoothing through different channels, exploiting the difference between GDP and gross national product (GNP), GNP and gross domestic income (GDI), and GDI and consumption. These wedges are in turn associated to the "capital or income channel" (that is, consumption

smoothing using income from financial assets held abroad), the “fiscal channel” (that is, shock absorption through cross-border transfers between governments, or federal transfers to states in the case of the United States), and the “credit channel” (that is, consumption smoothing achieved by borrowing abroad). Studies comparing risk sharing in Europe and the United States tend to find that the extent of shock absorption is markedly higher in the United States, largely because of the stronger effects of the capital and fiscal channels, but to some extent also because of the larger contribution of the credit channel (see Cimadomo and others 2022, for an overview of the literature).

The main advantage of the national accounts decomposition methodology is that it allows for an assessment of the role of multiple channels through which risk sharing operates. Drawbacks of this approach include uncertain estimates because of the imperfect measurement of some aggregates (notably, GNP and GDI), limitations in capturing the role of migration in response to country-specific shocks, and difficulties in fully capturing the changing role of primary and secondary income (see Giovannini and others 2022, for a discussion of several empirical limitations surrounding this approach).

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Staff Discussion Note No. SDN/2026/002