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Review of European Economic Policy

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What the EU Should Learn from China's Industrial Policy

China's industrial policy has become one of the most debated topics in global economic governance, generating reactions ranging from outright admiration to punitive tariffs. For the European Union, navigating this debate is not merely academic – it has direct consequences for the bloc's industrial competitiveness, its strategic autonomy and its capacity to manage an increasingly fractured global trading system. Below are some takeaways worth considering for the EU.

The first and most important lesson for European policymakers is epistemic: what we think we know about China's industrial policy is largely incomplete. The visible part – subsidies and state support directed at cutting-edge sectors like electric vehicles, semiconductors and green hydrogen – captures the imagination and drives the political response. It is the narrative of a state masterfully picking winners and deploying capital to leapfrog technological stages. But Garcia Herrero and Krystyanczuk's analysis (2024) reveals this to be the tip of the iceberg. Beneath the surface lies the more consequential portion of Chinese state support: subsidies flowing to mature, declining and inefficient sectors, the bulk of which are channelled to state-owned enterprises (SOEs). This is where the structural inefficiencies of China's model are concentrated, and where the real fiscal cost accumulates. For the EU, this distinction matters enormously. When Brussels frames its response to Chinese competition primarily around high-tech sectors, it risks misdiagnosing the problem. The competitive threat from Chinese electric vehicles, for instance, is real – but it is partly a symptom of an economy using industrial policy to compensate for the distortions created by state capitalism itself, rather than evidence of a superior model of economic organisation.

This brings us to the second lesson: context is everything. China's industrial policy does not operate in a market economy. It operates within a model of state capitalism in which SOEs enjoy structural advantages – preferential access to credit, land, regulatory forbearance and implicit government guarantees – that systematically disadvantage private firms. In this environment, industrial policy directed at private companies in new sectors serves a paradoxical function: it is an attempt to level a playing field that the state itself has tilted. Garcia Herrero and Schindowski's framing (2024) is instructive here. China's support for private champions in sectors like renewables or consumer electronics is, in a sense, a second-best substitute for a genuine transition to a market economy – politically unfeasible given the centrality of the Communist Party's control over SOEs, but economically necessary to generate dynamism. The EU, operating within a genuine single market, faces none of these structural constraints. European industrial policy does not need to compensate for state capitalism because the EU is not a state capitalist economy. This means that importing Chinese-style industrial policy would not only be unnecessary but potentially counterproductive, distorting a market structure that is already broadly functional. The EU's lesson here is to resist the temptation of policy mimicry. When European leaders call for an "industrial policy response" to China, they should be clear about what problem they are actually solving. If the answer is geopolitical resilience and strategic autonomy in critical supply chains, the toolkit looks different from what China employs. Targeted public investment, regulatory coordination and demand-side instruments within a competitive market framework are likely to be far more effective than attempting to replicate a model designed to paper over the cracks of authoritarian state capitalism.

The third lesson concerns what China has genuinely done well. Garcia Herrero and Schindowski (2024) consistently highlight that the real driver of China's ascent up the industrial and technological ladder is not invention, but commercialisation. China has demonstrated a remarkable capacity

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to take technologies developed elsewhere – or in domestic laboratories – and rapidly scale them into globally competitive industries. The combination of massive domestic market size, supply chain integration, patient state financing and competitive domestic rivalry among private firms has produced a commercialisation machine with few historical parallels. This is where the EU has the most to learn in a constructive sense. Europe remains a strong generator of fundamental research and technological innovation, yet its record on commercialisation is weak. The continent consistently produces ideas that are scaled and monetised elsewhere, particularly in the United States. If China's industrial policy offers any positive model for Europe, it is in the architecture of bridging research and market – through instruments such as public procurement, pilot programmes and co-investment mechanisms that de-risk the critical valley of death between laboratory and factory floor. However, Europe must also absorb the cautionary dimension of this lesson. China's commercialisation-heavy model is now facing mounting headwinds. The fiscal cost of sustaining it is rising steeply. Resources absorbed by industrial policy come at the direct expense of household consumption – an imbalance that has left the Chinese economy structurally dependent on external demand and dangerously under-resilient to shocks. The EU should not replicate a model that sacrifices the rebalancing of domestic demand at the altar of industrial ambition.

The fourth and perhaps most urgent lesson is geopolitical. Whether China's industrial policy continues to succeed will depend substantially on the response of the US. Garcia Herrero and Schindowski (2024) note that Washington's reaction has, until recently, been more measured than political rhetoric suggested – export controls have been selectively and inconsistently applied. But this could change rapidly and the implications for Europe would be profound. The EU sits in a uniquely exposed position. It faces competitive pressure from China in sectors central to its green and digital transitions, while simultaneously depending on Washington's security umbrella and, until recently, its technological leadership. If the US escalates its technological decoupling from China, European firms will be forced to choose sides in ways that are commercially costly. If, on the other hand, the US accommodates Chinese technological ascent, Europe risks being squeezed between two industrial superpowers with more aggressive state support frameworks than its own. The appropriate European response is neither to replicate Chinese industrial policy nor to subordinate its approach to Washington's trade politics. Instead, the EU should use this moment to build genuine strategic clarity: identifying the sectors in which European industrial capability is truly non-negotiable for security and prosperity, and concentrating resources there, rather than dispersing them across a sprawling industrial agenda that cannot realistically be fully funded.

Finally, there is a macroeconomic warning embedded in Garcia Herrero's analysis that European policymakers would be unwise to ignore (2021). China's continued push up the industrial and technological ladder, if unaccompanied by a meaningful shift towards domestic consumption-led growth, will deepen global imbalances. In the event of a major external shock – and the current conflict in Iran illustrates how rapidly geopolitical shocks can materialise – a global economy already strained by overcapacity and suppressed demand could face severe disruption. For the EU, this is not a peripheral concern. Europe's own growth model, increasingly reliant on external demand and investment-led recovery, is not immune to the consequences of a global demand shortfall. Understanding China's industrial policy in its full complexity – its dark subsidies, its structural inefficiencies, its commercialisation strengths and its rebalancing failures – is therefore not an academic exercise for European think tanks. It is the essential foundation for a coherent EU economic strategy in an era of intensifying geopolitical and economic uncertainty. The EU does not need to become China. But it does need to understand it, clearly and completely.

Alicia García Herrero,
Bruegel, Brussels, Belgium;
Hong Kong University of
Science and Technology,
Hong Kong.

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Stablecoins, the Digital Euro and the Future of Monetary Sovereignty in Europe

Stablecoins are moving from the margins of crypto markets towards the core of global finance, raising fundamental questions about who controls money, how it circulates and what role public institutions should play. This Forum brings together four perspectives on their technological promise, strategic implications and policy risks. The contributions explore the impact of stablecoins on financial stability, monetary sovereignty and seigniorage, and debate the case for both retail and wholesale central bank digital currencies. Together, they examine whether Europe risks ceding monetary influence to dollar-based digital infrastructures and what policy choices are needed to ensure that innovation strengthens rather than undermines the resilience and credibility of the euro.

Stablecoins and the Monetary and Financial System

Governor Signe Krogstrup, Danmarks Nationalbank, Copenhagen, Denmark.

The Digital Euro and Monetary Credibility

Rebecca Christie, Bruegel, Brussels, Belgium.

Anchoring Europe's Monetary Future: Why a Wholesale Digital Euro Is the Immediate Priority

Patrick Vanhoudt, Luxembourg School of Business, Luxembourg.

Confrontations Over Seigniorage in the Euro Area

Christian Pfister, University of Orléans, France.

Governor Signe Krogstrup*

Stablecoins and the Monetary and Financial System

The future role of stablecoins in the global monetary and payments system remains uncertain. Stablecoins may evolve into a more significant component of financial infrastructure, or they may remain a relatively specialised instrument within specific aspects of the digital asset ecosystem. At present, it is too early to determine their long-term trajectory. Regardless of their eventual scale or scope, the emergence of stablecoins raises important policy questions. A key challenge is to ensure that their development does not give rise to unintended risks for financial stability or the functioning of the financial system. This should enable society to benefit from technological innovation while safeguarding trust, financial resilience and monetary sovereignty. This article examines the concept of stablecoins, their technological and economic foundations, and their potential use cases. It further discusses recent developments in the political and regulatory environment, and assesses the implications of stablecoins for financial stability, monetary sovereignty, and the balance between public and private forms of money. Finally, it outlines key policy considerations for ensuring that the evolving monetary ecosystem remains resilient and well-functioning in the face of rapid technological change.

A stablecoin is a digital token designed to maintain a stable value relative to an underlying asset, most commonly a fiat currency. In most cases, this stability is achieved by backing the token with cash or short-term government securities. In essence, a stablecoin can be understood as a backed crypto-asset that seeks to avoid the price volatility associated with unbacked cryptoassets such as Bitcoin.

From a financial perspective, stablecoins share some characteristics with well-established instruments such as money-market fund shares or deposits in narrow banks. Consequently, many of the risks associated with stablecoins are conceptually familiar.

What distinguishes stablecoins from these traditional instruments is their technological foundation. Stablecoins operate on distributed ledger technology (DLT), which allows the to-

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Governor Signe Krogstrup, Danmarks Nationalbank, Copenhagen, Denmark.

ken to function as a transferable digital bearer instrument – conceptually similar to cash – without requiring the holder to maintain a bank account or register with the issuer. At the same time, DLT enables new functionalities, including the automated execution of transactions within DLT-based environments.

DLT offers several operational advantages. It operates continuously, supports programmability, and enables the integration of multiple functionalities and transactions within a single automated workflow. Bitcoin is frequently cited as the first widely adopted cryptoasset built on DLT. Introduced in the aftermath of the global financial crisis, it was inspired by the ambition to establish an alternative to banks and central banks: a decentralised financial ecosystem in which trust in institutions would be replaced by trust in code.

Nearly two decades later, it is widely recognised that these ambitions have not been realised. Bitcoin has proven too volatile and too inefficient to function effectively as money – that is, as a medium of exchange, a store of value or a unit of account. Instead, it has largely evolved into a speculative asset.

Nevertheless, certain technological features are gradually gaining traction. This particularly pertains to features related to settlement efficiency, transparency and programmability.

Stablecoins may therefore be understood as a pragmatic compromise. They combine the technological features of DLT with the stability derived from fiat-denominated backing and the institutional credibility of existing financial systems.

Stablecoins are typically discussed in relation to three interconnected use cases:

- payment and settlement, particularly for crypto assets and, potentially, tokenised financial assets on DLT-based platforms
- retail payments, including cross-border transfers and remittances
- store-of-value access to the underlying fiat currency, most notably US dollars.

Despite these potential applications, adoption remains relatively limited. Most stablecoin activity takes place within the crypto-asset ecosystem, where stablecoins are primarily used to settle transactions involving other cryptoassets. The global market capitalisation of stablecoins remains modest, reaching approximately US \$300 billion in 2025 – albeit with some fluctuation. This corresponds to roughly half a percent of the US equity market. Retail usage and store-of-value applications remain limited, although they have shown gradual growth.

The relatively slow pace of adoption is notable given that the underlying technology has existed for nearly two decades. Several explanations could be put forth. It could be argued that regulatory uncertainty – particularly in the United States – has been a key factor constraining development, with industry and stakeholder dynamics contributing to delayed regulatory clarity or the emergence of frameworks that limit usability. Also, demand for stablecoins may have been driven by opportunities for regulatory arbitrage rather than the benefits of the technology. By comparison, artificial intelligence – another frontier technology – expanded rapidly following the first wave of widely accessible chatbots in 2023, despite limited political or regulatory support. Admittedly, the comparison is imperfect. Artificial intelligence is a general-purpose technology, whereas stablecoins and DLT rely heavily on network effects. Nevertheless, the debate remains ongoing.

Explaining the current attention to stablecoins

The renewed focus on stablecoins seems to reflect two principal developments. First, political dynamics are evolving. The current US administration has adopted a more supportive stance towards cryptoassets and stablecoins. US dollar-denominated stablecoins dominate global issuance and are viewed by some policymakers as potentially reinforcing the international role of the US dollar. In addition, they may sustain demand for US Treasury bills and indirectly support the financing of US fiscal and external imbalances.

At the same time, the European Union and other jurisdictions have raised strategic concerns regarding the extensive role of US payment providers and US dollar-denominated pay-

ment infrastructures. The growth of stablecoins could potentially deepen these dependencies. These concerns are closely linked to broader discussions surrounding strategic autonomy, resilience and financial stability.

Second, the regulatory environment is undergoing significant development. The Markets in Crypto-Assets Regulation (MiCAR) represents one of the first comprehensive regulatory frameworks governing the issuance, trading and custody of cryptoassets, including stablecoins.

In the United States, legislative initiatives are also progressing, including the GENIUS Act and the proposed Clarity Act. These initiatives are expected to provide greater regulatory clarity, particularly regarding reserve composition and remuneration structures. Together, such developments have reduced regulatory uncertainty and may lower barriers to participation by financial institutions.

Prospects for expansion

Whether stablecoins will experience substantial growth under these conditions remains uncertain. Market capitalisation reportedly increased by approximately 50% in 2025, and financial institutions are increasingly exploring the use of stablecoins, either for wholesale settlement purposes or as part of broader crypto-related service offerings.

However, sustained growth will ultimately depend on the emergence of economically meaningful use cases. The available evidence remains mixed. Cross-border payments and remittances are frequently cited as potential areas of application. However, the extent to which stablecoins are currently used systematically for such purposes remains unclear (Reuter, 2025).

Another potential application is access to US dollar-denominated stores of value, particularly in countries characterised by weaker financial systems or high inflation. By contrast, in jurisdictions with efficient domestic payment infrastructures and stable inflation – such as the European Union – demand for such use cases is expected to remain limited.

Interest has also emerged in the use of stablecoins as wholesale settlement assets on DLT-based trading platforms. However, this possibility depends on whether DLT achieves significant scale within financial market infrastructure.

Should DLT become widely adopted, stablecoins may prove to be a convenient and efficient settlement instrument. At the same time, they could face substantial competition from alternative forms of tokenised money, including tokenised bank deposits, tokenised money-market funds and potentially wholesale or retail central bank digital currencies (CBDCs).

The future monetary ecosystem may well involve a combination of these instruments.

In summary, while considerable uncertainty remains, it would be premature to dismiss the possibility that stablecoins could achieve broader adoption.

Assessment of benefits and risks of stablecoins

When assessing potential benefits and risks of stablecoins, central banks typically focus on three key dimensions: financial stability, monetary sovereignty, and the relationship between public and private forms of money.

Financial stability

Stablecoins exhibit risks that are conceptually similar to those associated with money-market funds and narrow banking models.

One concern relates to credit and liquidity mismatches, which may expose stablecoins to run dynamics. The largest stablecoin issuers are now significant holders of short-term US Treasury securities and maintain substantial bank deposits as reserve assets. A disorderly redemption episode could therefore require rapid asset liquidation, potentially transmitting stress to sovereign debt markets or the banking system. While the current market size limits systemic risk, the potential transmission channels warrant attention.

The potential for cross-border spillovers adds to this concern. The ECB has highlighted risks associated with US dollar-denominated stablecoins issued within Europe under multi-issuance models, should these instruments become systemic (Aerts et al., 2025). Similarly, the European Systemic Risk Board (2025) has called for enhanced regulatory scrutiny and coordinated international policy responses.

A second concern relates to potential deposit displacement. Widespread retail adoption of stablecoins could divert deposits away from the banking sector, potentially affecting bank funding structures and credit provision. The MiCAR framework mitigates this risk by requiring EU-issued stablecoins to maintain a substantial share of reserves in bank deposits.

At present, financial stability risks in the EU appear limited. Nevertheless, indirect transmission channels – through money markets, collateral chains and cross-border linkages – warrant continuous monitoring. In jurisdictions where stablecoin usage is expanding more rapidly, these risks may materialise earlier.

On the positive side, stablecoins may stimulate innovation in retail payment systems or money remittances, an area that

has historically evolved slowly in some jurisdictions. In the EU, however, regulatory initiatives such as the EU Instant Payments Regulation already promote efficient payment solutions, thereby reducing the competitive pressure from stablecoins.

Monetary sovereignty

Stablecoins also raise questions regarding monetary sovereignty. Foreign currency-denominated stablecoins could facilitate currency substitution due to their accessibility and strong network effects. Unlike traditional dollarisation, stablecoin usage does not require physical cash holdings or access to foreign bank accounts; a smartphone and internet connection are sufficient.

More widespread adoption of US dollar-denominated stablecoins could therefore reinforce the global dominance of the US dollar and potentially reduce the ability of other jurisdictions to influence their own domestic monetary and financial conditions.

Within the EU, these risks are currently limited due to robust payment infrastructures and credible monetary policy frameworks.¹ However, rising adoption elsewhere could generate spillover effects. In countries characterised by weaker financial systems, less stable inflation, or limited trust in domestic currency, adoption is more likely.

Stablecoins may also raise challenges for financial integrity, particularly in relation to frameworks for Anti-Money Laundering and Countering the Financing of Terrorism (AML/CFT; Adrian et al., 2025). Increased use of privately issued US dollar stablecoins in geopolitically sensitive regions could complicate sanctions enforcement by reducing financial transparency (Bank for International Settlements, 2025).

Public versus private money

Finally, stablecoins raise broader questions about the respective roles of public and private money, particularly regarding seigniorage and data ownership.

Stablecoins constitute privately issued money and therefore resemble bank deposits rather than central bank money, such as cash, reserves or central bank digital currencies (CBDCs).

If stablecoins substitute cash, a portion of the seigniorage generated by central bank money issuance could shift to pri-

¹ Also, the EU's MiCAR sets monetary safeguards. Regulators, following an opinion of the ECB, can halt the issuance of foreign currency-denominated stablecoins if they pose a threat to the smooth operation of payments systems, monetary policy transmission, or monetary sovereignty, see Article 24(3) of MiCAR.

vate issuers. More plausibly, stablecoins may substitute for bank deposits, in which case seigniorage revenues would shift from banks to stablecoin issuers. In either scenario, however, the public sector continues to bear the responsibility for maintaining monetary stability through central bank mandates, regulatory oversight and financial safety nets. This raises the question of whether the regulation of stablecoin issuers sufficiently contributes to stability on par with regulatory frameworks faced by banks, as discussed earlier.

Issues related to data ownership and privacy are similarly important. If stablecoins are used for wholesale settlement rather than central bank settlement balances, transaction data could shift from central banks to private stablecoin issuers or DLT infrastructure providers. In retail contexts, data ownership could move from banks to stablecoin issuers. By contrast, a retail CBDC would place transaction data within the central bank.

Determining which data governance structure best serves the public interest is therefore an important policy consideration. Public trust in both public and private institutions will play a central role, and regulatory frameworks can provide safeguards regarding privacy and data protection.

Policy implications

The issues raised by stablecoins have broader implications for monetary and financial policy. Central banks are unlikely to become technological leaders in payments, nor should they attempt to select technological winners. Their role is to remain technology-neutral, ensuring that new forms of digital money can compete safely and under consistent regulatory conditions (Mogensen et al., 2022).

Regulatory frameworks should therefore focus on the economic function of financial instruments rather than the underlying technology. If stablecoins succeed because of genuine technological advantages rather than regulatory arbitrage, the regulatory framework can be considered effective. While foundational regulatory frameworks have now been established, further international coordination and alignment, as well as alignment with regulations governing comparable financial instruments, will remain essential.

At the same time, maintaining the resilience of the monetary ecosystem during periods of rapid technological change is critical. A resilient system requires multiple independent payment options, each characterised by stability and security. No single stablecoin should become the dominant medium of exchange in a potential tokenised financial system. Conversely, an uncontrolled proliferation of poorly harmonised stablecoins could create uncertainty regarding the value and reliability of money.

The issuance of tokenised central bank money may contribute to strengthening resilience. This objective underpins ongoing work between national central banks and the ECB on the development of infrastructure for wholesale CBDCs (Adolfson et al., 2025). The goal is to ensure continued access to a central bank-issued or central bank-linked settlement asset for systemically important transactions and to preserve lender-of-last-resort capabilities within a tokenised financial environment. Such infrastructure may also support tokenised bank deposits as a complementary component of the future payments system.

Similarly, the ECB's work on a retail CBDC – the digital euro – is considered relevant for the future resilience of the European payments ecosystem. While there is currently no identified need for a retail CBDC in Denmark, developments related to the digital euro are being closely monitored.

Conclusion

Stablecoins may develop into a more significant component of the global monetary and payments system, or they may remain a relatively specialised instrument. At present, it is too early to determine their long-term role.

Regardless of their eventual trajectory, the central policy challenge will be to ensure that stablecoins evolve within a regulatory framework that maintains a level playing field. Such a framework should allow society to benefit from technological innovation while safeguarding trust, financial resilience and monetary sovereignty.

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Rebecca Christie

The Digital Euro and Monetary Credibility

The European Central Bank needs to be the public anchor for all euros, including retail and wholesale digital currency. Abandoning a retail version would be a mistake. The European Union needs to protect the euro's credibility and can do this best if there is no void in the financial architecture.

Why does Europe need a digital euro? Supporters of the plan offer various rationales. These include independence from American payment providers, security in case those American providers cut off access, the convenience of digital cash now that notes and coins are used less (European Central Bank [ECB], 2024), and offline sales. But there is a bigger and better reason: monetary sovereignty and the credibility of the euro itself.

The ECB needs to be the anchor for all euros, digital included. The European Union should not take the risk that a public void triggers the development by the private sector of something that catches on and becomes widespread, then collapses and threatens financial stability. In other words, the EU cannot afford *not* to have a digital euro.

Figuring out what that means and how to bring it into being is now a central policy challenge. The project has split into two diverging tracks. “Digital euro” mostly refers to the retail project, now advancing in legislation proposed by the European Commission in 2023 and currently debated by member states and the European Parliament. Meanwhile, work on a “wholesale” digital euro has morphed into a conversation about the increasing use of distributed ledger technology (DLT), tokenised settlement and how to link the ECB's payment rails to private-sector projects. Talk of a wholesale digital euro has now transformed into a near-term Pontes¹ settlement initiative and a longer-term Appia² effort to ensure central bank money and collateral services remain properly linked with the rest of the financial system.

1 <https://www.ecb.europa.eu/paym/target/pontes/html/index.en.html>

2 <https://www.ecb.europa.eu/paym/dlt/appia/html/index.en.html>

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Rebecca Christie, Bruegel, Brussels, Belgium.

This split was initially driven by process: the ECB is empowered to work independently on the wholesale side, while the retail project must go through the EU's co-legislative procedures. Unfortunately, some political stakeholders have now begun to pit the two projects against each other.

In 2026, the ECB discusses the proposals in separate terms, and MEP Fernando Navarrete Rojas, the European Parliament's legislative rapporteur, has suggested that the retail product is not necessary and should be shelved to devote more attention to back-end settlement. In the November 2025 draft report from the Economic and Monetary Affairs Committee, lawmakers suggest that “the Union should prioritise the development and cross-border interoperability of wholesale CBDC [central bank digital currency] arrangements” (Navarrete Rojas, 2025, p. 14).

Dividing up the digital euro space in this way poses financial stability risks. The euro area already faces many legacy fragmentation issues. Creating more divides conceptually adds to the sense that the EU's monetary union is still not fully joined up, which in turn leaves room for market actors to exploit the seams in ways that could lead to future crises.

Credibility and central bank digital currencies

Digital euro conversations did not start out in this way. Initially, the ECB was spurred into action after Facebook's 2019 proposal for a digital “currency” called Libra.³ This project was put forward ten years after the debut of Bitcoin, the cryptoasset that introduced the world to the concept of “cryptocurrency” and put distributed ledger settlement, also called the blockchain, on the world stage. Bitcoin's travails, including the 2014 collapse of the Mt. Gox exchange, had shown that the biggest downside to new forms of payment and value storage was the lack of access to central bank systems. The Facebook plan

3 The Libra project is no longer under discussion as initially put forward, and the primary documents are no longer online in their original locations. Summaries of the initial proposal can be found in the news media, for example “Facebook Unveils Libra Cryptocurrency, Sets Launch For 2020”, 18 June 2019, <https://www.npr.org/2019/06/18/733701971/facebook-unveils-libra-cryptocurrency-sets-launch-for-2020>.

sought to bridge this gap by proposing a privately managed asset that would be pegged to a basket of world currencies, not just the US dollar, with proposed input from central bankers but without direct central bank ties.

In response, the world's central banks realised they needed to take control of the space. This launched the debate over CBDCs, which more than 100 monetary authorities began studying, and a few, such as the Bahamas,⁴ quickly put into practice. The Group of Seven major economies sprang into action – in 2020, through the Bank for International Settlements (BIS), the G7 central banks, Sweden and Switzerland put forward “foundational principles and core features” of a CBDC (BIS, 2020), and in 2021 the G7 followed up with a statement⁵ emphasising the need for standards and coordination.

This discussion was particularly important for the ECB, which had just weathered the 2010-2015 euro area crisis, in which five members of the monetary union had sought rescue assistance and Greece had needed multiple rounds of aid. The crisis revealed that investors did not always want to do due diligence on which parts of the EU system were healthier than others. In good times, they wanted to invest across the euro area, and when times were tough, they ran en masse. While national fiscal authorities faced the bulk of the scepticism, the ECB was drawn in as the crisis dragged on. At its low point, markets were tracking the use of Emergency Liquidity Authority to Greek banks as a marker of how the entire euro area was faring – not just the banks that this assistance was propping up – forcing the ECB to make this information publicly available for the first time.⁶

Policymakers such as former executive board member Benoit Cœuré spoke of a digital euro in broad and comprehensive strokes. In a 2021 speech, he laid out the project's importance across the financial sector: “Big techs are expanding their footprint in retail payments. Stablecoins are knocking on the door, seeking regulatory approval. Decentralised finance (DeFi) platforms are challenging traditional financial intermediation. They all come with different regulatory questions, which need fast and consistent answers” (Cœuré, 2021).

4 The Sand Dollar was launched in 2020 and remains available as a digital version of the official currency of the Bahamas, see <https://www.sanddollar.bs/>.

5 G7 Finance Ministers and Central Bank Governors' Statement on Central Bank Digital Currencies (CBDCs) and Digital Payments, 13 October 2021, https://assets.publishing.service.gov.uk/media/616754d2d3bf7f56080b1abf/FINAL_G7_Statement_on_Digital_Payments_13.10.21.pdf.

6 See the ECB's September 2015 statement, “The Governing Council of the European Central Bank has decided that national central banks will from now on have the option to communicate publicly about the provision of Emergency Liquidity Assistance (ELA) to the banks in their country, in cases where they deem that such communication is necessary.” <https://www.ecb.europa.eu/press/pr/date/2015/html/pr150916.en.html>

Stablecoins – digital assets that are backed by reserves in order to have a pegged value against a major sovereign currency – are these days discussed in single-currency terms, given the predominance of dollar-denominated products and the Trump Administration's interest in seeing these assets promote dollarisation abroad. Recognition of this more weaponised dollar stance, alongside fears that a CBDC could disintermediate the banks that still form the backbone of European financial markets, has changed the debate and encouraged more divided positioning.

In part due to heavy bank lobbying and in part due to the procedural differences in pursuing wholesale and retail options, the ECB's rhetoric has shifted. ECB Executive Board member Piero Cipollone began speaking of the ECB's existing Target 2 settlement system as an already extant wholesale digital euro (Cipollone, 2025), and now the conversation dwells more on tokenisation and the DLT settlement, setting the CBDC terminology aside, with ECB officials stressing integration as the overarching goal (Vlassopoulos, 2025).

Meanwhile supporters have struggled to make the case for the retail digital euro, perhaps because financial credibility is hard to explain to the general public. Other rationales, like smoother payments and an alternative to US card giants, may seem less pressing in an age of instant bank transfers and ready online transactions.

Scholars still recognise the digital euro holistically as a public good (Berg et al., 2026). This discussion highlights the potential of offline payments as well as policymakers' efforts to ensure banks remain central to retail digital euro use and management. A retail digital currency would need to support the existing financial system instead of undermining it, and debates about holding limits and transaction mechanics have so far been sensitive to and pragmatic about these concerns.

Fragmentation and financial stability

Separating the digital euro strands is tempting given the complexity of the policy process and the need to make sure the ECB's settlement rails keep up with the times. However, allowing consumer payments to fall out of the framework entirely would be a mistake. The retail digital euro does not need to fully replace cash transactions and Single Euro Payments Area (SEPA) transfers, nor should it. Even if it is not widely used, its existence is still important. The ECB needs to be very clear about what money is “public money”, direct from the central bank, and what is not. That means having a foothold in every financial and monetary space.

Forthcoming research by Lucrezia Reichlin, Bo Sangers and Jeromin Zettelmeyer distills the stakes into four key principles: first, making public money the final anchor of transaction set-

tlements; second, keeping credit intermediation within supervised institutions; third, a need for interoperability across digital platforms; and fourth, making euro-denominated liquidity available wherever digital markets coalesce. The last of these principles invites important conversations about whether the central bank should work directly with stablecoin providers or license them in a way that allows for limited lender-of-last-resort access; these will be important debates to have in the months and years ahead.

Public money as a final settlement anchor should not, however, be taken for granted. Turning retail digital currency into a separate policy debate increases the risk that a retail currency will not happen at all. It is one thing for the ECB and legislators to take their time figuring out how they will proceed, it would be another thing entirely if the project died outright and created a vacuum in the digital currency space.

If an ECB-backed digital euro stops being on the table, a private-sector actor could create a similar product that might act a lot like a *de facto* CBDC but be vulnerable because of course it would not be central bank backed and might not connect to central bank supporting infrastructure. And in the event this product became widely used and then failed, global investors might once again judge the entire euro by the worst performance of its parts, rather than consider how an ersatz digital euro is not a real digital euro and fine tune their response accordingly.

These types of unlikely but extreme turns of events reflect the euro's relative youth as a currency and therefore its outsized need to prioritise credibility in its own right. An analysis of Italian policies and Italian-German bond spreads bears this out: in a study spanning five administrations, spreads were worst when governments embraced anti-European sentiments (Cadamuro & Papadia, 2022). The perception itself of fragmentation was spooking investors.

Worst-case scenarios

In a worst-case scenario, hiccups in the privately managed digital asset space could spill over into the ECB system and threaten the euro area's overall soundness. If central bank money is marginalised, through the rise of electronic payments or by some other factor that diminishes links between public and private money in the euro area, financial stability would be weakened (Bindseil & Cipollone, 2025).

The European Systemic Risk Board (ESRB), which includes the ECB and other EU financial authorities within and outside the euro area, framed the problem accordingly: "growing interlinkages between traditional finance and crypto, coupled with high market concentration in core crypto services, increase the contagion risk for traditional finance" (ESRB, 2025).

The ESRB has so far focused on the risk of cross-border glitches, driven by different regulatory requirements in the US, the EU and other jurisdictions. The board's recent recommendations on stablecoins focus on the risk of "multi-issuance" stablecoins, where reserves for the digital asset are held in multiple jurisdictions. If things were to go wrong in that situation, the reserves could end up in a different part of the world than the assets themselves, and therefore be unavailable in a crisis, sparking a run, a market failure and possible contagion.

There are other ways a stablecoin could cause a crisis even without cross-border disruptions. For example, a private-sector stablecoin becoming the market default and then stumbling could trigger renewed fear of a euro area breakup. This could be because of imbalances in the sovereign bonds held as backing assets, alarming investors about diverging credit risk among euro area countries. Or a more general run could be prompted by breaking a peg, in the same way that failing money-market funds have set off crises before.

Other factors not yet on the radar could also arise, for stablecoins or for tokenised deposits. While the latter would be more closely tied to the banking system, they could introduce operational risks, particularly if financial institutions do a poor job of building interoperable systems.

The ECB will surely monitor these risks. But it will be better able to prevent and contain them if it already occupies all the spaces in the senior digital currency environment. This means a wholesale digital euro for cross-border payment and settlement and a retail version for everyday use – with the main reason for this distinction being process, not a difference in need. The ECB can introduce a wholesale version by itself, while retail money requires EU legislation alongside central bank planning (ECB, 2025a).

International stakes

In progressing to the digital euro, the EU should think broadly about how it protects monetary sovereignty. With sufficient investor confidence, the euro can maintain its status as a reliable store of value, unit of account and means of payment. This, in turn, will position the euro to expand its international role.

Even a weak dollar is still the global reference point, because financial plumbing is more important than comparative value when it comes to managing foreign reserves. To the extent that global central banks seek to protect themselves from US political risk, they buy gold (Partington, 2026) or consult with the Fed (Yokoyama & Fujioka, 2026), rather than making big moves into other currencies. For now, the stablecoin market

is more than 99% dollar denominated,⁷ and any deterioration of euro area payment rails will encourage global use of the US currency.

After the euro crisis, it took time and huge amounts of rescue money for the world to once again see the euro area as a thriving monetary union. The EU should build out its financial infrastructure to hold on to those gains. The retail and wholesale digital euro alike are vital to that process.

Putting things in perspective

The euro is still young. It is not rooted in a common fiscal policy, a full-fledged bank deposit insurance system or a permanent deep and liquid safe asset. Mostly, investors appreciate the euro area's many accomplishments. But there have been times – the 2010-2015 crisis period (Pisani-Ferry, 2014), for example – when the currency's inherent fragmentation has become a significant vulnerability. Rather than weighing whether, say, an Italian bond is as good as one from Cyprus, or what the spread between Estonia and Germany should be, investors just ran.

The United States has more room for manoeuvre because the dollar is the world's dominant currency and there is more integration at home. If a startup or an emerging-market country ruins itself using dollars, that company or country's poor management gets the blame. Fingers are not pointed at the dollar or the Federal Reserve.

But if the same happens to a euro-using company or country, the repercussions could be felt by the euro itself. It all boils down to credibility. If there is a digital euro, it will be easier for the ECB to differentiate between its own integrity and market ventures, and thus to defend the currency while letting market discipline run its course.

This credibility is the heart of the digital euro's relevance. To the extent a retail digital euro lessens reliance on Visa and Mastercard, its financial stability importance rests inside of this larger question of what the euro is and how much the ECB anchors. Monetary sovereignty includes payment sovereignty but should not be reduced to whose network provides the backbone for everyday commerce.

Supporters of the digital euro often argue the EU needs a homegrown alternative to US payment giants to assure payment sovereignty. This argument has not convinced the sceptics. Opponents say the private sector is capable of generating more options to meet demand (e.g. Navarrete, 2015), and

they note that the EU already has a strong bank-transfer protocol and widely available instant payments.

Furthermore, in the unlikely event of Washington moving to cut off access to the card networks, many other things would likely have already gone wrong, including the fracturing of NATO and an end to decades of security cooperation. In that context, having to pay with cash or direct bank debit would be a manageable problem.

It might be nice to have a European payments provider on the same scale as US giants – the EU needs more growth and innovation, and a new product could create jobs and other economic opportunities. It would also insulate the EU from Mastercard and Visa running into trouble, political, operational or otherwise.

All that said, Europe has enough payment options to manage without them if it really needed to. It does not, however, have a backstop for credibility.

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⁷ According to the ECB, dollar-denominated stablecoin issuance totaled more than €280 billion through November 2025, compared to about €395 million. See ECB (2025b).

Patrick Vanhoudt

Anchoring Europe's Monetary Future: Why a Wholesale Digital Euro Is the Immediate Priority

Dollar-denominated stablecoins are expanding rapidly. For Europe, this is not merely a technological development. The deeper question is strategic: who controls the infrastructure through which money circulates? Even where prices, contracts and accounting remain denominated in euro, a growing share of transactions may be executed on dollar-based digital rails, thereby reducing the effectiveness of ECB monetary policy and weakening one of the institutional foundations on which Europe's longer-term growth increasingly depends. This article argues that dollar stablecoins are best understood as "Eurodollars on steroids": a programmable and scalable extension of the offshore dollar system. It identifies three risks for the Economic and Monetary Union: leakage of liquidity and activity from euro monetary circuits, indirect support for US fiscal power, and new forms of fragility arising from reserve opacity and redemption risk. The article further contends that a wholesale CBDC could mitigate some of the EMU's structural constraints and provide catalytic infrastructure for scalable euro-denominated stablecoins, with the potential to become the most trustworthy in the world. By contrast, retail CBDC addresses the wrong battlefield: Europe's central vulnerability lies not in payments at the till, but in the deeper monetary architecture that will shape its future monetary sovereignty.

Over the past decade, dollar-denominated stablecoins have added a new private settlement layer to the international monetary system. In what follows, "stablecoins" means fiat-referenced, reserve-backed tokens (not algorithmic designs), which dominate today's market. By combining the denomination of traditional fiat money with the affordances of distributed-ledger technology (DLT) finance, these instruments extend the reach of the US dollar into cross-border payments, asset tokenisation, decentralised finance and, increasingly, retail-adjacent applications. What began as an internal liquidity device for crypto-asset markets is now transforming into a globally scalable payment and settlement infrastructure.

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Patrick Vanhoudt, Luxembourg School of Business, Luxembourg.

For the euro area, this development raises a structural rather than a technological question: how does the expansion of large dollar-stablecoin arrangements reshape the external monetary constraints of the Economic and Monetary Union (EMU), and how can a digital euro mitigate these pressures within the European Central Bank's (ECB) monetary sphere? Put plainly, if the fastest-growing tokenised payment and collateral circuits settle in dollars, the euro can remain the unit of account in the EMU while losing influence over the infrastructure where transactions actually clear.

The central claim of this article is not that a wholesale central bank digital currency (CBDC) is desirable in the abstract, nor that it represents a technologically superior form of digital money. Rather, it argues that a wholesale digital euro becomes *strategically unavoidable* as a response to the emerging form of digital monetary dependence. In this setting, anchoring euro-denominated digital money directly in central bank liabilities addresses a binding macro-monetary constraint faced by the EMU in the digital era.

The analysis proceeds in five steps. First, it places stablecoins in the monetary hierarchy and shows how DLT settlement revives a digital impossible trinity for the

EMU. Second, it argues that dollar stablecoins extend the Eurodollar logic, generating monetary-base leakage and an indirect channel of US public debt finance. Third, it adds an informational externality: by making private liabilities frictionless to use at scale, stablecoins expose users to asymmetric information about reserve quality and redemption risk – shifting liquidity towards fragile structures and amplifying confidence-sensitive run and spillover dynamics. Taken together, these mechanisms amount to a triple set of externalities that remain only partially recognised in the stablecoin and CBDC literature. Fourth, it situates these dynamics in a comparative geoeconomic perspective, contrasting Europe’s rule-based approach with the United States’ market-led strategy and China’s state-centred approach – and argues that Europe currently exports regulatory standards while importing monetary dependence. Fifth, it shows why the EMU’s institutional constraints – safe asset scarcity, fiscal fragmentation and Markets in Crypto-Assets Regulation’s (MiCAR) no-yield rule – impede a competitive euro-stablecoin market adjustment. Finally, the article concludes by outlining why a wholesale digital euro is the most feasible second-best response: it is a public settlement anchor that catalyses euro-denominated private digital money to scale under supervision.

Digital money in the monetary hierarchy and the EMU’s monetary dependence

Debates on digital money often conflate instant payment systems, private stablecoins and CBDCs. Instant payment platforms, such as TARGET Instant Payment Settlement (TIPS) or SEPA Instant, accelerate the settlement of existing bank money transfers but do not create new underlying monetary instruments. Stablecoins and CBDCs are fundamentally different: they are native digital liabilities transferable on DLT infrastructures without recourse to traditional clearing arrangements.

Modern monetary systems rely on a hierarchical architecture in which central bank money anchors private money creation. Following Goodhart’s (1998) distinction between the unit of account and the instruments that perform means-of-payment and store-of-value functions, the euro remains a public construct anchoring contracts, taxes and wages. What is at stake is control over the liabilities denominated in that unit of account. Monetary homogeneity is preserved because heterogeneous claims – banknotes, commercial-bank deposits, settlement balances – circulate interchangeably at par. This “singleness of money” is sustained by a supporting institutional framework encompassing regulation, supervision, lender-of-last-resort facilities and access to central bank settlement.

Stablecoins occupy an ambiguous position within this hierarchy. They can replicate the user experience of bank money, yet they remain private liabilities *outside* the lender-of-last-resort backstop that sustains par convertibility in the traditional system. When widely accepted and redeemable at predictable rates, they can therefore perform money-like functions. When denominated in a foreign unit of account, moreover, they graft an external layer onto domestic payment systems. In practice, tokenised trade, collateral and payments can default to dollar rails even inside the euro area. That shifts “where money lives” from the unit of account to the settlement layer. Over time, this can erode the euro’s role as the operative anchor in key segments of the digital payments landscape, giving rise to a novel form of *monetary dependence*.

The consequences of this dependence can be understood through a digital reinterpretation of the classic impossible trinity (Mundell, 1963). DLT settlement with stablecoins materially lowers cross-border transaction frictions, intensifying effective capital mobility for tokenised assets; par redeemability creates a functional “fixed-rate” property within these rails. Once dollar-denominated stablecoins import a foreign currency directly into payment chains, the EMU faces a sharper trade-off in pursuing monetary sovereignty. It must either constrain digital capital mobility – an implausible option for an economy embedded in international trade and finance – or accept a progressive erosion of monetary autonomy, with direct implications for macroeconomic stabilisation and long-term growth. The least distortionary response is therefore to scale credible euro-denominated stable values that can operate natively in these digital markets. In principle, private issuance could supply that layer. Yet in the absence of a unified federal AAA debt market and a deep pool of euro-denominated safe assets, a system of private innovation is bound to struggle to scale. A public settlement asset is therefore required to catalyse a competitive euro-stablecoin ecosystem.

This mechanism is central to understanding why dollar-denominated stablecoins matter for the EMU even when their initial use cases appear niche. Once settlement migrates to foreign-denominated digital instruments, the absence of a euro-denominated public anchor becomes binding – a constraint that a wholesale digital euro is uniquely positioned to address by re-grounding digital settlement in central bank money.

Before turning to the externalities and the geoeconomic stakes, the next section reviews what the literature explains about stablecoin design, stability and policy trade-offs – and what it still misses.

Stablecoins in the literature: Insights and blind spots

Despite their central role in crypto markets, the academic literature on stablecoins remains thin. Bibliometric evidence suggests that while thousands of articles examine cryptocurrencies broadly, only a few dozen analyse stablecoins as monetary instruments (Dionysopoulos & Urquhart, 2024). Three strands can nevertheless be identified.

The first strand examines how stablecoins interact with the wider crypto ecosystem, asking whether returns, trading volumes and volatility co-move across tokens and how shocks propagate (Grobys et al., 2021; Kristoufek, 2021; Lyons & Viswanath-Natraj, 2023). A related debate asks whether issuance has been used strategically to influence crypto prices (Griffin & Shams, 2020; Wei, 2018; Kristoufek, 2021).

The second cluster examines the very attribute that gives stablecoins their name: stability. Early work asks whether pegged tokens can serve as a safe parking place in stress (Bullmann et al., 2019; Lyons & Viswanath-Natraj, 2023). Empirical evidence shows that major fiat-backed stablecoins typically maintain tight pegs in normal times but can exhibit non-negligible deviations under stress, underscoring that stability is contingent on institutional design rather than inherent (Hoang & Baur, 2021; Jarno & Kołodziejczyk, 2021). Later studies use stress episodes – most notably Terra-Luna and the failure of the Silicon Valley Bank – to compare how different designs perform under pressure (Lee et al., 2023; Galati & Capalbo, 2024).

A central insight is that design features that support the peg in normal times can raise fragility in stress. d’Avernas et al. (2022) highlight time-inconsistency problems that become acute in algorithmic arrangements. Ma et al. (2025) show a trade-off: centralised arbitrage can keep the peg tight day-to-day, but it can also make runs sharper once confidence breaks, because a small set of intermediaries can keep the price near par at first, muting early warning signals and forcing the adjustment to arrive abruptly later. Consistent with this, prices and yields in stablecoin-based markets often react quickly to macro news despite blockchain frictions (Gorton et al., 2025; Ranaldo et al., 2024), while devaluation and run risk remain tied to backing quality and issuer credibility (Eichengreen et al., 2025).

A related line of macro-financial work links stablecoins to traditional short-term funding markets and monetary policy transmission. Barthélémy et al. (2026) document that large stablecoin reserve allocations generate additional demand for US dollar commercial paper, and they show

that commercial paper issuers accommodate this demand by issuing more, linking stablecoin growth to real-economy financing and financial-stability considerations. Aldasoro et al. (2025) add that stablecoin market capitalisation reacts to crypto shocks while MMF assets do not, and that US monetary tightening moves prime MMF assets and stablecoins in opposite directions.

The third cluster considers the role of stablecoins in central bank and policy work alongside CBDC debates, including implications for deposits, payment systems and monetary policy transmission, and comparisons between public CBDC solutions and private tokenised monies (Bullmann et al., 2019; Arner et al., 2020; Gorton & Zhang, 2021; Ahmed et al., 2024). Work on CBDC geoeconomics remains more limited: Quaglia and Verdun (2025) document how sovereignty and infrastructure autonomy increasingly frame the digital euro debate, while Lin and Mayer (2025) formalise a strategic timing logic wherein delayed public digitisation can allow private digital monies to entrench and weaken sovereign currency roles, implying that postponing wholesale settlement risks locking in a foreign anchor before a euro alternative can scale.

By contrast, what remains largely absent from the literature is an industrial-organisation perspective on competition between digital currencies. This omission matters because stablecoins sit uneasily with the assumptions of classical monetary theory. Standard money-demand and money-supply models treat money as an issuer-neutral, homogeneous good: as long as par convertibility holds, agents are assumed to be indifferent between different forms of bank money claims denominated in legal tender.

Stablecoins violate this presumption. They are privately coined liabilities whose issuers compete through product differentiation along economically meaningful dimensions, including reserve transparency, governance, settlement speed, yield pass-through and currency denomination. These differences are not incidental; they shape usage patterns, market segmentation and the geographic clustering of crypto-asset activities. Under asymmetric information, stablecoin markets can then generate allocative inefficiencies even when individual users behave rationally.

Market concentration makes this particularly visible. Over 80% of the global stablecoin market is accounted for by two issuers, USDT and USDC – nominally homogeneous, dollar-denominated instruments that nevertheless differ markedly in transparency and reserve disclosure. A striking empirical regularity is that the less transparent coin, USDT, exhibits more frequent and larger peg deviations

yet dominates transactional use, while the more transparent coin is disproportionately held as a short-term store of value (Lyons & Viswanath-Natraj, 2023). This pattern underscores that stablecoins function less like uniform monetary instruments and more like differentiated financial products competing across distinct use cases.

That gap in the literature is particularly salient in the European context. In the euro area, regulatory harmonisation under MiCAR coexists with nationally based supervision, where authorisation by a national competent authority grants crypto-assets and their service providers an EU-wide passport. Together with the uneven geographic concentration of regulatory, legal and compliance expertise, this institutional setup shapes competitive outcomes in digital money markets. Yet these features are rarely incorporated into existing analyses. Most contributions instead treat the euro area as a generic jurisdiction, offering limited insight into how EMU's structural asymmetries condition the equilibrium effects of euro-denominated stablecoin expansion.

The takeaway is that the existing policy-oriented literature emphasises monetary sovereignty and control over financial infrastructures, but offers limited guidance on how dollar-denominated stablecoins generate fiscal, monetary and informational externalities under asymmetric institutional regimes. It devotes relatively little attention to how issuer competition, market concentration, and platform-based usage patterns shape these spillovers, or to which policy instruments remain available to the euro area when market-based adjustment is institutionally constrained. Against this background, this article examines the role of a wholesale digital euro as a strategically coherent response to digital monetary dependence under the EMU's institutional constraints.

Stablecoins: Eurodollars on steroids

The tension between public monetary control and private liquidity innovation is not new. The expansion of Eurodollar markets in the 1960s already created offshore dollar liquidity beyond the Federal Reserve's direct jurisdiction. Eurodollars operated primarily within a professional banking system and along a wholesale vector, reinforcing US monetary dominance while generating systemic vulnerabilities (Mehrling, 2022).

Dollar-denominated stablecoins represent a digital successor to this system. Like Eurodollars, stablecoins are privately issued, foreign-based liabilities denominated in US dollars outside of American lender-of-last-resort support. Unlike Eurodollars, however, they settle *instantly* on programmable infrastructures and increasingly reach

beyond wholesale finance into retail-adjacent applications across decentralised platforms, trade finance applications and cross-border payment networks. In short, they amplify Eurodollar-style systemic risk through scale, speed and a broader user base.

The trinity of externalities confronting the EMU

Dollar-denominated stablecoins generate a triple set of externalities for the EMU. In economic theory, externalities – costs or benefits not reflected in market outcomes – justify regulatory and other public policy intervention, particularly when they distort resource allocation, create market failures or undermine macroeconomic stability.

The first one mentioned earlier is the monetary-base leakage. When trade finance, collateral and payment settlements migrate onto dollar stablecoin rails, monetary autonomy erodes not through the exchange rate, but through the settlement infrastructure and the private balance sheets that intermediate it. The euro may remain the unit of account, yet dollar-denominated settlement embeds US liquidity conditions in the plumbing of European transactions, which narrows the ECB's room for manoeuvre and, over time, weighs on growth.

Second, on the fiscal side, the reserve assets backing large dollar stablecoins are predominantly held in US Treasury bills and related short-term dollar instruments. This means that when European users and firms adopt dollar stablecoins for payment settlement and collateral, a part of their cash-like balances is effectively channeled into US government financing via reserve investment – an externality that replicates, and potentially amplifies, the Eurodollar-era spillovers (Afonso et al., 2024).

Third, stablecoin expansion exposes relatively uninformed users to private currencies that lack the institutional safeguards associated with central bank money. Moreover, the technological ease of use of these stablecoins in large networks obscures underlying differences in risk, reserve quality and institutional backing, making money-like instruments appear more homogeneous than they actually are. "A dollar is a dollar", but under asymmetric information about reserve quality, this opacity can distort usage patterns. Transactional activity becomes biased towards lower-transparency coins, while higher-transparency issuers absorb balance accumulation and associated maturity mismatch. This allocation is individually rational given users' beliefs, but socially inefficient: it reallocates liquidity towards more fragile structures and amplifies confidence-sensitive dynamics, increasing the risk of destabilising runs and spillovers into the broader financial system.

This raises a fundamental question for monetary economics: how should stablecoins be regulated once issuer heterogeneity becomes economically salient? The answer is not only microprudential. If payments and collateral increasingly settle on foreign-denominated rails, institutional design becomes decisive: the access rules, backstop and governance of the settlement layer. These choices shape the geoeconomic distribution of monetary power, even when individual issuers meet high supervisory standards.

Digital money as geoeconomic strategy

Regulators have embraced DLT at markedly different speeds and for different reasons, shaped primarily by divergent geoeconomic and geopolitical interests related to monetary sovereignty, the strategic autonomy of financial market infrastructures, and international influence. As a result, regulatory rulebooks now diverge sharply across jurisdictions.

The United States has embraced privately issued dollar-denominated stablecoins, while political and legislative momentum has shifted decisively against the introduction of a US CBDC. Recent legislative initiatives consolidate stablecoins as a Treasury-adjacent liquidity layer.

From a geoeconomic perspective, this design extends US monetary influence globally while fiscal benefits accrue domestically through sustained demand for Treasury securities – precisely the externality the euro area must now confront. The absence of a CBDC thus reflects a strategic policy orientation rather than a technological constraint: it supports low-cost, market-based financing of US public debt while keeping stablecoins outside the perimeter of central bank money and the Federal Reserve’s lender-of-last-resort safety net, thereby deflecting credit and liquidity risks to global users and markets.

China’s approach is best read as bifurcated. Domestically, a retail CBDC (e-CNY) modernises retail payments while preserving state control and capital account restrictions, thereby preventing arbitrage or leakage into the financing of foreign-currency (US) debt. Offshore, Hong Kong is emerging as a tightly regulated experimentation venue for fiat-referenced stablecoins under a “one country, two systems” framework via a dedicated licensing regime. This regulated proximity organises the ability to monitor institutional and market interactions between public digital money and private stablecoin infrastructures.

From a geoeconomic perspective, this configuration also serves a clear strategic purpose. By permitting fiat-backed stablecoins to operate under Hong Kong’s supervisory umbrella, China creates a regulated venue where

such fiat liquidity can accumulate in a jurisdiction politically connected to the mainland. The result is a monetary architecture with renminbi centrality at home and a supervised offshore arena for foreign currency-linked token settlement. This arrangement keeps offshore token activity institutionally close to mainland-linked authorities and state-connected financial actors, creating information advantages and strategic optionality without implying legal control over private reserve assets.

Together, these choices may strengthen China’s international monetary position while preserving sovereign control, and lay the groundwork for a more assertive role in future currency and geopolitical competition.

The European Union has prioritised the swift development of a comprehensive framework rather than experiments with monetary instruments. Regulation (EU) 2023/1114 – better known as the MiCA Regulation or MiCAR – created the most detailed rulebook globally and subjects every issuer or crypto service provider that targets EU users to the same capital, governance and transparency tests imposed on electronic money institutions. It requires full reserve backing, governance safeguards and audits. Crucially, MiCAR prohibits the granting of interest to token holders – under Article 40 for asset-referenced tokens (ARTs) and Article 50 for e-money tokens. This contrasts sharply with the permissive US stance on yield.

While MiCAR represents an institutional breakthrough, its emphasis on regulatory prudence adds to the structural constraints of the euro area. Unlike the United States, the EU cannot rely on a deep, unified market in safe federal assets to support stablecoin reserves. Nor does it possess China’s capacity, or desire, to impose capital controls and experiment with monetary instruments in a single jurisdiction. Instead, Europe’s comparative advantage lies in legal harmonisation and market rule-setting – regulatory power for electronic tokens and crypto-asset service providers (CASPs): once licensed in one member state, based on that nation’s supervisory authority’s approval, an issuer may “passport” that licence across all 27 EU countries, creating a single, high-bar market standard. Because MiCAR covers any crypto-asset service aimed at EU residents – no matter where the firm is incorporated – global players must adapt to these rules if they want European customers. From a geoeconomic perspective, MiCAR is to digital finance what the GDPR became to data privacy: a benchmark shaping *global* practice.

Yet where Europe exports rules, it imports monetary dependence, and regulatory prudence has come at a tangible cost. As of the end of 2025, euro-denominated stablecoins account for only around US \$0.7 billion in out-

standing supply, compared with nearly US \$310 billion for dollar-denominated tokens.

MiCAR establishes the most stringent microprudential framework for stablecoins among jurisdictions that permit their issuance. However, by focusing on issuer-level safety while remaining currency-neutral, the macroeconomic and geoeconomic externalities of foreign-currency stablecoins are left largely unaddressed – and may, in the absence of a euro-denominated public alternative, inadvertently be reinforced.

Geoeconomic considerations already inform central banks' cautious approach to retail CBDCs (Quaglia & Verdun, 2025). However, the rapid expansion of dollar-denominated stablecoins makes these stakes considerably more acute. Without a credible euro-denominated digital settlement layer, the ECB risks a further erosion of monetary autonomy – with consequences for stabilisation policy, monetary transmission and Europe's growth potential.

Wholesale CBDC as a European institutional response

A wholesale digital euro, designed as a Eurosystem settlement and reserve facility for supervised stablecoin issuers, offers a coherent response to the constraints identified above.

In both the United States and Europe, the commercial viability of fully collateralised, non-bank issuers depends on two things: access to safe, short-term, liquid, yield-bearing reserve instruments, and reliable settlement through the banking and payment system. Unlike the US, the euro area lacks a structural unified federal short-term safe asset market that can serve as a natural reserve backbone at scale.

A wholesale CBDC can provide the missing public reserve layer by allowing supervised euro-stablecoin issuers to back tokens with central bank liabilities redeemable at par. Doing so would require the ECB Governing Council to establish a dedicated access-and-remuneration regime – setting eligibility, safeguarding, reporting and operational connectivity – and to define a rule-based remuneration parameterised to the Eurosystem's short-term rate framework (with caps/tiering as needed). This would not necessarily require treaty change, but it would go beyond today's non-bank access arrangements and would need to be designed consistently with the EU's broader legal and supervisory perimeter governing access to central bank money.

Unlike the US model, where stablecoin reserve assets are typically placed in Treasury bills and money market

instruments, this structure would not mechanically channel stablecoin backing into sovereign debt markets. It preserves a clearer separation between settlement architecture and fiscal financing while keeping reserve backing inside the Eurosystem's monetary policy framework and under a remuneration regime that can be tiered or capped if needed to protect monetary policy control.

The mechanisms at work are straightforward. On the fiscal side, placing reserves in wholesale CBDC rather than in US Treasuries removes the channel through which European stablecoin activity contributes to US fiscal financing, thereby attenuating the fiscal externality. On the monetary side, anchoring euro-stablecoins in central bank money reinternalises payment activity and monetary base creation into the ECB's balance sheet, mitigating leakage into foreign digital instruments. Relative to the baseline of unanchored dollar-stablecoin growth, the dual-track design thus mitigates the monetary-base leakage channel and partially offsets the fiscal externality channel, even though it does not rely on, nor does it create, a deep pool of euro area safe assets.

Importantly, wholesale CBDC avoids the political and distributive challenges associated with retail CBDC (Belikoff & Blaszek, 2025). It does not in itself disintermediate banks, raise privacy concerns or require a treaty change. Instead, it extends existing settlement arrangements into a DLT environment, consistent with the EMU's historical pattern of integration through monetary instruments in the absence of a fiscal union (Schelkle, 2017; Howarth & Quaglia, 2020).

The design also addresses run risk by ensuring that every private token is fully backed by central bank money. In other words, a wholesale CBDC would become a geoeconomic instrument in its own right that could be conducive to innovation of truly “stable” privately minted euro coins on DLT rails.

From a welfare-theoretic perspective, a wholesale digital euro constitutes a second-best solution. It substitutes for the absence of a unified euro area safe asset and fiscal authority by anchoring private digital money directly in central bank liabilities. In the presence of binding institutional constraints, however, this second-best arrangement becomes the most operationally feasible means of preserving monetary sovereignty in the programmable economy.

Yield as a product differentiation dimension

MiCAR bans “yield” for stablecoins. Token issuers may not grant “interest” or any other benefit related to the length of time a token is held; and CASPs may not grant

such interest when providing crypto-asset services related to those tokens. “Interest” is defined broadly to capture any remuneration or benefit tied to holding duration, including net compensation or discounts that stem directly or indirectly from the issuer (or third parties directly associated with it), or that are effectively delivered through the remuneration or pricing of other products.

That rule locks euro-stablecoins into a “digital cash” profile. It prevents reserve returns from reaching end users, even when the backing is prudentially strong, and it creates a structural competitiveness wedge relative to the US’s more permissive ecosystem for yield and rewards around stablecoins. MiCAR’s no-yield stance reflects a deposit displacement concern: yield-bearing tokens could pull household liquidity out of bank deposits, shrinking bank balance sheets, and push banks towards a payments-and-service utilities role.

If Europe wants commercially successful euro tokens, the answer is not to dilute MiCAR’s safeguards but to differentiate within them. Deposit substitution arises when yield and convenience make token balances more attractive than deposits. A narrow carve-out for wholesale CBDC-backed tokens, under strict disclosure and reporting, would make that trade-off manageable and give the ECB a clear control knob: it could set, by rule, the terms of access to the wholesale CBDC facility, including quantitative limits on eligible backing balances and a tiered remuneration schedule for those balances. That is competitiveness by legislative design – deliverable through MiCAR’s review clause and the ordinary legislative procedure.

Longer-term progress on the Capital Markets Union would undoubtedly reinforce the design, but such reforms are not prerequisites for safeguarding monetary autonomy. In line with the Union’s established pattern of advancing integration through monetary instruments in the absence of fiscal federalisation (Schelkle, 2017; Howarth & Quaglia, 2020), a wholesale digital euro would provide the euro with a credible anchor in the programmable economy, even in the absence of a full fiscal union.

Conclusion: Strategic coherence under constraint

Dollar-denominated stablecoins constitute a digital continuation of the Eurodollar system, amplifying asymmetric fiscal and monetary externalities for the euro area.

Much of today’s stablecoin demand is increasingly driven by non-retail balances – centralised/decentralised finance liquidity, cross-border treasury management, trade finance, collateral posting and institutional settlement – rather than point-of-sale payments. This matters because

a retail CBDC mainly competes at the local checkout, where it would have to displace already well-functioning instant payments on bank-based rails, while leaving the core settlement-layer externalities only weakly affected. Experience with the four retail CBDCs issued outside China – the Bahamas, Jamaica, the Eastern Caribbean Currency Union and Nigeria – also suggests that uptake of retail CBDC has so far remained modest, reinforcing the difficulty of relying on retail adoption to shift the relevant market segment.

Regulatory leadership alone cannot neutralise these dynamics. In a world characterised by open capital markets and programmable settlement, monetary sovereignty increasingly hinges on control over digital financial infrastructure.

Europe thus faces a strategic inflection point. Persisting with slow-moving debates over a retail digital euro – valuable in their own right – risks allowing dollar-backed stablecoins to entrench themselves as the default settlement layer of the programmable economy, accelerating a leakage of monetary sovereignty that the EMU’s architects never envisaged.

Prioritising a wholesale digital euro, by contrast, offers a coherent and institutionally grounded response. It would provide the euro with a credible anchor in the programmable economy while catalysing private fintech innovation – an anchor that is, by design, aligned with Europe’s institutional constraints and safeguards its geoeconomic interests.

Essentially, this is about strategic autonomy in the DLT settlement layer. The choice is political: Europe can export rules while accepting that settlement may default to foreign currency rails, or it can provide a public euro settlement anchor and accept the institutional decisions that this entails.

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Christian Pfister

Confrontations Over Seigniorage in the Euro Area

Concerns about the prospective evolution of seigniorage collected by central banks as a result of innovation in the field of money and payments are not new. They have resurfaced recently with the prospect of stablecoins gaining traction. This paper considers that commercial banks also collect a form of seigniorage. On the basis of back-of-the-envelope calculations, we show that, in the euro area, stablecoins could impact banks' seigniorage more negatively than that of the ECB. Furthermore, a digital euro could support the ECB's seigniorage far more than euro stablecoins could dent it, while protective regulation and banks' adaptation to the new context would allow them to limit the fall in their seigniorage caused by stablecoins and a digital euro. All in all, seigniorage would increase.

Concerns about the prospective developments in the seigniorage collected by central banks, in the face of innovation in the field of money and payments, are not new. Such concerns were, for instance, expressed at a time when electronic money seemed poised for a bright future in Europe (see, e.g. Boeschoten & Hebbink, 1996; Groeneveld & Visser, 1997). They have resurfaced in the context of the digitalisation of payments and the development of new forms of money, in particular stablecoins (Armas & Singh, 2022; Clouse, 2025) as well as central bank digital currencies (CBDCs) (Gustaffson & Lagerwall, 2020).

Seigniorage accrues as a result of the use as money of an asset that is not remunerated or remunerated at a significantly below-market interest rate. The best example is the central bank as issuer of currency, which bears a zero interest rate, and possibly also, in the future, as a supplier of a CBDC.¹ However, seigniorage in the broader sense can also be collected by the private sector. In particular, the closeness of overnight deposits to currency, with

both means of payment used in large part for transaction purposes, allows banks to pay a very low interest rate on sight deposits, hence to collect seigniorage.² In the following, we refer to seigniorage in this broader sense.

Seigniorage can be measured as a flow (the revenue derived from the issuance of zero or below-market interest-bearing liabilities used as money) or as a stock (the volume of the corresponding liabilities). We retain the second measurement for two reasons. Firstly, this avoids specifying the yield on the assets held by the issuers as a counterpart to the issuance of seigniorage-generating liabilities and enables the equation of changes in these liabilities with changes in seigniorage. Secondly, beyond short-term fluctuations, seigniorage-generating liabilities usually do not decrease; their issuance thus amounts to a transfer of the same amount to the collectors of seigniorage. Finally, we do not take into account the infrastructure, production, maintenance and distribution costs of currency or new forms of money, which we deem negligible in comparison with seigniorage.

This paper focuses on the potential impact of new forms of money (i.e. stablecoins and CBDCs) on the volume and the sharing of seigniorage in the euro area in the coming years. First, it briefly presents the current state of play in the stablecoin industry. Subsequently, the paper provides rough estimates of the consequences of the issuance of

¹ The European Commission (2023) proposal for a regulation on the digital euro foresees that the digital euro will bear a zero interest rate.

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Christian Pfister, University of Orléans, France.

² For instance, interest rates on overnight deposits placed by households and corporations stood respectively at 0.52% and 0.25% in October 2025, whereas the interest rate on the ECB deposit facility stood then at 2%. See https://data.ecb.europa.eu/data/concepts/overnight-deposits?tags_array%5B0%5D=Overnight%20deposits&layerType=AL.

euro stablecoins for the level and sharing of seigniorage in the euro area.³ It then discusses how the traditional actors in the monetary field (the central bank and commercial banks) could respond to the negative impact of stablecoins, and more broadly of new forms of money, on their profitability. Finally, the paper concludes.

State of play

Stablecoins are crypto-assets that have recourse to a stabilisation mechanism and are meant to be used as a means of payment and/or a store of value (FSB, 2023). Unlike deposits, which are attached to an account, stablecoins are bearer instruments. The first stablecoin was created in 2014. The total market capitalisation of stablecoins reached around US \$310 billion as of mid-January 2026, 2.4 times more than two years before.⁴ Most stablecoins aim to keep a stable value vis-à-vis the dollar and are backed by reserves invested in short-term dollar-denominated assets (deposits and securities), with euro stablecoins representing only 0.2% of the total market capitalisation of stablecoins. To our knowledge, there are no statistics on the use of stablecoins; however, one estimate frequently mentioned is that 90% of transactions in stablecoins take place in crypto trading activities and only 6% are in non-crypto-related payments, consisting mostly of remittances (see, e.g. Jhanji et al., 2025). However, the use of stablecoins is expected to pick up rapidly in the coming years on account of several factors: the clarification of the regulatory environment; the tokenisation of financial assets; the decrease in stablecoin transaction costs, allowed by economies of scale; the extension of uses to corporate treasury and P2P payments; and dollarisation.

In the EU, the regulatory environment of stablecoins has been clarified by the Markets in Crypto-Assets (MiCA) Regulation (European Union, 2023). The mono-currency stablecoins we focus on are labelled “electronic money tokens” (EMTs) in MiCA. EMTs can only be issued by banks and electronic money institutions, which are not allowed to pay interest on them and thus collect seigniorage. EMTs have to be backed at a minimum 1:1 ratio by deposits and secure, liquid and low-risk assets, denominated in the same official currency as the EMTs. However, EMTs issued by banks do not have to be backed

by a dedicated reserve.⁵ Smaller issuers have to hold at least 30% of their reserve as deposits, and larger ones (so-called ‘significant’ issuers) have to hold at least 60%. All issuers are subject to some transparency, governance and prudential requirements and must redeem EMTs at par at any time, without redemption fees. These restrictive provisions, in particular the latter one, should result in the perfect stability of stablecoins, implying a regime shift, since stablecoins have not always been stable in the past (Melachrinou & Pfister, 2021).

Consequences of the issuance of euro stablecoins for the level and sharing of seigniorage in the euro area

In order to estimate the consequences of the issuance for the level and sharing of seigniorage, we first have to assess the potential issuance of stablecoins. This is a difficult exercise. However, one can try to draw a parallel with current forecasts for dollar stablecoins. At the time horizon of 2028, these forecasts range from US \$500-\$750 billion (J.P. Morgan Global Research, 2025) to US \$1.2 trillion (Duong & Vasco, 2025)⁶ and even US \$2 trillion (TBAC, 2025). We use the median of these forecasts (US \$1.2 trillion), considering the range provided by J.P. Morgan as a single forecast. To derive an estimate for euro stablecoins issuance in the next few years, we use the average shares of international and foreign currency liabilities provided by Bertaut et al. (2025) over the period 2015-2024. This is due to the fact that, as discussed below, it is mainly deposits that can be expected to substitute into stablecoins. These average shares are 61.85% for the US dollar and 18.42% for the euro. Consequently, euro stablecoin issuance could potentially reach US \$1.2 trillion \times (18.42/61.85) = US \$357 billion, probably after 2028 as a result of an initial delay in creating a stablecoin industry in Europe. Using an exchange rate of the euro against the dollar of 1.1823, equal to the average since its creation, euro stablecoins issuance could reach close to €300 billion in the medium to long term; this is the figure we use in the following. Of course, as a result of the many assumptions made in computing this figure, it is fraught with a high degree of uncertainty. Rather than a precise forecast, it should be considered an order of magnitude.

As a second step, we make assumptions about how other assets will substitute into stablecoins (we disregard

3 We consider only euro-denominated stablecoins, since we view the possible substitution of euro-denominated monetary assets into foreign currency-denominated stablecoins as highly unlikely, as the euro is a credible currency that also benefits from strong network effects.

4 Please also note that the TMC of stablecoins, according to the same source, was slightly over US \$315 billion as of 26 March 2026. See <https://defillama.com/stablecoins>.

5 Incidentally, since stablecoins are bearer instruments and as such circulate in the public without clearing, allowing banks to issue stablecoins without backing them with a dedicated reserve amounts to introducing a form of free banking.

6 The methods used to make these forecasts are not always clear. However, Duong and Basco (2025) mention they have used an AR(1) model and run Monte Carlo simulations.

the possibility that stablecoins or other new forms of money could result in higher saving). For that purpose, we use information collected by the ECB in its survey on the source of the funds of the digital euro (this information is used by the ECB itself to gauge the potential financial stability impact of the digital euro; ECB, 2025a). According to the survey, digital euro wallets would be credited using sight deposits, saving deposits, cash and other assets up to around 64%, 13%, 16% and 7% respectively.

However, the ECB surveyed only individuals, whereas euro stablecoins will also be held by firms. Consequently, we make the following assumptions.

Only individuals hold cash, while firms hold term deposits in lieu of saving deposits held by individuals. We also assume that non-individuals will fund their holding of euro stablecoins in the same relative proportions as individuals, i.e. up to 76% ($0.64/(1 - 0.16)$) with overnight deposits, 15% ($0.13/(1 - 0.16)$) with term deposits, and 9% ($0.07/(1 - 0.16)$) with other assets.

We assume that savings and term deposits, as well as other assets that are held outside banks (i.e. with money market mutual funds), do not generate seigniorage. Thus, the loss of seigniorage by banks would result from their loss of overnight deposits.

With different sources of funding for individuals and non-individuals, we need a breakdown of the estimated ownership of stablecoins by the two categories. We hypothesise that the shares in total ownership will correspond to those in all deposits in M3, which stood at 61% and 39% respectively in September 2025.⁷ Indeed, the digital euro and euro stablecoins are not substitutes, and both new forms of money have to find their share in portfolios. Since monetary assets held by financial agents (in the sense of banks and money market mutual funds) are not included in M3, we also assume that stablecoins will not be held, just as the digital euro, or held in negligible quantity, by banks and money market mutual funds. This seems justified since, as seen above, MiCA does not allow interest to be paid on EMTs and mandates them to invest a large part of their reserve in deposits, thus making them less secure than reserves, which banks will still need for final settlement. Overall, on the basis of our estimate for total euro stablecoin circulation, €183 billion (300×0.61) would be held by individuals and the remaining €117 billion by non-individuals.

⁷ See <https://data.ecb.europa.eu/key-figures/money-credit-and-banking/bank-balance-sheets/deposits>.

Finally, we assume that the Eurosystem will not open accounts to stablecoin issuers or that, if it does, it will be in the form envisaged by the Fed for its “skinny” master accounts, i.e. not interest-bearing and limited in size (Waller, 2025). We therefore neglect this potential recycling of funds and of seigniorage from stablecoin issuers to the central bank.

Regarding the consequences for the ECB, the loss of seigniorage will be equal to the decline in cash circulation. Furthermore, as a result of the current and prospective uses of stablecoins, we assume that the substitution of cash into stablecoins by euro area residents will be limited (half of the substitution of cash into the digital euro, i.e. 8%), whereas non-residents would substitute cash into stablecoins to the same extent as respondents to the survey would substitute cash into the digital euro. The reasons are that euro stablecoins would be more accessible than euro banknotes to residents in countries with capital controls,⁸ and that they would be easier and safer to hold, store and use. Based on Zamora-Pérez (2021), who provides a range of 30% to 50% for the share of euro banknotes held abroad in 2019, we retain a percentage of 40% for that value, which leaves 60% for euro area residents. Consequently, the seigniorage collected by the ECB as a result of the issuance of euro stablecoins would decrease by $\text{€}183 \text{ billion} \times (0.6 \times 0.08 + 0.4 \times 0.16) = \text{€}20 \text{ billion}$.

Regarding the consequences for banks, the fall in their seigniorage would depend on two factors. The first factor, as indicated above, is their loss of sight deposits. The second factor depends on how they remunerate the deposits made by the stablecoin issuers, which in turn depends on the share of banks and their subsidiaries acting as electronic money issuers among stablecoin issuers. One can consider two extreme scenarios:

In Scenario 1, the share of banks and their subsidiaries is zero, giving stablecoin issuers market power. Supposing that banks keep the size of their balance sheet unchanged, banks would have to replace the overnight deposits they lose with resources, including the deposits of stablecoin issuers, remunerated at market interest rates. Banks’ seigniorage would fall by $\text{€}183 \text{ billion} \times 0.64 + \text{€}117 \times 0.76 = \text{€}206 \text{ billion}$.

In Scenario 2, the share of banks and their subsidiaries is 100%. Stablecoins would just replace other liabilities in their aggregated balance sheet and, since stablecoins do not pay interest, banking groups’ seigniorage would increase by $\text{€}183 \text{ billion} \times (0.13 + 0.07) + \text{€}117 \text{ billion} \times (0.15 + 0.09) = \text{€}65 \text{ billion}$.

⁸ According to Auer et al. (2025), capital controls appear ineffective against the holding of crypto-assets.

In these two scenarios, the share of the reserves invested as deposits does not play a role. In between, many intermediate scenarios could materialise, in which banks would have to craft a sort of compromise with euro stablecoin issuers, likely more favourable to them if they manage to take a bigger share of the market. Furthermore, euro stablecoin issuers would be forced by regulation to deposit a large part of their reserve with banks, which would weaken their bargaining power vis-à-vis banks, thereby making the fall in banks' seigniorage less pronounced than in Scenario 1.⁹

Possible responses of traditional actors

The ECB

One way for the ECB to offset the decrease in seigniorage resulting from the issuance of euro stablecoins would be to launch a digital euro although this would not necessarily be the main reason for this decision for said launch. The first issuance could take place in 2029 (ECB, 2025b). According to the ECB survey mentioned above, in normal circumstances (i.e. in the absence of a financial crisis), the demand for a digital euro, with an individual holding limit of €3000, would amount to around €110 billion. This demand would be funded by cash up to 16%, which implies that the ECB's seigniorage would increase by $€110 \text{ billion} \times 0.84 = €92 \text{ billion}$. We consider that the substitution between euro stablecoins and the digital euro would be negligible, as they would be complementary rather than substitutes. Indeed, the digital euro will likely not use blockchain, access to it by non-residents will be restricted, which will limit its international use, and its capacity to act as a store of value will also be limited by an individual holding ceiling (European Commission, 2023). The cumulative impact of euro stablecoins and the digital euro on the ECB's seigniorage would thus be a gain of €72 billion.¹⁰

Additionally, the ECB, or rather the European Council, which is scheduled to be the authority in charge of this matter (European Commission, 2023), could choose to extend the access to the digital euro beyond individuals, to public administrations and firms.¹¹ *Inter alia*, this would

9 Conversely, the bargaining power of euro stablecoins issuers would be significantly increased if they had access to the ECB's deposit facility.

10 We do not take into account the potential creation of a wholesale version of the digital euro for two reasons. Firstly, due to a high velocity, the demand for it would likely be limited. Secondly, there would likely be a substitution between it and reserves.

11 In fact, the European Council already envisages such an extension, since it suggests that use cases for the digital euro also include payments not just to, but also from businesses and government (Council of the EU, 2025).

allow the payment of salaries and social benefits in digital euro.

Two other ways for the ECB to preserve its seigniorage against stablecoin issuers could be:

- To fully recover the costs of issuing central bank money, including the digital euro, as the Fed is legally required to in pricing all its payment services. Instead, the ECB applies a “public good” adjustment, leading to a pricing of its payment services below those of the private sector. However, delivering a “public good” should not imply undercutting the private sector, but rather keeping costs at the lowest possible level, which is consistent with full cost recovery. All basic services attached to the digital euro would nevertheless have to be free for users (European Commission, 2023), which would make full cost recovery difficult.
- To raise the level of non-interest bearing minimum reserve requirements, possibly also incorporating euro stablecoins in the scope of liabilities submitted to them.¹² However, especially in the case of stablecoins, this would create a risk of dislocation of financial activity.

Commercial banks

Banks could be the main losers from the creation of new forms of money, with stablecoins causing a change from +€65 billion to –€206 billion in their profitability in the two extreme scenarios considered above. In addition, the issuance of the digital euro could dent their seigniorage by $€110 \text{ billion} \times 0.64 = €70 \text{ billion}$, meaning that the cumulative impact of stablecoins and the digital euro would range from –€5 billion to –€276 billion. Banks could react in three complementary ways.

First, they could improve the quality of the payment services they provide, thus limiting the loss of overnight deposits, e.g. through the generalisation of instant payments, which are already underway. Second, they could pass the loss of seigniorage on to their customers, most likely by increasing the cost of credit, since the competition for the collection of resources would be strengthened by new forms of money, making it difficult to lower interest paid on deposits. Third, they could launch their own financial products, as the ECB has done with the digital euro. These products could be stablecoins or tokenised deposits. The latter would benefit from their statute as deposits, including deposit insurance and commercial banks' access to central bank refinancing;

12 The ECB has been remunerating minimum reserve requirements at a rate of 0% since July 2023.

Table 1
Volume and sharing of seigniorage

Changes in billion euro

Scenario 1	
- ECB	-20
- Banks	-206
- Stablecoin issuers	+300
Total	+74
Scenario 2	
- ECB	-20
- Banks and their affiliates	+65
Total	+45
Scenario 1 and digital euro	
- ECB	+72
- Banks	-276
- Stablecoins issuers	+300
Total	+96
Scenario 2 and digital euro	
- ECB	+70
- Banks and their affiliates	-5
Total	+65

Source: Author's estimates.

however, they could not circulate in public, unlike stablecoins. In this case, the impact on banks' profitability would also depend on whether they can avoid remunerating tokenised deposits more than they currently remunerate sight deposits. To the extent that tokenised deposits allow their holders to enjoy the benefit of tokenisation, banks may be able to limit the remuneration of tokenised deposits, provided that competition in the market for new forms of money is not too strong. In that regard, just as stablecoins, tokenised deposits would differ from the digital euro and are therefore more likely to complement it than substitute for it.

Table 1 summarises the consequences on the volume and sharing of seigniorage in the euro area of the issuance of euro stablecoins under various scenarios. In all cases, total seigniorage increases.

Conclusions

Three main conclusions emerge, although all estimates provided in this paper are highly tentative.

The stakes are non-negligible. To give points of comparison, according to ECB monetary statistics, as of Septem-

ber 2025, currency in circulation in the euro area stood at €1575 billion and overnight deposits at €9308 billion. This means that the ECB's seigniorage could be dented by 1% by the issuance of stablecoins or boosted by 5% if it also launches the digital euro. Regarding the banking sector, the impact of both stablecoins and the digital euro on its seigniorage could range from very little in Scenario 2 to a fall of 3% in Scenario 1.

The estimates are also subject to a high degree of uncertainty. In particular, they are highly sensitive to the assumptions regarding the funding of new forms of money through overnight deposits (0.61 for individuals; 0.76 for non-individuals). Overall, seigniorage would increase in all scenarios.

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Armin Bolouri, Tim Lohse and Salmal Qari

Can Europe Deliver NATO's Five Percent?

Fiscal Constraints, Political Feasibility and Security Beyond Spending Targets

The adoption of NATO's new 5% defence spending target reflects shifting US strategic priorities and places heavy demands on European allies. This article assesses whether European NATO members can realistically meet this target, combining evidence on past and projected military spending, fiscal constraints, party programmes and voter preferences. It argues that focusing narrowly on expenditure targets risks obscuring more fundamental challenges. In a security environment dominated by hybrid threats, Europe's ability to enhance security and peace depends less on uniform spending benchmarks than on effective capabilities, societal resilience and coordinated contributions across countries.

The release of the US National Security Strategy (NSS) on 4 December 2025 under the Trump Administration marks a decisive turning point in American foreign and security policy (The White House, 2025). The document signals a clear and deliberate recalibration of US global engagement, embedding "America First" principles at the core of strategic planning. In contrast to earlier strategies, it places much stronger emphasis on burden-sharing within alliances, criticises long-standing multilateral practices and stresses that the United States will reduce its presence in regions where, in Washington's view, capable allies can and should assume the primary responsibility. Although the NSS formally reaffirms the US commitment to NATO, this commitment is explicitly conditioned on allies undertaking what the strategy refers to as their "fair share" and correcting what it portrays as decades of accumulated imbalances. Preventing adversarial domination in key re-

gions such as Europe remains a declared objective, yet the NSS makes unmistakably clear that the United States will not continue underwriting European security to the degree it once did unless Europeans significantly expand their own efforts.

This shift had already been preceded by the "Hague Commitment", adopted by all 32 NATO members at the NATO Summit in The Hague in June 2025, which represents one of the most far-reaching revisions of alliance commitments since the end of the Cold War. Under considerable pressure from President Trump, allies agreed to raise their defence- and security-related expenditure to 5% of GDP by 2035, thereby moving well beyond the long-standing 2% benchmark, which all members now meet. The new 5% target requires that at least 3.5% of GDP be devoted to core defence activities such as equipment, military personnel and readiness, while an additional 1.5% must be allocated to broader security-related domains including infrastructure, research and development, cyber capabilities, and mobility corridors essential for military logistics.

The US administration sees the increase as indispensable for restoring alliance fairness and strengthening deterrence. Importantly, the NSS dispels any ambiguity regarding American priorities: the strategic focus of the United States is shifting away from Europe, and Europeans will be expected to assume the primary responsibility for defending their continent. Initial attempts by some governments to broaden the definition of defence expenditures, such as Italy's idea to classify the long-planned Messina Bridge megaproject as a form of dual-use infrastructure contributing to security, are widely interpreted

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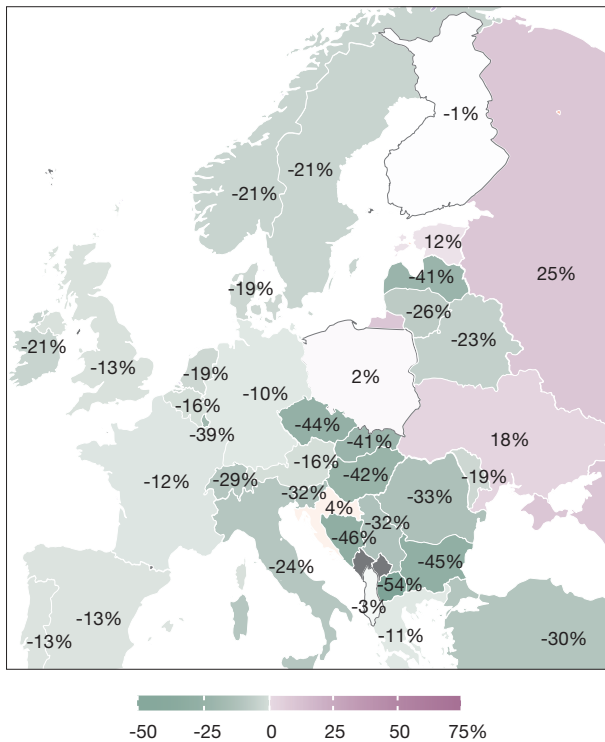
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Armin Bolouri, Berlin School of Economics and Law; and Freie Universität Berlin, Germany.

Tim Lohse, Berlin School of Economics and Law, Germany.

Salmal Qari, Berlin School of Economics and Law, Germany.

Figure 1
Military spending as a share of GDP in Europe:
Percentage change from 2004 to 2014



Source: Authors' calculations based on data from the Stockholm International Peace Research Institute (2025).

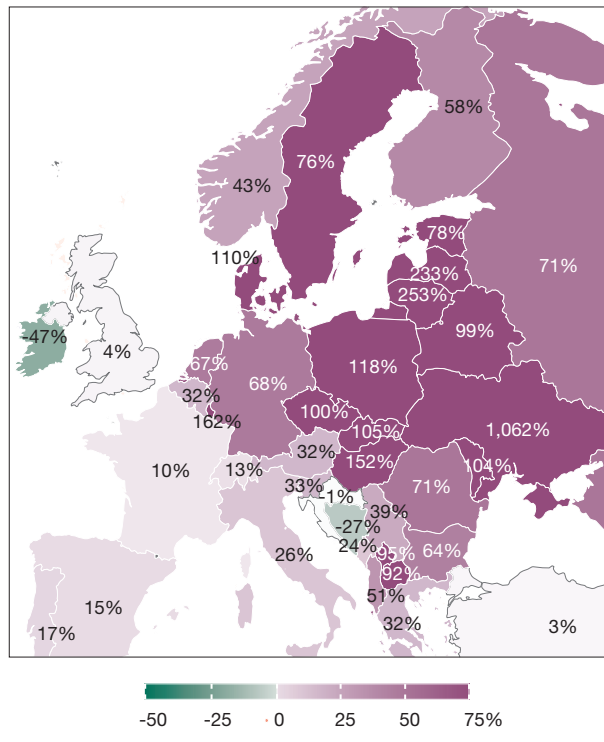
as inconsistent with the intent of the new commitment. Against this backdrop, Europe faces an unavoidable need for substantial and sustained action.

Europe's past underinvestment and the magnitude of the adjustment ahead

To understand the magnitude of the adjustment required, our analysis presents a historical, contemporary and forward-looking assessment of European military spending using a set of heat maps that illustrate the evolution of the military burden (defined as military expenditure relative to GDP) over the past two decades and the next ten years. The heat maps display percentage changes using data from the Stockholm International Peace Research Institute (SIPRI, 2025) and employ a colour scheme where green shades indicate declining burdens, purple tones represent increasing burdens, and white denotes relative stability.

Figure 1, covering the period from 2004 to 2014, illustrates the extent to which Europe continued to disarm after the end of the Cold War. During this decade, military spending relative to GDP fell across almost the entire continent.

Figure 2
Military spending as a share of GDP in Europe:
Percentage change from 2014 to 2024



Source: Authors' calculations based on data from the Stockholm International Peace Research Institute (2025).

The decline was particularly pronounced in southeastern Europe, where Romania reduced its burden by 33%, Bulgaria by 45% and Turkey by 30%. The Baltic states likewise experienced significant cuts, with Latvia decreasing its burden by 41% and Lithuania by 26%. Europe's three largest military spenders (in nominal terms) – Germany, the United Kingdom and France – reduced their burdens by 10%, 13% and 12%, respectively, underscoring that even major states participated in the broader trend of disarmament.

Only a few countries diverged meaningfully from this pattern. Poland maintained almost constant spending with a slight increase of 2%, while Finland essentially stabilised its burden with only a 1% decline. Estonia and Ukraine, both directly exposed to neighbouring Russia, increased their burdens by 12% and 18%, respectively. Russia stands out with a 25% increase, likely understating its true expansion due to opaque military budgeting. The overall picture is unambiguous: with the exception of a few states that were more cautious in light of Russia's use of force in Georgia in 2008, Europe did not respond to Russia's rising military posture and continued to reduce its defence effort throughout the decade preceding the annexation of Crimea.

Table 1
Government debt-to-GDP ratios in European NATO member states, 2024

ALB	55.7%	EST	23.6%	ISL	59.1%	NLD	43.2%	SVK	58.0%
BEL	104.5%	FIN	82.5%	ITA	135.3%	MKD	54.8%	SVN	67.0%
BGR	24.1%	FRA	113.1%	LTU	47.4%	NOR	42.7%	ESP	101.8%
HRV	57.6%	DEU	63.9%	LVA	38.2%	POL	55.3%	SWE	32.6%
CZE	43.0%	GRC	150.9%	LUX	26.0%	PRT	94.9%	TUR	26.0%
DNK	28.0%	HUN	73.5%	MNE	62.6%	ROU	54.6%	GBR	101.3%

Source: International Monetary Fund (2025).

In principle, governments can finance higher defence spending through three main channels: tax increases, expenditure reallocations within existing budgets or higher public borrowing – options that are constrained in parts of Europe (Dorn, 2024; Dorn et al., 2024). Tax increases and spending reallocations are often regarded as politically unpopular, which has led many governments to view deficit financing as the least contentious option, at least in the short run. Borrowing allows defence expenditure to rise without immediately imposing visible costs on voters and without directly confronting competing spending priorities.

However, the scope for relying on public debt differs markedly across European NATO members and is constrained in many cases by already elevated debt levels. Table 1 reports general government debt-to-GDP ratios for all 30 European NATO member states in 2024 (International Monetary Fund, 2025) and reveals a highly heterogeneous fiscal landscape. Several large and strategically important countries enter the current rearmament phase with very high public debt. Greece's debt-to-GDP ratio stood at 150.9% of GDP, Italy's at 135.3%, France's at 113.1%, Belgium's at 104.5%, Spain's at 101.8%, and the United Kingdom's at 101.3%. Portugal, with a ratio of 94.9%, and Finland, at 82.5%, also operate under limited fiscal headroom. Even Germany, often perceived as fiscally conservative, recorded a debt-to-GDP ratio of 63.9% in 2024, which substantially narrows the scope for sustained debt-financed spending increases compared to earlier decades.

What makes this constellation particularly challenging is that many of the countries facing the largest required increases in military spending are simultaneously among the most highly indebted. Italy, Spain, Belgium and France – all of which would need to more than double, and in some cases even triple, their military burdens to reach the 5% target – also exhibit some of the highest debt-to-GDP ratios in Europe. This overlap between high adjustment needs and limited fiscal space raises serious

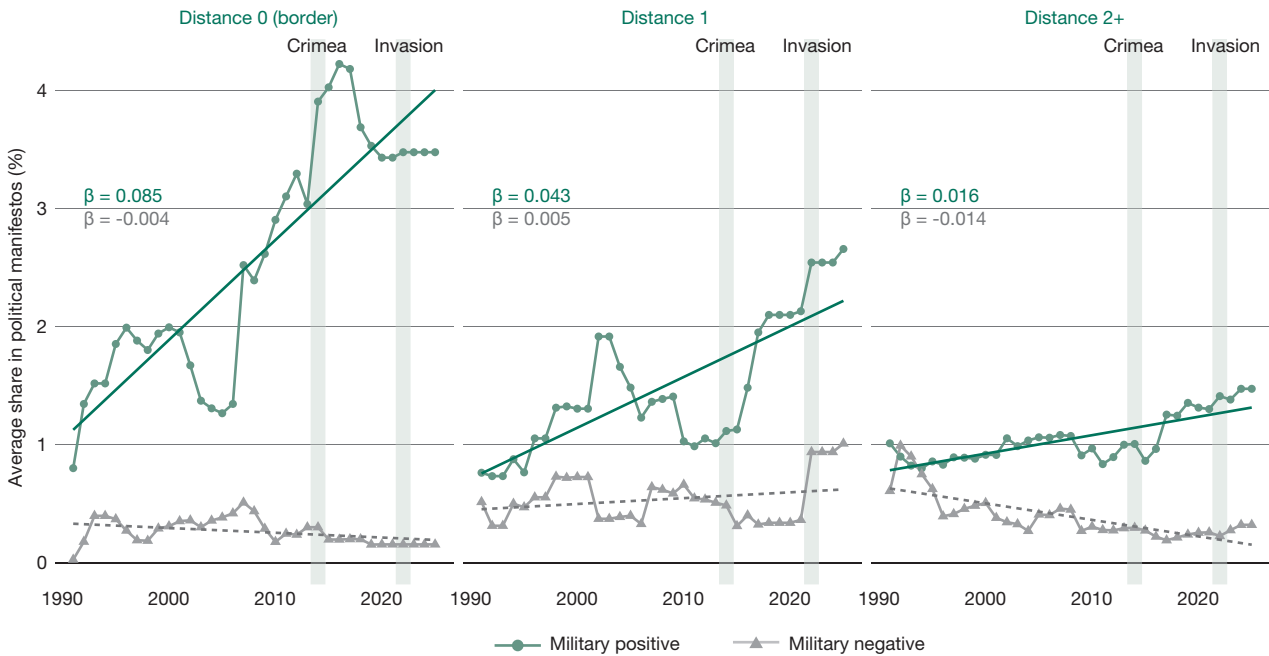
doubts about whether borrowing alone can serve as a viable financing strategy for meeting the new NATO benchmark.

Historical evidence reinforces these concerns. Using a panel of 167 countries from 1817 to 2024, Bolouri et al. (2025a) provide a global analysis of how governments finance and defund military spending over extended periods. Their results show that deficit financing is historically the dominant instrument during phases of armament, particularly in wartime or periods of heightened geopolitical tension. However, large military build-ups are also associated with substantial cuts to civilian spending, indicating that borrowing alone is often insufficient to absorb the fiscal shock. Crucially, fiscal space emerges as a key moderating factor: countries with low public debt rely primarily on borrowing to finance military expansions, whereas highly indebted countries are more often forced to resort to taxation and expenditure reallocations. Applied to the European context, their findings suggest that the fiscal challenges associated with the 5% target are not merely transitional. For countries with already high debt-to-GDP ratios, sustained reliance on borrowing is unlikely to be feasible, while large-scale tax increases or spending reallocations may become unavoidable over time.

Defence spending in party programmes across Europe

Whether the required adjustments can be implemented in practice and NATO's 5% target is ultimately achieved depends not only on fiscal capacity, as reflected in public debt levels and budgetary constraints, but also on political feasibility. Even where governments possess sufficient economic resources, large and sustained increases in military spending require a programmatic commitment and sustained support within the political system. Without such backing, ambitious defence commitments risk remaining symbolic, being postponed or being weakened in implementation. Political parties play a central role in mediating between strategic imperatives, fiscal constraints

Figure 4
Party manifesto connotations of military spending by geographic exposure, 1990-2025



Notes: Negative connotations refer to criticism of the military or military power, including appeals to the evils of war, disarmament, lower military spending or ending conscription. Positive connotations emphasise external security and defence, such as maintaining or increasing military spending, strengthening armed forces and fulfilling military treaty obligations.

Source: Authors' calculations based on data from Lehmann et al. (2025).

and voter preferences. Party manifestos offer insight into how military spending is evaluated, justified or contested within national political debates.

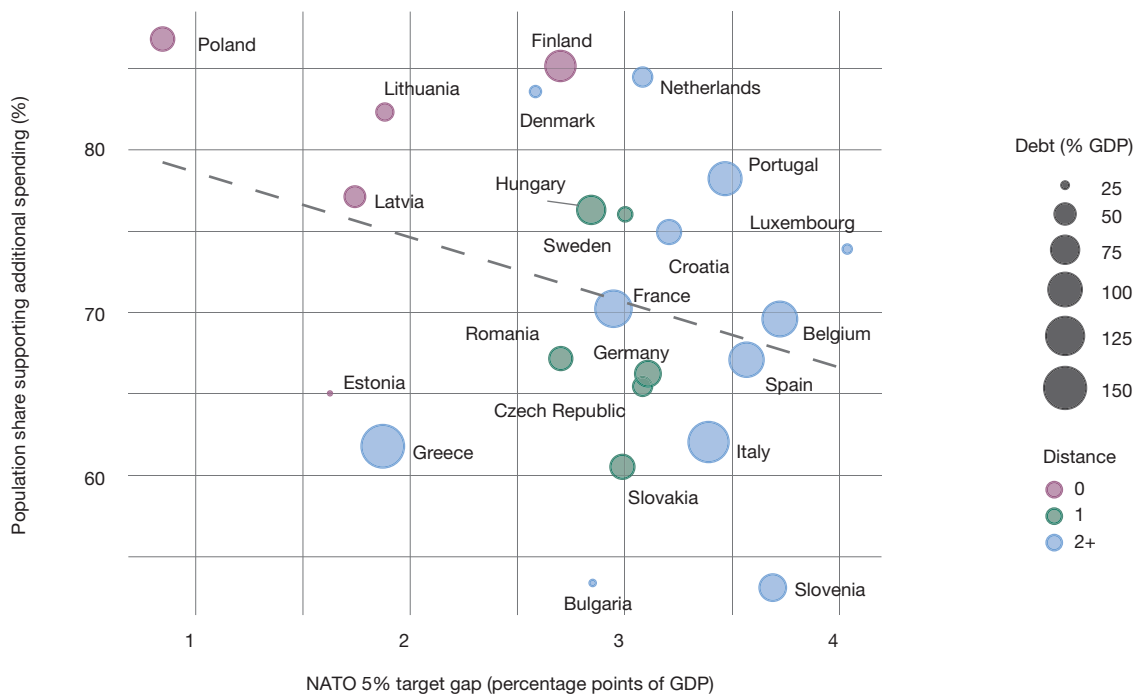
To assess the political support for higher defence spending, we have analysed party programmes across European NATO member states using data from the Manifesto Project (Lehmann et al., 2025) covering the period from 1990 to 2025. Figure 4 illustrates the average relevance of positive and negative statements related to military expenditure and readiness, measured as the share of sentences in party manifestos. The focus lies on the connotation of military issues in party manifestos, distinguishing between positive and negative references to defence spending and military preparedness. Negative connotations include references critical of the military or the use of military power, including appeals to the evils of war, disarmament, reduced military spending, or the abolition of conscription. Positive connotations include references emphasising the importance of external security and defence, including the need to maintain or increase military expenditure, secure adequate manpower, modernise and strengthen armed forces, pursue rearmament and self-defence and uphold military treaty obligations. The underlying data include all political parties covered by the Manifesto Project and are

averaged using equal weights, first at the country level and subsequently by distance group.

To account for differences in perceived threat exposure, countries are grouped into three distance categories (Figure 4). The first group comprises countries that directly border Russia or Belarus and are therefore immediate neighbours of the current war parties (0 neighbours away; left panel). The second group includes countries whose neighbours directly border Russia or Belarus, implying one degree of geographical separation from the conflict (1 neighbour away, centre panel). The third group consists of all remaining countries, including those geographically more distant from the war or insulated by geography, such as island states (2+ neighbours away; right panel). Within the observation period, Russia's annexation of Crimea in 2014 and its full-scale invasion of Ukraine in 2022 mark key geopolitical turning points.

Across all three country groups and throughout the entire period, negative references to military issues persist in party programmes. This reflects the continued presence of pacifist traditions within parts of the European party landscape as well as the influence of parties that oppose military build-up for ideological, strategic or geopolitical

Figure 5
Public support for higher military spending and the 2024 gap to NATO's 5% target



Source: Authors' calculations based on European Commission (2024), the Stockholm International Peace Research Institute (2025) and International Monetary Fund (2025).

reasons. Scepticism towards military spending has therefore remained a stable feature of European politics, even as the security environment has deteriorated markedly.

Although country groups begin from broadly similar levels in 1990, the subsequent evolution of positive military connotations diverges sharply. In countries that directly border Russia or Belarus, positive references to military spending and defence preparedness were stronger over time compared to more distant countries. The estimated regression coefficient indicates a positive and statistically significant increase in positive military connotations in party programmes ($\beta = 0.085$). This pattern suggests a sustained and systematic shift in political attitudes towards defence in countries most directly exposed to the perceived military threat. In the second group of countries (those separated from Russia and Belarus by one intermediary state), the increase in positive military references is still positive, but noticeably weaker. Some upward movement can be observed, but it is less pronounced, with a regression coefficient only about half the size ($\beta = 0.043$). In the third group of countries, which are geographically more distant from the conflict or insulated by geography, we observe only a very minor increase in positive military connotations ($\beta = 0.016$).

Public support, fiscal constraints and the politics of financing defence

Figure 5 complements the manifesto-based analysis by relating public support for higher military spending to countries' remaining gap to NATO's 5% target in 2024. The horizontal axis displays the NATO target gap, measured in percentage points as the difference between current defence spending and the 5% commitment. The vertical axis reports the share of the population that supports further increases in defence spending, based on Eurobarometer survey data (European Commission, 2024). Approval rates exceed 50%, indicating broad support at an abstract level. However, the survey captures general attitudinal preferences while approaches that elicit monetary trade-offs tend to yield more differentiated results (Nicoli et al., 2025; Qari et al., 2024). The figure includes all EU NATO member states and reveals a systematic relationship between public support and the size of the remaining target gap. Countries that are further away from the 5% benchmark, such as Slovenia, Italy or Belgium, tend to exhibit lower levels of public support for additional increases in military spending than countries closer to the target level. This negative association is illustrated by the dashed trend line.

Geographic exposure to the conflict is captured by the colour coding. Countries that directly border Russia or Belarus (category 0; purple) typically exhibit relatively small target gaps and comparatively high levels of public support, with Poland representing the most pronounced case. Countries separated from Russia or Belarus by one intermediary state, such as Romania and Germany (category 1; green), tend to occupy an intermediate position in terms of both remaining gaps and public approval. By contrast, countries that are more distant from the conflict zone (category 2+; blue) generally combine larger target gaps with lower public support for higher defence spending.

The figure also highlights the relevance of public debt levels relative to GDP for both the remaining gap to the 5% target and public support for higher military spending. Public debt is represented by the size of the markers. A clear pattern emerges: countries with larger target gaps are often those with higher public debt ratios. These countries are also more frequently located in the geographically more distant group and tend to display weaker public support for further increases in defence spending. The figure thus points to a reinforcing constellation of fiscal, political and geographic constraints. Countries facing the largest increases required to meet the 5% target are often those with limited fiscal space, lower public support and greater distance from the perceived military threat.

While Figure 5 documents systematic cross-country patterns in public support for higher defence spending, it does not reveal how voters evaluate the underlying fiscal trade-offs. Addressing this question requires evidence at the individual level. Using a survey-based discrete choice experiment with 1,808 respondents representative of the German population, Bolouri et al. (2025b) show that preferences over defence spending cannot be understood independently of preferences over how such spending is financed. Their results reveal a strong interdependence between spending and financing preferences. Individuals who attach high importance to defence readiness and are aware of the fiscal costs associated with military expansion are significantly more willing to support tax-based financing in a deficit-neutral manner. By contrast, respondents who are less supportive of defence expenditure tend to prefer debt financing or budget consolidation strategies that avoid immediate and visible personal costs.

Importantly, Bolouri et al. (2025b) demonstrate that these preferences vary systematically across political orientations and socio-demographic groups. Supporters of higher defence spending are not uniformly opposed to tax-

ation; rather, they are more likely to endorse tax increases when the purpose of additional spending is clearly specified and directly linked to national security. Conversely, opposition to tax-based financing is concentrated among individuals who are sceptical of military expansion itself. These findings challenge the widespread assumption that tax financing of defence spending is inherently politically infeasible and suggest that public resistance depends crucially on policy framing, transparency and perceived necessity.

Beyond spending targets: Hybrid threats, capability and societal resilience

The shift in US security policy and NATO's adoption of a 5% spending target underscore growing expectations that Europe assumes greater responsibility for its own security. From an economic perspective, this responsibility can be understood as the provision of a European public good, where coordination in delivery and financing is central due to economies of scale and cross-border spillovers (Beetsma et al., 2024). At the same time, the most likely security challenges facing Europe in the near term are unlikely to take the form of conventional interstate warfare. According to a recent study by the European University Institute, hybrid threats, including cyberattacks, disinformation campaigns, and attacks on critical infrastructure, represent the most probable risk scenario in the coming years (Anghel, 2025). Such threats target societies directly and cannot be effectively addressed through higher military spending alone or through conventional force structures.

This threat environment highlights that security is produced less by inputs than by outputs. Numerical spending targets offer, at best, an incomplete proxy for deterrence and resilience. The strategic value of higher defence budgets depends critically on what resources are spent on and how effectively they translate into relevant capabilities. Recent battlefield experience in Ukraine suggests that traditional Cold War-era systems (such as large warships, heavy tanks or fighter jets) play a more limited role in contemporary warfare than often assumed. Modern conflicts are increasingly shaped by drones, cyber capabilities, intelligence, logistics and rapid technological adaptation. Large-scale investments in legacy platforms therefore risk delivering diminishing returns if they crowd out spending on capabilities better suited to evolving threats; an effect that could be reinforced by a narrow focus on meeting the 5% spending target.

Against this background, the heterogeneity of European states suggests that security provision is unlikely to converge on uniform national models. Differences in

fiscal space, political support, industrial capacity and geographic exposure instead point towards a functional division of labour within Europe. As argued by Lohse and Bolouri (2025) in the context of the Weimar Triangle, complementary national roles – combining forward military posture, financial capacity and defence-industrial strengths – may offer a more realistic and sustainable contribution to European security than identical spending trajectories across countries.

Security, moreover, rests on societal willingness to defend, not solely on military hardware. Public attitudes and civic commitment constitute a critical component of deterrence and resilience, particularly in the context of hybrid warfare. Evidence from a recent representative survey that we conducted in Poland and Germany illustrates substantial cross-country differences in this regard. While a clear majority in Poland expressed willingness to personally defend their country (61.6%), support was considerably lower in Germany (45.5%). Conversely, explicit unwillingness was substantially higher in Germany, with 32% rejecting such engagement compared to only 14.6% in Poland. Such variation matters because hybrid threats are explicitly designed to exploit societal divisions and weaken collective resolve.

Seen in this light, the current debate risks conflating commitment with capability. The 5% target may serve as a signal of political resolve and alliance solidarity – a point emphasised by Caverley and Kapstein (2025), who argue that the United States continues to rely on European allies despite tougher burden-sharing demands – but it is a poor substitute for strategic prioritisation. In a security environment dominated by hybrid threats, Europe's central challenge lies less in meeting a numerical benchmark than in aligning military and civilian instruments towards resilience, adaptability and societal cohesion. Without such alignment, higher defence spending – even where economically feasible – risks increasing inputs while failing to strengthen security and eroding political support, strategic credibility and ultimately peace.

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Christian Lau* and Simon Schropp**

Economic Welfare to Economic Warfare? The EU and the Changing Face of International Trade

In today's world, trade serves economic security – and economic security is subordinate to national security. This article discusses how well the EU was able to navigate the turbulence of 2025 and what comes next as it deploys its own economic security toolkit in 2026.

In the current geopolitical landscape, trade policy functions less as a traditional market-access mechanism than as a primary lever of economic statecraft. Major global actors are increasingly subordinating trade to broader strategic objectives, establishing the principle that economic relations must serve economic security – and that economic security is, in turn, an essential component of national security. In a world where “everything can be weaponised” (Euronews, 2025b), instruments such as import duties, standards, data flows, investment, trade defence measures and supply-chain dependencies are no longer mere commercial variables; they are active tools of power used to build resilience or expose the vulnerabilities of rivals.

The European Union (EU) has moved decisively to adapt to this era of economic gamesmanship. As the Commission observed in its December 2025 “Economic Security Doctrine” (European Commission, 2025e), the stakes of this shift extend beyond trade balances and classical efficiencies; they affect the bloc’s fundamental public order, competitiveness and long-term security.

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Christian Lau, Dentons Europe LLP, Brussels, Belgium.

Simon Schropp, Berkeley Research Group, LLC, Brussels, Belgium.

This article examines the EU’s trade policy through this security-centric prism. It assesses how effectively the Union navigated the turbulence of 2025 and analyses the road ahead for 2026 as the EU’s expanded economic-security toolkit moves from theoretical framework to practical enforcement. The article then proceeds with an evaluation of the EU’s response to a volatile environment and the concrete policy actions it undertook in 2025, and maps the upcoming challenges facing the Union’s institutional machinery.

Navigating geopolitics

Four ongoing geopolitical challenges stand out when examining the outside factors that shaped EU trade policy in 2025.

First, the war in Ukraine and the EU’s stern sanction regime vis-à-vis Russia continued to shape Europe’s external environment. As part of a broader, coordinated Western effort, the EU introduced its 19th sanctions package in October 2025 that includes a phased import ban on liquefied natural gas (LNG) imports from Russia (Council of the European Union, 2025). The phased ban rattled European energy markets, adding to the pressures on an already underperforming EU economy. Specifically, it added substantial cost pressure to gas- and power-intensive sectors – notably basic chemicals and fertilisers, petrochemicals/plastics, non-ferrous metals, steel and kiln-heavy industries such as glass and ceramics.

Second, the EU increasingly found itself a collateral target in the US–China trade war. The EU absorbed real economic consequences from the continued bilateral escalation. In addition to heightened market uncertainty, the main channels of harm included trade diversion of Chinese goods towards Europe as other markets closed, which led to further Chinese overcapacity and a surge in “dumped” low-cost imports, erosion of external demand for EU exports and fractured or disrupted supply chains that particularly hurt European mid-chain producers. In addition, investors postponed, cancelled or scaled back European investment plans, preferring to redirect foreign direct investments (FDI) either towards jurisdictions shielded behind tariff walls or towards “neutral” production locations.

A telling example of the extent to which the EU was caught in the US–China crossfire was export-control measures that Beijing imposed in reaction to specific US trade restrictions. On 4 April 2025, China limited exports of seven rare earth elements and selected high-performance magnets, a move widely read as retaliation for new US tariffs and export-control steps taken on what the Trump Administration termed “Liberation Day”. On 9 October 2025, China further widened the scope to include goods affecting electric vehicle drivetrains, wind-turbine generators and defence sensors (European Parliament Research Service, 2025). While China subsequently suspended its 9 October measures in early November (European Parliament Research Service, 2025), the damage was done. Permit-risk and lead-time uncertainty had already rippled through European automotive, renewables and defence supply chains.

While the EU could neither control US–China escalation nor fully insulate itself from collateral shocks, it attempted to blunt the worst spillovers through measured deployment of its own trade defences and enforcement arsenal. This was not a posture of aggression, but one of economic triage – stabilising exposure while avoiding open confrontation.

Third, the EU felt the reverberations of its own actions or those of its member states. China’s retaliation against the EU’s de-risking served as a sharp reminder of both the costs of regulatory tightening and the limits of EU trade policy autonomy. Thankfully for the EU, Beijing’s responses remained calibrated rather than explosive – targeted countermeasures rather than shock therapy. China chose its pressure-points deliberately, applying mirror-investigations, regulatory frictions and supply-chain pressure points that were big enough to affect sensitive EU sectors without provoking a full-blown retaliatory spiral. A few examples may illustrate.

- In October 2025, the Dutch government took temporary control of Nexperia under emergency national security powers. China, citing a national security review, temporarily halted export clearances for specific automotive grade microcontrollers and power semiconductors produced in China by Nexperia affiliates (Sterling, 2025). The four-week hold caused severe disruptions in just-in-time deliveries for several EU automotive suppliers (Reuters, 2025a). While Beijing lifted the administrative hold on 8 November 2025 (Baptista, 2025) – ironically during a US–China summit – the episode served as a reminder to the EU that China has significant leverage over certain EU value chains. Case in point: Dutch authorities suspended their restrictions on the Nexperia deal, effectively handing back control to the Chinese owners (Haeck, 2025).

- The EU’s definitive countervailing duties on Chinese battery electric vehicles (BEVs; in force since late 2024) (European Commission, 2024) remained an important point of irritation for China. In 2025, China pursued anti-dumping cases on EU brandy and pork and a countervailing duty investigation into EU dairy. Several commentators labelled these actions as direct responses to the EU’s anti-subsidy actions (Reuters, 2025b). So far, Chinese trade defence has culminated in preliminary anti-dumping margins as high as 60% (September 2025) and price-undertaking commitments from several EU brandy exporters. In parallel, China requested World Trade Organization (WTO) consultations over the EU BEV duties, with a panel composed on 13 October 2025 (DS630).
- In its first application of the International Procurement Instrument in June 2025, the Commission directed authorities to exclude Chinese bidders from medical device tenders exceeding €5 million and to limit China-origin content on inputs or subcontracting to below 50%. Beijing condemned the step and, effective 6 July 2025, barred most EU firms from Chinese central government procurement of medical equipment above 45 million yuan (ca. €5.3 million), while allowing participation by locally incorporated subsidiaries (Euronews, 2025a).

Despite – or, indeed, as a sign of – that choreographed tit-for-tat, communication channels between the EU and China remained open. In November 2025, a bilateral technical working group on customs and export-licensing facilitation was revived, and Chinese trade authorities began expediting licensing pathways for rare earth and magnet shipments tied to time-critical EU industrial orders. While limited, this calibrated easing signalled a shared interest in de-escalation and in avoiding broader supply chain disruption that would hurt both sides.

Fourth, the EU had to deal with the neo-interventionism and transactionalism of the incoming Trump Administration. In developing what can be termed “the art of the stop-gap”, the EU avoided full escalation – but arguably at a high price. In the realm of economic affairs (that is, abstracting from foreign-policy flashpoints such as Greenland or Ukraine), the US-EU relationship appeared asymmetrical yet temporarily stable. The culminating event likely was the so-called US–EU Framework Agreement on Reciprocal, Fair, and Balanced Trade, concluded on 21 August 2025 (European Commission & The White House, 2025). That arrangement, concluded after President Trump’s unilateral tariff announcements on “Liberation Day” in April 2025, was to put an end to the ad-hocracy of previous months. However, it extracted sizeable concessions from the EU. The EU vowed to eliminate tariffs on all US industrial goods and grant preferential market access to a range of US agri-

cultural and processed goods. In return, the US offered an all-in tariff floor/ceiling of 15% on most EU exports (importantly including pharmaceutical products and cars).¹

For the time being, steel and aluminium were notably excluded, leaving the United States' Section 232 tariffs against EU exporters in place. Washington conditioned any discussion of an end to metals tariffs on digital concessions by the EU. Brussels officially resisted linking dossiers, but many commentators read the November 2025 digital omnibus (European Commission, 2025d) – suggesting “tune-ups”, timing relief and “simplifications” across various AI, data and cybersecurity instruments, including the GDPR and AI Act – as a strategic olive branch to Washington (see, e.g. EDRI, 2025).

The Framework Agreement also contains several volume commitments by the EU, including assurances to purchase US \$750 billion worth of US energy by 2028 and US \$40 billion in AI chips, and to invest an additional US \$600 billion across US strategic sectors. The energy commitment is particularly controversial in Brussels; critics argue it replaces dependence on Russian energy with dependence on US energy (Stamouli, 2026).

All of that seems a lopsided result, but the EU was able to claim some victories in the negotiations over the Framework Agreement. Most importantly, the EU succeeded in preventing a full-blown tariff war with Washington and also avoided any activation of its “trade bazooka”, the Anti-Coercion Instrument, against the US (or any trading partner, for that matter). The EU also secured several carve-outs from the 15% flat tariff facing its exports, ensuring that certain goods – aircraft and aircraft components, generic pharmaceuticals and their chemical precursors, as well as natural resources unavailable in the United States – retain standard most-favoured-nation market access in the United States. Furthermore, the Framework Agreement preserves and even reaffirms cooperation in areas where EU and US interests align, such as the Critical Minerals Agreement and ongoing coordination on export-control and sanctions regimes.

Summing up the EU's year in geopolitics, 2025 left Brussels with ruffled feathers rather than broken bones. Despite significant geopolitical pressures, the EU preserved agency and acted as a stabilising presence in a turbulent trade environment.

¹ The Framework Agreement will still need to move from a work programme and lofty rhetoric to concrete drafting and implementing acts. US and EU vowed to continue negotiation over details on a technical level. However, subsequent implementing legislation and formal ratification by the EU (and congressional approval in the US) will be required for US import duties to normalise in 2026.

The EU's 2025 trade agenda of “promote, protect and partner” in review

The EU took active steps towards shaping its own economic-security posture. Its operational blueprint – the 2023 Economic Security Strategy (European Commission & High Representative of the Union for Foreign Affairs and Security Policy, 2023) – is organised around three core pillars: promote, protect and partner. After a considerable legislative drive in the direct aftermath of the publication of the Economic Security Strategy in 2023-24, 2025 was characterised by selective implementation, enforcement, calibration and operationalisation of existing tools.

The “promote” pillar: Industrial policy and supply-chain resilience

Under the rubric “promoting competitiveness”, the EU built out its trade-related industrial policy architecture aimed at reindustrialising, de-risking and promoting resilience, in other words reducing dependence on foreign imports.

The Critical Raw Materials Act (in force since May 2024) creates a permanent framework to secure critical and strategic raw materials via “strategic projects”, permitting acceleration, capacity benchmarks, diversification caps (to reduce reliance on any single third country) and structured partnerships. This de-risking framework shifted from concept to delivery in 2025. Notable developments included an expansion of the project pipeline, the launch of a matching platform connecting EU stakeholders and the initiation of work on a second project call.

Next, the Net-Zero Industry Act (NZIA), adopted in 2024 to build EU clean-tech capacity, also entered its implementation phase in 2025. The Commission issued the first package of secondary legislation aiming to expand the scope of qualifying strategic technologies and to begin operationalising project-specific support mechanisms. In parallel, work advanced on procurement and permitting rules to accelerate investment and direct demand towards EU-based production.

On state aid, the Clean Industrial Deal State Aid Framework (CISAF), introduced in June 2025, codifies aid intensities, enables matching of aid against third-country subsidy offers and streamlines notification procedures. Compared with previous ad hoc regimes, CISAF provides a more durable architecture for matching foreign subsidies, gives member states clearer conditions under which they can respond to third country incentives, and achieves more predictable, rules-based assessments.

Finally, the Corporate Sustainability Due Diligence Directive (CS3D) and the Corporate Sustainability Reporting

Directive (CSRD) are policies intended to illuminate corporate supply chains with a view towards human rights and environmental compliance with extraterritorial effects for suppliers. Conscious of the fact that the directives may entail overly onerous value chain due diligence obligations, EU institutions advanced an “omnibus” package aimed at simplification, streamlining scope and delaying application of parts of both directives. The Commission explicitly hopes to reduce reporting and due diligence costs for EU and foreign groups. Trilogues are underway following the European Parliament’s November 2025 vote.

The “protect” pillar: The EU’s protective crouch against national security risks

As for “protection against security risks”, in 2025 the EU zeroed in on its arsenal of defensive and enforcement tools.

The Foreign Subsidies Regulation (FSR), fully operational since 2024, is a policy tool that empowers the Commission to tackle EU internal market distortions caused by foreign subsidies in the context of mergers and acquisitions, public procurement and foreign direct investment. The tool continued to mature in 2025, with multiple in-depth investigations across both government procurement and concentration modules. While fewer notifications were withdrawn in 2025 than in 2024, practitioners read this not as weakened deterrence, but as evidence that voluntary compliance, early engagement with the Commission and pre-notification structuring are now working as intended. On 9 January 2026, the European Commission (2026a) followed up with guidelines on the application of the FSR, helpfully clarifying the future application of the FSR based on recent experience.

Trade-defence activity remained high in 2025. Highlights included definitive anti-dumping determinations in biodiesel from China, definitive countervailing duties in biodiesel from Argentina and a safeguard action on certain ferro-alloys. In an effort to counter global overcapacity and trade deflection resulting from US tariffs, the Commission proposed a new tariff-rate quota regime in early October 2025 to succeed the current steel safeguard due to expire on 30 June 2026 (European Commission, 2025b). The proposal – to be pursued under the renegotiation procedures for tariff bindings under Art. XXVIII of the General Agreement on Tariffs and Trade – would halve the duty-free quota and double the over-quota duty to 50%. Many commentators regard this normalisation of steel protection with great concern, and it remains to be seen how trading partners will react to it in the upcoming WTO discussions (see, e.g. Garcia Bercero, 2025).

Next, the EU considerably tightened its export control regime in 2025. The regime covers exports, brokering, tran-

sit, technical assistance and tangible or intangible transfers of software and/or technology for dual-use items, plus targeted autonomous controls for technologies considered “sensitive” from a national security perspective. On 14 November 2025, the Commission published an updated dual-use export controls list with new controls on quantum technologies, advanced computing, semiconductor manufacturing and testing equipment, and certain high-precision inspection tools.² Notably, the EU opted to include controls where multilateral consensus, particularly among Wassenaar³ signatories, lagged.

Finally, while the Commission’s role in national security-motivated reviews of non-EU investments is of a coordinating nature, its role is nevertheless influential. Revisions to the FDI Screening Regulation EU 2019/452 entered trilogue in June 2025 (European Parliament, 2025). The Commission’s proposal would make FDI screening mechanisms mandatory in all member states, define a minimum sectoral scope (including critical infrastructure, technologies and media), harmonise timelines and procedures, and extend coverage to EU-incorporated acquirers that are ultimately controlled by non-EU entities (EU shell coverage).

The “partner” pillar: Seeking ties with like-minded allies

It is probably fair to say that in 2025 bilateral, plurilateral and multilateral trade negotiations took a less prominent and visible place in the EU’s trade agenda. Nonetheless, some negotiation progress was achieved.

At the bilateral level, 2025 was a mixed bag. The EU maintained enhanced market access for Ukraine in 2025, extending unilateral tariff suspensions and streamlining customs and regulatory procedures to support Ukrainian exporters (European Commission, 2025c). This reflects the EU’s broader commitment to keeping Ukraine economically integrated with European markets.

Moreover, the EU engaged in partner dialogues with India, Canada, Australia and South Africa. These bilateral talks primarily focused on critical minerals and supply-chain risk. While they produced soft-law outcomes (principles, working groups, financing signals) and yielded no tangible market access concessions, these talks nonetheless reflected a deliberate effort to reduce risk rather than court confrontation.

² Commission Delegated Regulation (EU) 2025/2003 of 8 September 2025 amending Regulation (EU) 2021/821 of the European Parliament and of the Council as regards the list of dual-use items (Annex I).

³ The Wassenaar Arrangement is an export control framework that promotes transparency of national export control regimes on conventional arms and dual-use goods and technologies. It has 42 signatories.

Of free trade agreements (FTAs) with realistic prospects in 2025, only the EU–Chile Interim Trade Agreement is fully operational. The EU–Australia FTA stalled, although negotiations recently resumed with renewed energy. Substantive negotiations for the EU–Indonesia Comprehensive Economic Partnership Agreement (CEPA), the EU–Mexico modernised agreement and the EU–Mercosur agreement concluded in 2025, but none of these texts has been fully ratified. The EU–Mercosur agreement is farthest along: the Council authorised signature in early January, leading to the official signing on 17 January 2026. To get the deal over the finish line, EU leaders utilised a “split” legal structure. This allows the core trade provisions to be approved at the EU level, thus bypassing the long and uncertain process of seeking approval from every member state parliament. Under this “split architecture”, the trade pillar of the deal only required European Parliament consent for provisional entry into force – effectively unlocking the vast majority of commercial benefits. Yet, in a somewhat unexpected move, a majority of European parliamentarians referred the EU–Mercosur Agreement to the Court of Justice of the EU, seeking an opinion on the legality of the trade deal. This legal manoeuvre is likely to delay ratification by close to two years (Financial Times, 2026a). Moreover, for the agreement to be finalised in its entirety, the mixed elements of the deal (that is, issue areas where EU competency is shared with member states, such as certain investment protection, transport or service provisions) still need to be ratified by every member state under national procedures. And the file remains politically contentious: in France, two no-confidence motions tied to the government’s stance on Mercosur were defeated on 14 January 2026, but they underscored domestic resistance that could shadow national ratification.

At the multilateral level, 2025 left the WTO idling in neutral. With the US not fully engaged, there was no measurable progress on negotiations (fisheries subsidies, e-commerce, industrial subsidies) or dispute-settlement reform, which remains stalled until the next major ministerial meeting in March 2026. The EU played a constructive role keeping reform pressure up: it tabled proposals (e.g. on transparency on industrial subsidies), pushed working coalitions to conserve a constituency for multilateral rules, and relied on the alternative dispute resolution system, the Multi-Party Interim Appeal Arbitration Arrangement, to keep appeals alive (European Commission, 2025a). Despite these efforts, the EU was unable to overcome the persistent systemic WTO gridlock in the run-up to the 2026 WTO Ministerial Conference.

In reviewing the EU’s efforts to protect, promote and partner, 2025 may go down as the year of “just enough”, which, given the year it had, is no small achievement. On the geopolitical stage, the EU took blows without being

knocked off course – absorbing external shocks, managing vulnerabilities and preventing escalation. Internally, 2025 was not a year of legislative fireworks or headline-grabbing breakthroughs; rather, it was a year of introspection, steady implementation, consolidation and the quiet building of institutional resilience.

Looking ahead to 2026

If 2025 was the EU’s year of “just enough”, 2026 is shaping up to be a year of “yet more challenges” – when Europe’s ambitions face geopolitical realities, and the EU’s economic-security architecture is stress-tested and expected to deliver results. Certain geopolitical events may shape the trajectory of the EU’s trade and economic security policy in 2026.

Geopolitical challenges

First, the US–EU Framework Agreement will need to demonstrate whether it can deliver relative stability. A pivotal test occurred on 20 February 2026, when the US Supreme Court ruled in *Learning Resources, Inc. v. Trump* that the International Emergency Economic Powers Act (IEEPA) does not authorise the President to impose tariffs when responding to alleged national security concerns. While this decision curtailed executive overreach under IEEPA, the Trump administration immediately pivoted to using (or threatening to use) an arsenal of alternative statutory bases for tariffs. Within hours of the ruling, the President invoked Section 122 of the Trade Act of 1974, implementing a blanket 10% “balance-of-payments” surcharge covering most of US trading partners and goods for a period of 150 days, and announcing on social media that surcharge would increase to 15%.

This aggressive shift towards “tariff chaos”⁴ – that was further stoked by the US administration’s announcement of Section 301, 232 and 338 investigations – prompted the European Parliament to suspend legislative work on the US–EU Framework Agreement in late February. The strategic landscape has thus entered a paradoxical phase: while the loss of IEEPA authority has nominally removed the need for the Framework Agreement and reduced the threat of a truly unbound executive mandate, the administration’s rapid deployment of other instruments suggests that tariff uncertainty will persist. For the EU, the spectre of the US–EU Framework Agreement appears to be replaced by the realisation that relief from IEEPA is unlikely to translate into market stability, let alone decreased protectionist pressure.

In the short and medium term, this means that most EU exports face additional 10% or 15% tariffs (partially in viola-

4 Bernd Lange, the Chair of the European Parliament’s Committee on International Trade on social media on 22 February, 2026.

tion of the EU–US Framework Agreement), while existing Section 232 US tariffs against EU exports remain in place (including 50% on steel and aluminium products). A key question for the EU will then be whether to retain the Framework Agreement as the (geo-)politically and economically least bad outcome.

Next, continued Chinese responses to EU economic security measures are to be expected, ranging from export licensing delays and procurement restrictions to trade remedies. Possible cross-sector retaliation spilling into green energy, food, chemicals or machinery would further complicate EU supply and value chain strategies.

With respect to negotiations of trade agreements, 2026 will be both about breaking new ground in negotiations and about the volatile task of legislative delivery on prior agreements. Although settling for an agreement that is less comprehensive than originally aimed for, the EU and India began 2026 with the signature of a substantial new trade agreement (Financial Times, 2026b). A similarly scaled back agreement with Australia may follow later this year. These agreements further enhance the EU’s web of trade agreements and strengthen key trade relationships at a time of challenging relations with the US. With regards to implementation, the modernised EU–Mexico agreement may follow the same path of the EU–Mercosur agreement later this year, once the Council completes its review of the “split” legal architecture. Meanwhile, the technical “legal scrubbing” of the Indonesia CEPA – finalised in late 2025 – will occupy the bulk of 2026, targeting a 2027 start date. Simultaneously, the EU is aiming to close the remaining gaps with Thailand. Success in these files requires translating high-level political deals into operational trade reality, all while navigating hardening domestic resistance to global trade agreements.

Lastly, at the WTO, 2026 will likely be a holding pattern regarding large-scale reform, unless the 14th Ministerial Conference were to produce a genuine breakthrough. Progress will likely be incremental, rather than transformational. This year may also clarify whether dispute settlement reform can remain a live issue or whether the Multi-Party Interim Appeal Arbitration Arrangement (MPIA)⁵ and other DSU Article 25 workarounds solidify into the long-term de facto architecture of global trade adjudication between willing WTO members. On the negotiation front, a “win” in 2026 would include the extension of the e-commerce moratorium for a full term, and agreement on a way forward for disciplining harmful fisheries subsidies.

⁵ The MPIA was established by the EU and like-minded members as an interim architecture to enable WTO disputes to be adjudicated through an appeal stage, thus bypassing the gridlock caused by US refusal to appoint Appellate Body judges in 2020. This workaround is based on Article 25 of the Dispute Settlement Understanding (DSU).

Priorities on the EU agenda

As for the EU’s own agenda, 2026 will likely be less about new tools and more about proof of concept – whether its web of trade and security instruments can mature into a coherent economic security architecture.

Published on 3 December, the EU’s Economic-Security doctrine – officially titled the “Joint Communication on Strengthening Economic Security” (European Commission, 2025e) – builds on the 2023 Economic Security Strategy. The Communication serves as the operational mandate for DG Trade and the newly established Chief Trade Enforcement Officer and sets a workplan to prioritise economic security risks and coordinate the use of tools such as export controls, FDI screening, FSR and Carbon Border Adjustment Mechanisms (CBAM). Though non-binding, it is intended to guide legislative and financing initiatives, including resource allocation to priority sectors and reinforcement of monitoring capacity from 2026 onwards. This may prove to be a seismic shift for the EU – from ad hoc, reactive deployment of isolated instruments towards a more predictable, integrated and strategic model of economic security policymaking.

Case in point, CBAM has moved from “text to teeth”. Since 1 January 2026, only authorised declarants can import CBAM goods (European Commission, 2026b). Declarants must calculate embedded emissions under the EU method, purchase CBAM certificates and surrender them annually. Trade partners may lobby the Commission to grant recognition of equivalence with their own domestic carbon constraints. CBAM’s real test is enforcement and anti-circumvention architecture in 2026-27, and whether it attracts WTO litigation beyond Russia’s 2025 challenge (DS 639).

A second phase of critical raw materials policies is expected in 2026. The Critical Raw Materials Act (CRMA) – a permanent framework aimed at securing critical and strategic inputs via strategic projects, contingency planning, accelerated permitting and structured partnerships/finance – has been operational since 2023. In 2026, we expect first tangible results: financial closes for the first project wave and applications under a second strategic-projects call, with greater scrutiny of permitting timelines, funding readiness, and verifiable dependency reductions. That said, the Act’s stress points – notably single-country caps, contingency mechanisms and diversification targets – have not yet been meaningfully tested, therefore it is too early to judge effectiveness. It also remains to be seen whether the proposed “RESourceEU” initiative will materialise into EU-level financing and support mechanisms for selected mining, processing and recycling projects.

The first results of the multi-year overhaul of EU customs will also take place in 2026, including the abolition of the €150 *de minimis* rule (making small consignments dutiable), platform and marketplace liability, and the introduction of uniform parcel-handling fees to fund checks at the border. Broader systemic customs reforms are ongoing but unlikely to be concluded in 2026. As we move further into 2026, a litmus test will be whether the institutional machinery of Brussels and the member states can handle the sheer volume of data required by CBAM and the new *de minimis* rules (to name just a few challenges), without choking the very trade it seeks to secure.

As regards investment screening, the focus is on the legislative landing of the revised FDI screening regulation. This year could mark the beginning of a more coordinated and consistent baseline EU screening model. Member states will evidently retain decision rights, so process convergence – not centralisation – is the most likely direction.

Following a January 2025 recommendation asking member states to assess outbound investments, Brussels is currently coordinating a mapping exercise. The Commission will determine in 2026 whether to propose EU legislation towards a real screening regime similar to the US Comprehensive Outbound Investment National Security Act of 2025, or whether to continue relying on national regimes supplemented by Commission guidance and coordination.

Looking at trade defence, the headline operational issue for 2026 is a continuing heavy investigations workload and a congested docket at the Commission. Practitioners report initiation lags, compressed effective investigative timetables and quality risks. While the backlog has multiple drivers – case volume, complexity and staffing (and other capacity constraints) – the practical effect is the same: files that lack a high-stakes strategic impact (large trade values, critical inputs, overlap with other policy tools) or that lack prosecutorial readiness are increasingly sidelined, and once opened, deadlines are tight and typically inflexible. For now, expectations are low that substantial additional internal resources will be redirected to the trade-defence divisions of DG Trade during 2026.

If market pressure rises and global overcapacity intensifies, the EU may broaden the existing steel and ferro-alloy safeguards and extend protection to aluminium. This would most certainly harm using industries (forced to pay higher prices) and could result in calls for “cascading protection”, i.e. demands for more protection of industries downstream from raw aluminium.

In sum, the legislative work is largely complete; the coming year is about administrative delivery. For Brussels, the

primary challenge in 2026 will be developing the institutional capacity to execute and enforce this complex web of security instruments – without succumbing to the very protectionism it aims to defend against.

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Vitor Correia, W. Eberhard Falck, Tamás Hamor, Marzia Cescon and Luis Rosendo*

From Principles to Practice: Operationalising Europe's Critical Raw Materials Strategy

Europe's Critical Raw Materials Act faces a fundamental implementation barrier: community opposition has emerged as the decisive constraint on new mining projects, not geology or economics. With 85% of known domestic mineral deposits lying within or near environmentally protected areas, operationalising the Critical Raw Materials Act requires institutional innovations grounded in community realities. Drawing on stakeholder consultations across European regions, three prerequisites for community acceptance were identified: demonstrable material criticality for societal needs, minimal environmental impact through technological innovation and fair and binding benefit-sharing. This paper introduces two complementary institutional mechanisms – systematic decision-making frameworks and community development agreements – that address these conditions while upholding democratic values and environmental standards. These frameworks require no changes to EU legislation, are adaptable across member state contexts and provide practical pathways for reconciling strategic resource security with local legitimacy.

The European Union's Critical Raw Materials Act (CRMA; Regulation 1252/2024), adopted in 2024, represents a fundamental shift towards strategic autonomy in response to growing supply chain vulnerabilities (European Union, 2024). The CRMA's ambitious targets – 10% domestic extraction, 40% processing and 25% recycling by 2030 – reflect Europe's determination to reduce strategic dependencies that have exposed the continent to geopolitical leverage and supply disruptions. This policy evolution, initiated by the Raw Materials Initiative in 2008 (European Commission, 2008), was accelerated by supply chain disruptions from unilateral trade restrictions, the COVID-19 pandemic and Russia's invasion of Ukraine.

The challenge of CRMA implementation

The CRMA's implementation faces formidable barriers spanning institutional, techno-economic and socio-environmental dimensions. Public acceptance has emerged as particularly critical, with recent cases in Serbia (Jadar lithium; Giebel et al., 2024), Portugal (lithium operations; Lusa, 2024) and France (Échassières lithium; Canas, 2024) demonstrating that technical, economic and regulatory feasibility are necessary but insufficient. The decisive constraint is not what can be mined, but what will be accepted to be mined.

Mineral criticality emerges at the intersection of geological endowment, technological necessity and geopoliti-

Vitor Correia, International Raw Materials Observatory, Brussels, Belgium.

W. Eberhard Falck, International Raw Materials Observatory, Brussels, Belgium.

Tamás Hamor, University of Pecs, Hungary.

Marzia Cescon, European Association for Local Democracy (ALDA), Strasbourg, France.

Luis Rosendo, Generator, Lisbon, Portugal.

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cal structure (European Commission, 2017). Unlike other commodities, minerals face geological realities that cannot be engineered away. Ore deposits occur only under particular conditions and in limited locations, creating structural dependencies. Whilst most critical minerals are required in comparatively small quantities, all are technologically irreplaceable in specific applications, meaning that substitution options are severely limited. Moreover, extraction and processing require highly specialised infrastructure, technical expertise and lengthy development timelines, creating bottlenecks that cannot be rapidly overcome even with substantial capital investment.

Europe's mineral resource challenge reflects deeper tensions in contemporary governance between strategic imperatives and local democratic participation. The CRMA articulates European strategic interests in reducing import dependencies, yet these EU-level objectives must be implemented through projects imposing concentrated, long-term impacts on specific communities. Without legitimate governance frameworks reconciling these scales, strategic ambitions risk foundering on local opposition – or being imposed in ways that undermine democratic values.

From theory to practice

Correia and Falck (2025) diagnosed CRMA implementation barriers and proposed a three-pronged strategy addressing public acceptance, financing and international cooperation. Their framework identified community development agreements (CDAs), financing guarantees and a global minerals trust as complementary mechanisms. This analysis provided essential conceptual foundations but left crucial operationalisation questions unanswered: How exactly should these mechanisms function? What institutional designs reconcile competing interests? What conditions make societal acceptance possible?

This paper advances from diagnosis to prescription by presenting empirically grounded institutional frameworks tested through two years of stakeholder consultations across European mining regions.

First, we document three non-negotiable conditions under which communities accept mining operations in environmentally protected areas. These emerged consistently from Delphi panels, deliberative workshops and structured consultations. Communities will consider mining only when: first, material criticality is demonstrable; second, environmental impact is minimal; and third, benefit-sharing is fair and binding. These three conditions function as an integrated system; communities reject approaches that cherry-pick one or two conditions while ignoring the third.

Second, we present institutional mechanisms operationalising these conditions within existing legal frameworks. A systematic three-tier decision-making protocol addresses criticality (Condition 1) through a transparent, evidence-based assessment of public interest, economic feasibility and environmental compatibility. Community development agreements address benefit-sharing (Condition 3) through binding tripartite contracts establishing enforceable participation rights and equitable distribution. Together with technological innovation enabling low-impact extraction (Condition 2), these frameworks transform social licence from veto constraint into negotiated governance.

Third, we provide implementation pathways adaptable to diverse member state contexts. Neither mechanism requires EU legislative changes; both operate within existing constitutional and administrative structures.

The social acceptance challenge

Why traditional approaches fail in European contexts

Opposition to mineral projects in Europe typically stems not from the “not in my backyard” syndrome often invoked dismissively, but from a profound disconnection between EU-level policy priorities and local interests (Tost et al., 2021). Europe's mining history shapes current attitudes: decades of disinvestment, relocation of environmental burdens to developing countries and loss of domestic technical capacity have created societal memory that views mining with suspicion (Bridge, 2004; Correia et al., 2024a). The trust deficit is compounded when communities perceive that CRMA benefits accrue to distant Brussels or multinational corporations while burdens – environmental impacts, social disruption, landscape transformation – are concentrated locally and persist across generations (Kivinen et al., 2020; Dunlap & Riquito, 2023).

The European context differs fundamentally from mining regions in Canada, Australia or developing countries where CDAs and social licence frameworks have evolved (O’Faircheallaigh, 2013). Europe has higher institutional trust expectations, comprehensive regulatory frameworks with robust enforcement, strong environmental consciousness, dense populations increasing proximity impacts and democratic traditions demanding genuine participation rather than consultation theatre (Lesser et al., 2023). Traditional approaches relying on technical environmental impact assessments and expert consensus have proven markedly insufficient in addressing value-based concerns about place attachment, environmental stewardship and community autonomy (Stewart & Lewis, 2017).

The environmental paradox and spatial constraints

Research from the Horizon Europe CIRAN project reveals that 85% of Europe's critical mineral raw material occurrences are located either beneath environmentally protected areas or within a five kilometre proximity (Ovaskainen et al., 2024). This is not an outlier situation requiring site-by-site exemptions; it is the structural reality. When combined with the Nature Restoration Law's requirement to restore at least 20% of EU land and sea areas by 2030, and calls to expand protected areas to 30% of EU territory, the spatial constraint intensifies rather than diminishes (European Commission, 2024).

This creates a serious governance challenge: two legitimate public interests – resource security and environmental protection – directly conflict in specific places. No amount of technical assessment can resolve this tension; it requires political judgement about which objectives take precedence under what conditions. Yet existing regulatory frameworks provide no systematic method for weighing these incommensurable values, leading to either administrative deadlock or decisions perceived as arbitrary.

Existing governance gaps

Current permitting systems fragment decision-making across multiple regulators (mining law, environmental protection, water management, spatial planning, cultural heritage) with divergent mandates and institutional cultures (Tiess, 2010; Tost et al., 2018). For example, an environmental regulator's mission is protection, a mining regulator's mandate includes enabling responsible resource development, and economic development agencies prioritise investment and employment. Without coordination mechanisms, sequential processing creates opportunities for delay, conflicting requirements and decisions by default through administrative dysfunction rather than reasoned deliberation.

Moreover, public consultation processes, while required, often function as procedural compliance exercises rather than genuine participation (Arnstein, 2007; Owen & Kemp, 2017). Communities provide input but have no binding influence on outcomes (Dunlap & Riquito, 2023). Promises made during permitting may have legal force if reflected in the eventual resolution, but subsequent authority and public monitoring are also attributes of due implementation. Benefits, if any, frequently depend on voluntary corporate commitments that companies can modify or withdraw at any moment. The structural power asymmetry, i.e. companies possess legal expertise, financial resources and project experience while communities rely on external support, leaves affected populations at a disadvantage in negotiations.

What is missing is not more technical assessment but decision-making frameworks for demonstrating public interest, binding mechanisms for community participation and adaptive regulation enabling technological innovation.

What European communities expect

Our findings derive from a comprehensive citizen engagement programme conducted within the Horizon Europe project CIRAN¹ explicitly designed to move beyond proxy debates between environmental organisations and industry representatives to engage actual communities. Between 2023 and 2025, CIRAN organised 12 citizen engagement activities across six European countries – Czechia, France, Ireland, Italy, Portugal and Slovakia – involving 173 participants through focus groups and public dialogues combining educational and deliberative elements (Cescon et al., 2025).

Participants were deliberately recruited for diversity across multiple dimensions: representatives of public and private bodies, local non-governmental organisations, and civil society organisations, with 14% participating as individual citizens. Gender distribution was 57% male and 43% female. Crucially, participants represented diverse geographical contexts: regions with historical mining experience and those without extraction, economically developed areas and periphery regions, locations adjacent to or included in environmentally protected areas under different designations, and jurisdictions with varied regulatory frameworks and political traditions. This diversity enabled the identification of conditions that hold across contexts rather than reflecting local idiosyncrasies.

The focus groups revealed remarkably consistent patterns despite national differences. Participants expressed deep concern for environmental sustainability, strong mistrust in central government and mining executives, and widespread demand for education, transparency and genuine public involvement. Across all countries, citizens favoured circular economy approaches over primary extraction and supported mining only under strict, ethical and transparent governance frameworks.

The public dialogues yielded five cross-cutting themes. First, participants articulated broad demand for transitioning to circular economies and more sustainable consumption patterns. Second, they firmly prioritised environmental protection, particularly opposing mining in protected areas without compelling justification and robust safeguards. Third, they expressed conditional rather than absolute opposition: acceptance was possible but only un-

¹ www.ciranproject.eu

der strict ethical standards, environmental oversight and meaningful community participation. Fourth, participants demonstrated widespread mistrust in government and corporate influence. Fifth, they strongly supported investment in education, technological innovation enabling minimal-impact extraction and inclusive public engagement.

The findings demonstrate that European communities, when provided with balanced information and structured opportunities for deliberation, articulate sophisticated positions recognising both the necessity of certain minerals for societal transitions and the non-negotiable requirements for responsible extraction. The consistency of these conditions across diverse national contexts strengthens confidence that they reflect fundamental requirements for social licence.

The three non-negotiable conditions

Condition 1: Demonstrable material criticality

Communities consistently expressed: “We will not sacrifice our environment for someone’s profit or speculative demand”. This reflects deep scepticism towards industry claims, market justifications, government and authorities. Price volatility and short-term demand signals of CRM do not convince communities to accept irreversible environmental impacts. What communities demand is transparent demonstration from independent public-interest sources that the raw material is genuinely essential for EU strategic objectives – climate transition, defence, critical infrastructure – with no viable alternatives available in relevant timeframes.

The temporal dimension matters critically. Communities recognise that criticality assessments change as technologies evolve, recycling capacity expands, and substitutes emerge. They therefore demand forward-looking analysis acknowledging uncertainty while demonstrating robust demand scenarios. The burden of proof lies with those proposing extraction to show why domestic mining is necessary rather than just convenient, and why this specific deposit must be developed rather than alternatives pursued.

Condition 2: Zero or minimal environmental impact

The statement “If you cannot mine it without destroying what we value, do not mine it” recurred throughout consultations. Traditional open-pit mining generating large waste volumes, permanent landscape transformation and visual impacts is categorically rejected in or near environmentally protected areas. However, communities demonstrated willingness to consider underground mining with minimal surface footprints, provided that: operations re-

main invisible or barely visible from the surface; waste is managed underground or through dry stacking, eliminating tailings ponds; water systems are closed-loops with no discharge to surface waters; biodiversity impacts are avoided or, where unavoidable, offset by net positive conservation; rehabilitation extends throughout operation; and long-term environmental stewardship continues beyond mine life.

Technological advancement – precision extraction, underground processing, backfilling of extractive waste – has transformed what is possible (Köllner et al., 2023; Correia et al., 2024b). Communities make their acceptance conditional on operators demonstrating that extraction is compatible with environmental protection through innovation, rather than accepting conventional mining methods.

Condition 3: Fair and binding benefit-sharing

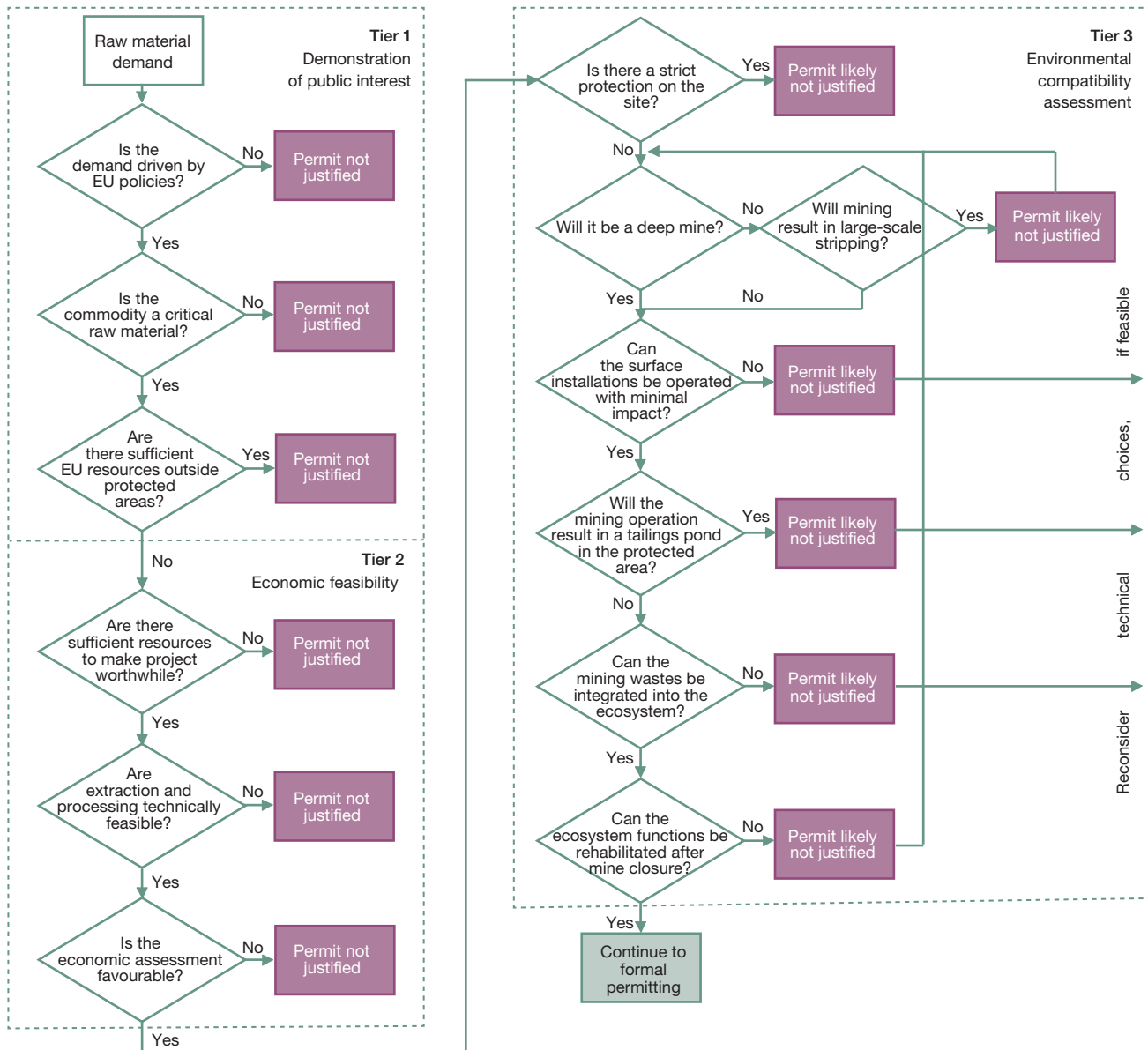
“Why should we bear the risk while others reap the rewards?” This question reflects fundamental concerns about distributional equity. Tax revenues flowing to national budgets, employment opportunities requiring specialised skills from outside the region and vague promises of economic development provide insufficient justification. Communities demand tangible, local benefits: guaranteed employment for residents, skills training creating transferable competencies, infrastructure investments addressing community priorities and resources for environmental enhancement extending beyond project boundaries.

Crucially, benefit-sharing must be legally enforceable, not dependent on corporate goodwill. Voluntary corporate social responsibility initiatives, subject to company discretion, generate cynicism rather than trust. Communities require binding contracts establishing rights and obligations for all parties – government, company and community – with clear enforcement mechanisms and dispute resolution procedures. Moreover, benefits must extend beyond operational periods, with mine closure creating economic adjustment challenges that require support for diversification to ensure sustainable livelihoods after minerals are exhausted.

The conditions as an integrated system

These three conditions function interdependently. Communities reject substitution – high payments cannot compensate for environmental destruction, nor can perfect environmental management justify extraction serving no genuine public interest. The conditions reinforce each other: demonstrating criticality creates a mandate for accepting carefully managed impacts; technological solutions enabling minimal impact

Figure 1
Graphical representation of the decision-making protocol



Source: Authors' elaboration.

make criticality arguments more defensible; benefit-sharing addresses equity and creates community stakes in success. What communities consistently reject is cherry-picking one or two conditions while ignoring others or approaching negotiations as adversarial rather than collaborative.

Step 1: Demonstrating public interest

The first community condition requires systematic demonstration that domestic extraction serves “overriding

public interest”. We propose a three-tier protocol operating within existing regulatory frameworks and requiring no legislative changes (Figure 1). Each tier is structured around a core question, assessment methodology, and a decision point to ensure a transparent and replicable evaluation.

Tier 1: Overriding public interest

Question: Is there a compelling public interest justification for domestic extraction of this specific material?

Methodology: The Drivers-Pressures-States-Impacts-Responses (DPSIR) framework (Kristensen, 2004) systematically evaluates whether CRM demand constitutes justifiable public interest: Drivers (which EU or national policies create demand – Green Deal renewable energy targets, defence technologies, digital infrastructure, industrial and societal resilience, open strategic autonomy); Pressures (consequences of import dependency – price volatility, geopolitical leverage by dominant suppliers, supply disruption risk); States (current and projected supply-demand balance – can demand be met through recycling, substitution, stocking, or secure imports); Impacts (consequences if domestic sources are not developed – stranded climate targets, strategic vulnerability, technology deployment constraints); Responses (policy options beyond domestic extraction – are they sufficient and timely?).

The analysis must project 10-15 years forward, matching mine development timelines, while acknowledging uncertainty through scenario analysis. The output is defensible public interest justification specific to this mineral deposit or demonstration that alternatives suffice.

Decision point: If no overriding public interest can be demonstrated, exploration ceases.

Tier 2: Economic feasibility under enhanced protection

Question: Can extraction be economically viable while meeting exceptional environmental protection requirements?

Methodology: The assessment applies industry-standard tools – CRIRSCO-compliant² resource evaluation for investors and UNFC³ for strategic evaluation – but integrates enhanced costs for environmental protection, monitoring, rehabilitation, long-term stewardship and social licence (community benefit-sharing, extended stakeholder engagement). This assessment is inherently iterative. Initial economics may be unfavourable, but adjustments to mining methods, processing technologies or benefit-sharing arrangements may create viability.

Decision point: If no economically viable scenario exists, even with iterative optimisation, extraction is not justified.

Tier 3: Environmental compatibility assessment

Question: Can extraction be conducted compatibly with protected status?

² CRIRSCO (Committee for Mineral Reserves International Reporting Standards) is an international reporting framework used to classify and assess the feasibility of mining projects.

³ UNFC (United Nations Framework Classification) is a system for classifying mineral, energy and other resource deposits based on their technical and socio-economic viability.

Methodology: This tier systematically examines whether technical solutions reconcile extraction with conservation objectives, evaluating protection requirements (IUCN category, Natura 2000 designation, cultural heritage status); technical solutions (underground mining, minimal surface footprint, underground waste disposal, closed-loop water systems, biodiversity avoidance measures); mitigation hierarchy (avoiding impacts, minimising unavoidable impacts, rehabilitating disturbed areas, compensating residual impacts); net positive outcomes (habitat corridors, buffer zone creation, expanded protected areas funded by project revenues). The compatibility assessment is not pass/fail but negotiated optimisation. It is enshrined in EU legislation such as the Environmental Impact Assessment (EIA) Directive as “Scoping Opinion” and “Development Consent”, and in the Natura Directives, where stakeholder consultation is integrated into the “appropriate assessment”. These steps, together with water permit procedures, can be integrated into one (Hámor et al., 2021a). The assessment may conclude extraction is compatible only with specific technologies, operational constraints, enhanced monitoring or compensatory measures, or that no technical solution adequately protects site values.

Decision point: If compatibility can be achieved, proceed to permitting with binding conditions. If not, extraction is refused.

Integration and iteration across tiers

The three tiers are not strictly sequential. Information from Tier 3 may affect Tier 2; economic constraints may influence Tier 1. The protocol explicitly accommodates iteration, increasing the likelihood of finding solutions where they exist while providing clear documentation when they do not. Each tier produces publicly accessible documentation showing decision paths and alternatives considered.

Addressing regulatory fragmentation

Decision-making about extraction in protected areas occurs within multiple regulatory frameworks: mining law, environmental protection, water management, spatial planning and cultural heritage (Hámor et al., 2021b). Effective implementation requires coordination mechanisms that designate a clear lead authority for coordinating assessment, create inter-agency fora with all relevant regulators, establish unified information-sharing platforms, specify consultation timelines preventing sequential delays and provide dispute resolution procedures when regulatory bodies disagree.

Some member states have “one-stop-shop” permitting systems providing natural homes for integrated protocols.

Where these do not exist, implementation may require establishing coordination mechanisms. Importantly, coordination does not mean subordinating environmental protection to economic objectives; each regulator retains its statutory mandate.

Step 2: Defining equitable benefit-sharing

Public consultation, while required, functions as a procedural exercise providing communities with voice but no binding influence (Arnstein, 2007). Promises made during permitting lack legal force if not incorporated into the final authority resolution permit. Benefits frequently depend on voluntary corporate commitments revocable at company discretion. The power asymmetry – companies possess legal expertise, financial resources and technical knowledge while communities rely on external support – structurally disadvantages affected populations (Lesser et al., 2023). Community condition 3 demands binding, enforceable benefit-sharing. CDAs provide a tested legal basis (World Bank, 2012; O’Faircheallaigh, 2014).

Community development agreements: Structure and elements

CDAs are formal, legally binding tripartite contracts (Otto, 2010) between government (national and local levels), the mining company and affected communities (represented through recognised legal association supported by the majority of inhabitants). CDAs are structured around several core components.

Ownership and equity participation refer to mechanisms that enable communities to become shareholders in mining operations, transforming them from passive recipients of benefits into active co-owners with seats at decision-making tables. This can include direct equity stakes in project companies, community investment trusts holding shares on behalf of residents, or profit-sharing arrangements that evolve into ownership positions over time. Ownership fundamentally changes power dynamics, ensuring that communities negotiate benefits as partners with fiduciary interests aligned with project success and long-term sustainability.

Employment and skills development include guaranteed hiring quotas from the local/regional labour force, skills training programmes for mine-related and transferable competencies, workforce development extending beyond mine operation, as well as apprenticeships and career pathways.

Benefit-sharing mechanisms focus on transparent formulas linking community benefits to project revenues. They

also include community development funds with local control over allocation, as well as infrastructure investments (roads, schools, water provision, health facilities, broadband internet) and support for economic diversification reducing dependence on the mine.

Environmental protection commitments include standards exceeding regulatory minima where appropriate and community participation in environmental monitoring as well as independent verification of compliance. These commitments mean the promotion of habitat enhancement and biodiversity net positive outcomes in addition to long-term environmental stewardship funds.

Community participation rights require a representative monitoring body with genuine authority. This body should have adequate resourcing for technical capacity and independent advice, regular reporting and transparent information sharing, and influence over operational decisions affecting the community.

Dispute resolution entails graduated procedures (negotiation followed mediation and, if necessary, arbitration) featuring independent mediators who are acceptable to all parties. Accessible grievance mechanisms help to ensure binding resolutions, which in turn prevent prolonged conflicts.

Duration and mine closure provisions ensure that agreements extend beyond the operational period. They include post-closure rehabilitation commitments, legacy funds for long-term environmental management and transition planning for economic adjustment.

International evidence and European adaptation

Canada’s Raglan Mine (Glencore’s nickel operation with Inuit communities) demonstrates CDA success: a 20% Inuit workforce, two billion Canadian dollars in community benefits over 25 years, and environmental co-management (Newswire, 2024). Australia’s Pilbara region native title agreements with Rio Tinto achieved 12% Indigenous workforce participation and over one billion Australian dollars in community investments (YMAC, 2011). Mongolia’s Oyu Tolgoi CDA resolved initial disputes through benefit-sharing, environmental monitoring and capacity building (Sternberg et al., 2019).

European contexts differ: there are higher institutional trust expectations, comprehensive regulatory frameworks, strong environmental consciousness and established democratic traditions. CDAs must therefore supplement rather than replace statutory protections, integrate with existing permitting and monitoring systems

and adapt to diverse community definitions (e.g. municipalities, regional and local associations).

Legally, CDAs require no legislative changes at the EU level. They operate within existing frameworks: national civil codes, the Company Law Directive (1132/2017), the Corporate Sustainability Reporting Directive (2464/2022), the Accounting Directive (34/2013) and the Taxonomy Regulation (852/2020). Member states may need European Commission guidance on implementation within national legal systems, and precedents exist in other sectors (e.g. renewable energy community benefit agreements; CAN, 2025).

Enabling CRMA implementation through integrated governance

How the mechanisms interact

The decision protocol establishes whether extraction is justified (Condition 1). CDAs establish how benefits are distributed and communities participate (Condition 3). Technology and adaptive regulation determine what methods minimise impacts (Condition 2). These mechanisms are complementary and mutually reinforcing:

- The decision framework without CDAs provides justification without legitimacy;
- CDAs without a decision framework create agreements without a clear public interest foundation;
- Neither mechanism, without technological innovation, can meet minimal impact requirements.

Together, they transform social licence from a blocking condition into negotiated good governance. Communities gain binding participation rights, transparent demonstration of public interest, enforceable benefit-sharing and verification that environmental commitments are met. Operators gain regulatory clarity, reduced permitting delays and community partnerships supporting rather than opposing projects. Governments reconcile EU-level strategic objectives with local democratic participation.

Implementation barriers and remaining challenges

Correia and Falck (2025) identified three critical barriers: social acceptance, financing mechanisms and international cooperation. This paper focuses primarily on social acceptance – the binding constraint – by operationalising solutions through institutional design. However, the frameworks also support the other dimensions. The decision protocol de-risks investment by clarifying

whether projects can proceed, reducing permitting uncertainty that deters capital. CDAs' transparent benefit-sharing improves project bankability. Enhanced environmental standards are integrated into the economic assessment (Tier 2), providing realistic feasibility metrics. European governance innovations can inform partnerships with resource-rich countries. CDAs and decision protocols are exportable to partner jurisdictions, strengthening EU global leadership in responsible mining governance.

These mechanisms cannot overcome situations where technical solutions do not adequately protect site values, make economically unviable projects viable, resolve cases where public interest genuinely does not justify extraction or convert deep ideological opposition to mining in principle. What they can meaningfully improve is transparency and legitimacy of decision-making, community participation and benefit-sharing, environmental protection through enhanced standards and monitoring, and probability of successful implementation where justifiable.

Success requires a sustained commitment encompassing political will to implement frameworks consistently, adequate resourcing for community capacity and monitoring, regulatory capacity to evaluate innovative technologies, and long-term institutional learning.

Policy recommendations

Translating the institutional frameworks into practice requires coordinated action across multiple governance levels, each with distinct capacities and responsibilities. The proposed implementation strategy balances ambition with realism, recognising that governance innovation cannot be imposed uniformly but must accommodate diverse national contexts, regulatory traditions and political constraints.

Strategic actions for EU institutions

EU institutions can catalyse implementation without requiring legislative amendments by leveraging existing policy instruments. Most immediately, EU institutions should integrate the decision-making protocols and CDAs into the criteria for strategic project designation under the CRMA, potentially through adjustment of future calls or release of a specific guidance document. Projects demonstrating these governance innovations would receive prioritised consideration for EU financial support and streamlined permitting coordination.

Equally important is the development of comprehensive EU-level guidance documents providing member states with practical templates adaptable to national legal frame-

works. Such guidance should include methodological specifications for implementing the three-tier protocol, model CDA templates customisable to regional circumstances, best practice libraries drawing on pilot implementations and technical standards defining low-impact mining technologies. The European Commission is well-positioned to coordinate development through the Joint Research Centre and the Critical Raw Materials Board.

Financial support mechanisms represent a critical enabler. Dedicated funding streams within the European Competitiveness Fund – or through existing instruments such as InvestEU, Horizon Europe or cohesion policy programmes – should prioritise support for protocol development and pilot testing, community capacity building, independent monitoring infrastructure and technology demonstration projects.

EU institutions should facilitate knowledge exchange among member states through establishment of a European network for governance innovation in mineral development. This could operate through regular meetings convened by the Commission, research partnerships evaluating implementation outcomes and integration with existing platforms such as the European Raw Materials Alliance, the European Technology Platform on Sustainable Mineral Resources or the International Raw Materials Observatory.

Finally, public acceptance, designated as indicator No. 2 in the Raw Materials Scoreboard, requires dedicated attention at the EU level. Building societal trust in the CRM sector necessitates a transparent demonstration of environmental responsibility throughout mineral value chains. In this regard, EU bodies may consider the extension of its ecolabel and eco-design legislation to mineral raw materials, which could significantly strengthen public trust in the CRM sector.

Implementation requirements for member states

Member states bear primary responsibility for operationalising these frameworks within their constitutional and administrative law structures. The first essential step involves formal adoption and adaptation of the decision-making protocol. This requires designation of lead authorities responsible for coordinating assessments, development of national guidance documents translating EU-level principles into jurisdiction-specific procedures, and systematic training programmes ensuring regulatory staff understand the protocol's logic and application.

Pilot programmes represent the most effective pathway for testing, refining and building confidence. Each mem-

ber state should launch frameworks in selected representative regions, deliberately varying protection designations, mineral deposits, institutional structures and stakeholder contexts. Rigorous evaluation and transparent reporting on both successes and challenges build the evidence base necessary for broader adoption.

Strengthening institutional capacity must accompany framework adoption. This encompasses establishment of formal inter-agency coordination mechanisms preventing sequential delays, investment in spatial data infrastructure ensuring INSPIRE Directive compliance, provision of resources enabling communities to participate meaningfully and creation of independent monitoring frameworks verifying environmental commitments throughout project lifecycles.

Member states may also enact regulatory reforms enabling technological innovation in the mining industry. Performance-based standards that specify environmental outcomes rather than prescribing technologies, fast-track permitting pathways for demonstrably superior methods, public investment in research and development partnerships and cross-border learning about novel regulatory approaches can all accelerate the technological transformation necessary to meet the second community condition.

Roles for industry and civil society

While government action is necessary, success ultimately depends on constructive engagement from industry and civil society. Mining companies should embrace proactive community engagement, beginning well before formal permitting applications; transparency about project economics and environmental impacts; willingness to negotiate CDAs as standard practice; and investment in technological innovation proving low-impact extraction feasibility.

Civil society organisations and communities should participate constructively in framework development and pilot testing, providing feedback that improves practical functionality. This includes building technical capacity for meaningful engagement, holding governments and companies accountable to commitments and recognising the complexity inherent in reconciling competing public interests. Environmental organisations have particularly important roles as honest brokers who can validate that frameworks genuinely protect environmental values while enabling extraction where justifiable.

The outlined implementation pathway is ambitious but achievable. It requires sustained commitment across electoral cycles, adequate resourcing and political cour-

age to embrace innovation. The alternative – continuation of current approaches that generate social conflict, delay and democratic deficit – has already proven untenable.

Conclusions

Europe faces a choice in implementing the Critical Raw Materials Act. It can continue with traditional permitting approaches that generate endless conflict, delay and ultimately failure to achieve strategic objectives. Alternatively, it can embrace governance innovations that respect both strategic necessities and democratic values.

Societal acceptance is possible under specific conditions. Communities will consider mining operations when materials criticality is transparently demonstrated, environmental impacts are minimised through technological innovation, and benefit-sharing is fair and binding. These conditions cannot be met through ad hoc negotiations or voluntary corporate commitments; they require systematic institutional frameworks.

The decision-making protocol provides transparent, evidence-based justification of public interest while assessing economic feasibility and environmental compatibility. Community development agreements create binding participation mechanisms and equitable benefit distribution. Together with technological innovation enabling low-impact extraction, these frameworks operationalise the strategy proposed by Correia and Falck (2025) through institutional designs tested with communities, industry and regulators across Europe.

Implementation does not require EU legislative changes. Both mechanisms operate within existing legal frameworks and are adaptable to diverse member state contexts. What is required is political commitment to embrace institutional innovation, sustained endurance for phased implementation and genuine respect for community voices.

The stakes extend beyond mineral supply. Europe's response to the CRMA implementation challenge will determine not only its industrial competitiveness and strategic autonomy but its capacity to demonstrate that democratic governance can effectively address complex, multi-scale challenges where global imperatives and local impacts collide. The frameworks presented here offer templates for reconciling these tensions, not through technocratic imposition but through transparent justification, binding participation, and equitable distribution of benefits and burdens.

The path forward is clear. The question is whether European institutions, member states, industry and communities will commit to governance innovation matching the

scale of the challenge. The alternative, a prolonged business-as-usual stalemate between resource security and environmental protection, serves neither objective and risks both strategic autonomy and democratic legitimacy.

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Marc Peter Radke

Do Higher Wealth Levels Really Guarantee Higher Returns? A Euro Area Test

Euro area household wealth accumulation is commonly perceived to be impaired by negative return shocks, wealth-reducing policy measures and suboptimal investment behaviour. It is further assumed that poorer households are disproportionately affected, earn lower returns and that wealth inequality is thereby amplified. This article challenges these assumptions by providing the first comprehensive estimates of real asset and equity returns by wealth group for France, Germany, Italy, Spain and the euro area as a whole, using a new Eurosystem data set from 2011 onwards. The results show that, except in Spain, real asset returns rise with net wealth. Real equity returns display a U-shaped pattern in Germany, France and the euro area – where both poorer and very wealthy households achieve higher returns than the middle class – while returns are positively correlated with net wealth in Italy and negatively in Spain. These patterns reflect heterogeneous asset returns and leverage dynamics both within and between countries.

Wealth accumulation by euro area households is often perceived as a risky and suboptimal process, leading to inefficiencies at both the household and macroeconomic levels. Four key problem areas are frequently cited.

First, since its inception, the euro area has faced major financial and real-sector shocks – including the New Economy bubble burst, the Global Financial Crisis, the euro area crisis, the COVID-19 pandemic and the post-pandemic inflation period – causing significant volatility and losses in financial and real estate markets. The Eurosystem's responses, notably ultra-low interest rates, quantitative easing and the subsequent tightening cycle, further increased return uncertainty. This sequence of crises and policy shifts has fuelled persistent debates about risks to household wealth and unstable return prospects (Fischer et al., 2013; Heise, 2016; Schickentanz, 2022). In some countries, this was framed as “expropriation of the saver”. In Germany and Austria, it referred to prolonged low or

negative interest rates, which at times produced negative real returns on bank deposits (Cowen, 2019; Die Presse, 2013). In Cyprus, Greece, Italy and Spain, by contrast, “expropriation” referred to bail-ins during the euro crisis that imposed losses on households to stabilise banking systems and reduce public debt (European Commission, 2013, 2016; International Monetary Fund, 2012, 2016).

Second, euro area households are often considered inefficient financial managers, as they overweight liquid, low-risk and low-yielding assets such as deposits, currency and insurance or pension products, resulting in suboptimal risk–return profiles (Deutsche Bundesbank, 2020; European Central Bank, 2020; European Fund and Asset Management Association, 2024; Rupperecht, 2020). This allocation behaviour, however, varies systematically across the wealth distribution: poorer households hold mainly safe financial assets, while wealthier ones allocate more to riskier, higher-yielding instruments like equities and mutual funds (European Central Bank, 2020). These differences are frequently linked to financial literacy, which tends to increase with income and wealth, though the causal nature of this relationship remains debated (Behrman et al., 2012; Lusardi & Mitchell, 2007; van Rooij et al., 2011, 2012).

Third, given the differences in financial wealth portfolios, poorer households are generally assumed to earn lower real returns on total assets (sum of financial and non-financial assets) than richer ones – a pattern not unique to the euro area (Piketty, 2014, 2015). Data limitations

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Marc Peter Radke, Furtwangen University, Villingen-Schwenningen, Germany.

long hindered research, but recent studies for Norway (Fagereng et al., 2020), Sweden (Bach et al., 2020) and Germany (Radke, 2025) reveal strong return heterogeneity across wealth groups. All three studies find a positive correlation between real asset returns and household net wealth or equity (gross wealth minus liabilities). Moreover, in Norway and Germany, real equity returns follow a U-shaped pattern: poorer and very wealthy households achieve higher returns than the middle class. This reflects positive leverage effects among lower-wealth households and the richer households' higher shares of high-yielding assets.

Finally, heterogeneity in households' real returns may create two major socio-economic challenges in the euro area. First, with the old-age dependency ratio rising sharply (European Commission, 2024), private pension provision becomes increasingly important as benefits from pay-as-you-go public systems are expected to decline. This need is particularly acute for poorer households, which tend to earn lower gross returns and face higher risks from indebtedness – leaving them especially vulnerable to income shortfalls in retirement. Second, persistent return heterogeneity may accelerate long-term wealth and income inequality (Piketty, 2014, 2015), as higher returns for richer households increase their capital income and, if largely saved, their wealth share, amplified by compounding over time.¹

Research issue, data and computation method

But are the claimed impairments in euro area household wealth accumulation and return performance – caused by negative return shocks, wealth-reducing policy responses, and suboptimal investment and borrowing behaviour – truly justified, especially for households with lower wealth?

To address this question, using a new Eurosystem dataset on Distributional Wealth Accounts (DWA; European Central Bank, 2024a, n.d.), this study calculates, for the first time by wealth group, households' real returns on assets (gross wealth) and real returns on equity (net wealth = gross wealth less liabilities) in the “big four” euro area countries (Germany,² France, Spain, Italy) and for the euro area as a whole, now on a quarterly ba-

sis.³ The DWA data cover the following assets: housing wealth (residential buildings and underlying land), non-financial business wealth (buildings, land and machinery of sole proprietors, independent professionals and self-employed farmers), financial business wealth (non-listed shares of public limited companies and equity holdings in private limited companies, cooperative societies and partnerships), bank deposits, securities (bonds, listed shares, investment funds) and life insurance entitlements. The liability side includes mortgage loans and other loans (including consumer credit) as well as net worth (equity).

Regarding the breakdown by wealth groups, the DWA do not always distinguish all wealth deciles. Therefore, for the calculations presented here, and following other analyses on wealth inequality (World Inequality Lab, n.d.; European Central Bank, 2024c; Deutsche Bundesbank, 2024), the following wealth groups were distinguished based on their net wealth: the bottom 50% (deciles 1 to 5, 0%–50% group), the next 40% or middle class (deciles 6 to 9, 50%–90% group) and the top 10% (decile 10, 90%–100% group). In addition, figures were also reported for the aggregate of all households (deciles 1 to 10, 0%–100% group).

To calculate the real returns on assets (gross wealth), country-specific rolling annual nominal returns were first computed on a quarterly basis for all of the aforementioned asset classes, using multiple sources and taking account of differences in maturities, risk categories and issuer sectors. Nominal returns were computed as the sum of cumulative cash flows (e.g. interest, rent and dividend payments) and market price changes (valuation changes) over the preceding four quarters, relative to the asset's market price four quarters earlier. This procedure yields a continuous series of overlapping annual returns at quarterly frequency and captures the average one-year asset returns a household would have earned at any point in time. The nominal return series were then converted into real returns by deflating them with country-specific year-on-year inflation rates on a quarterly basis. In a final step, the coun-

1 Piketty (2014, 2015) argues that, besides the “ $r - g$ gap” – the excess of real after-tax returns on capital (r) over real income growth (g) – heterogeneity in returns further amplifies wealth inequality. Historically, $r > g$ has prevailed since antiquity, except between World War I and the early 1980s, implying rising inequality unless mitigated by shocks or redistributive taxation.

2 Data for Germany has already been published in Radke (2025) and is presented here again to compare it, *inter alia*, in a broader context.

3 The calculation of euro area households' portfolio returns has evolved over the past ten years. Deutsche Bundesbank (2015) first computed real returns on German households' financial assets. Radke and Rupprecht (2018, 2019, 2020, 2021, 2022) later extended this approach to non-financial assets, the entire liability side and additional countries (Spain, Italy, France and the euro area). However, due to limited distributional data, these studies could not differentiate between wealth groups. The only exception is Andreasch et al. (2020), who analysed financial asset returns by wealth deciles for Germany and Austria using household finance and consumption survey data (European Central Bank, 2024b), which were, however, only available for the years 2010, 2014 and 2017.

try- and asset-specific real returns were weighted by the portfolio shares of the respective assets for each wealth group according to DWA data and aggregated to obtain the real asset returns for each wealth group in each jurisdiction.

The country-specific real returns on equity (net wealth) were subsequently derived using the weighted average cost of capital (WACC) framework, incorporating wealth group-specific asset returns, interest rates on debt instruments and leverage ratios. Formally,

$$r_E = r_A + (r_A - r_D) \cdot \frac{D}{E} \quad (1)$$

where r_E denotes the real return on equity, r_A the real return on assets, r_D the real cost of debt, D the market value of debt, E the market value of equity, and D/E the leverage ratio. The term $(r_A - r_D) \cdot (D/E)$ captures the magnitude and direction of the leverage effect: if $r_A > r_D$, the leverage effect is positive and boosts equity returns, resulting in $r_E > r_A$; if $r_A < r_D$, the effect is negative and leads to $r_E < r_A$. A higher leverage ratio amplifies either outcome (Radke & Rupprecht, 2022).

For consistency and temporal comparability, the entire observation period spans from 2011 Q1 to 2024 Q2⁴, and is divided into three phases⁵: the “euro area crisis phase” from 2011 Q1 (beginning of the time series) to 2014 Q2; the “low interest rate phase” from 2014 Q3 (marked by the initial reduction of the deposit facility rate into negative territory and the introduction of the Eurosystem’s Asset Purchase Programme, APP) to 2021 Q2; the “inflation phase” from 2021 Q3 (characterised by the first pronounced increase in inflation rates in the major euro area countries above the 2% target) to 2024 Q2 (end of the available time series at the time of writing). Real asset and equity returns are reported for each country and wealth group across all subperiods

4 The time series start in 2011 Q1, based on the availability of German data. Although data for France and the euro area begin in 2009 Q1, and for Italy in 2010 Q4, earlier periods were excluded to avoid omitting Germany, the largest euro area economy. To avoid further shortening of the observation period, Spanish data – available only from 2011 Q4 – were estimated for the first three quarters of 2011 by assuming portfolio shares matched those in 2011 Q4. This is justified by the short estimation horizon and Spain’s relatively small asset volumes among the “big four” countries.

5 The division into these sub-periods is based on the premise that, from a macroeconomic perspective, real returns across asset classes are mainly driven by growth, inflation, risk premia, and central bank-determined risk-free rates. Monetary policy both shapes and responds to these variables, so the monetary stance (tight, neutral, loose, crisis) and the corresponding macroeconomic environment are reflected in distinct “return regimes” with characteristic asset-class return patterns.

and the entire observation period, expressed as arithmetic means.⁶

Return dynamics across asset and liability classes

The evolution of households’ real asset and equity returns is shaped by two factors: changes in the real returns of individual assets and liabilities, and shifts in their portfolio shares. Since households adjust their portfolios only slowly and marginally, return dynamics are primarily driven by fluctuations in real returns on individual assets and liabilities.

During the euro area crisis, business wealth, listed shares and investment fund shares were generally the best-performing assets across countries, though returns in Spain and Italy were lower (Figure 1). Life insurance products and debt securities delivered slightly weaker returns but were particularly strong in Spain. Real deposit rates were negative everywhere except France, where they reached zero. Housing yields were highly heterogeneous, partly reflecting the origins of the euro area crisis: positive in Germany and France, but negative in Italy and Spain. Housing loan rates were exceptionally low in Spain and Italy, while the opposite was true for other loans.

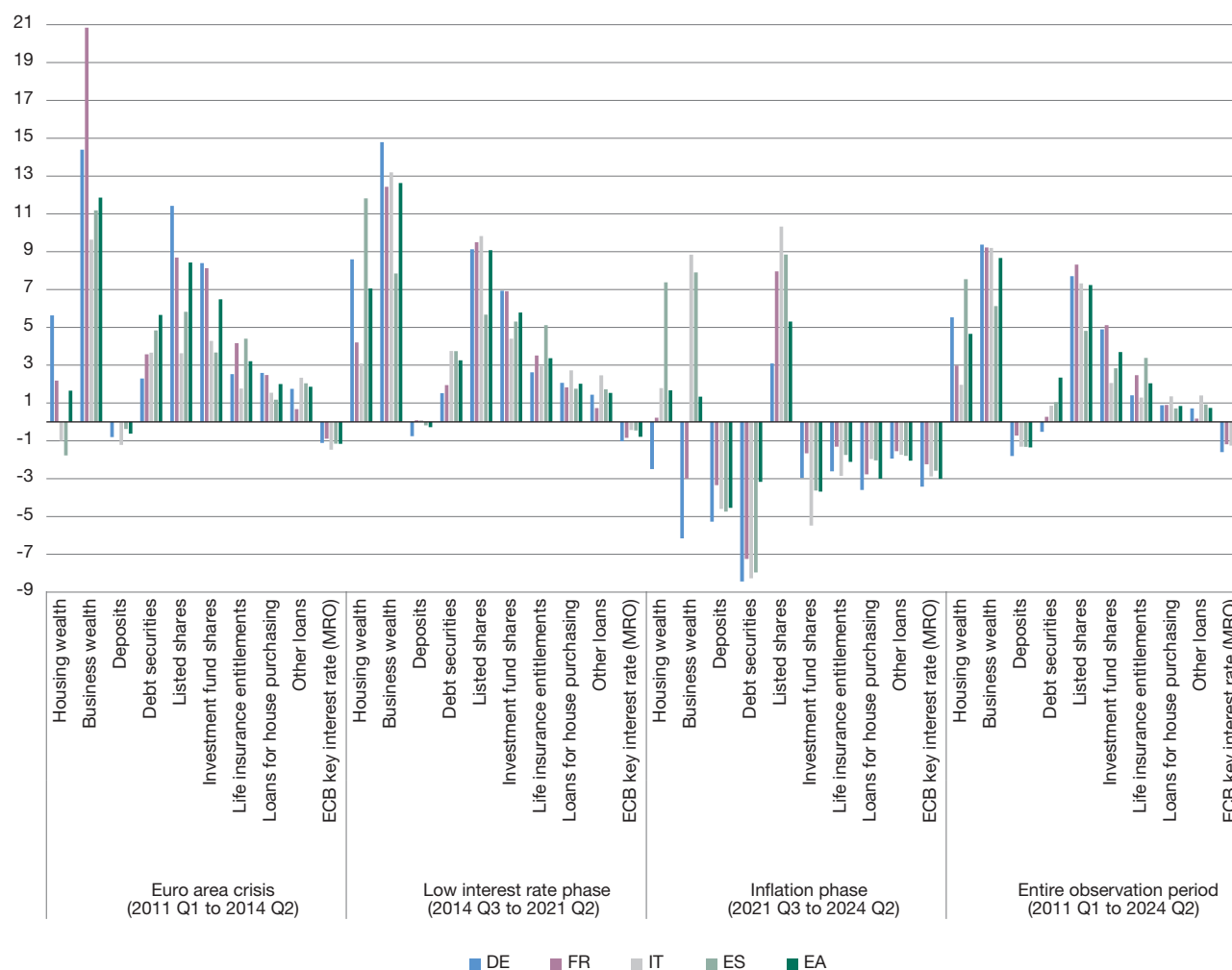
During the low interest rate phase, most of the return patterns largely mirrored those of the euro area crisis period. Business wealth, listed shares and investment fund shares again yielded the highest returns, followed by life insurance products and debt securities. Real deposit rates became less negative in Germany, the euro area and Spain, and hovered around zero in Italy and France. Loan rates declined slightly in Germany and France, but rose somewhat in Italy and Spain. Housing yields, however, diverged sharply from the previous phase: returns were positive and rose, for the most part, markedly in all countries. Spain and Italy saw the strongest gains, shifting from negative to clearly positive yields. Overall, housing yields recorded the largest increase across all asset classes.

At the onset of the inflation phase, returns on all asset classes fell sharply across all jurisdictions, except for listed shares in Italy and Spain. Losses were largest in business wealth, debt securities and investment fund shares, followed by smaller declines in housing wealth, life insurance products and deposits. Apart from listed

6 Arithmetic averages are used instead of the commonly applied geometric averages due to missing information on investment horizons and reinvestment behaviour, which affects compounding. Hence, the data reflect the average one-year real asset and equity returns a household would have earned at any point during the respective period.

Figure 1
Real returns on individual asset classes and debt instruments

Unweighted yields, arithmetic means in percent per year; broken down by time periods and countries



Note: Country codes: DE: Germany; ES: Spain; FR: France; IT: Italy; EA: euro area.

Source: Author's calculations based on European Central Bank (n.d.), Organisation for Economic Co-operation and Development (n.d.), LSEG (n.d.).

shares, business wealth in Italy, Spain and the euro area, and housing wealth in all countries except Germany, real asset returns were negative. Real loan rates also turned negative, and the ECB's key interest rate became even more negative than during the euro area crisis and the low interest rate period.

Over the entire reporting period, business wealth, listed shares, housing wealth and investment fund shares generated the highest positive yields, followed by life insurance products and debt securities, with some country-specific exceptions. Real deposit rates were negative in all countries, real loan rates slightly positive, while the

ECB's key interest rate remained negative throughout all sub-periods.⁷

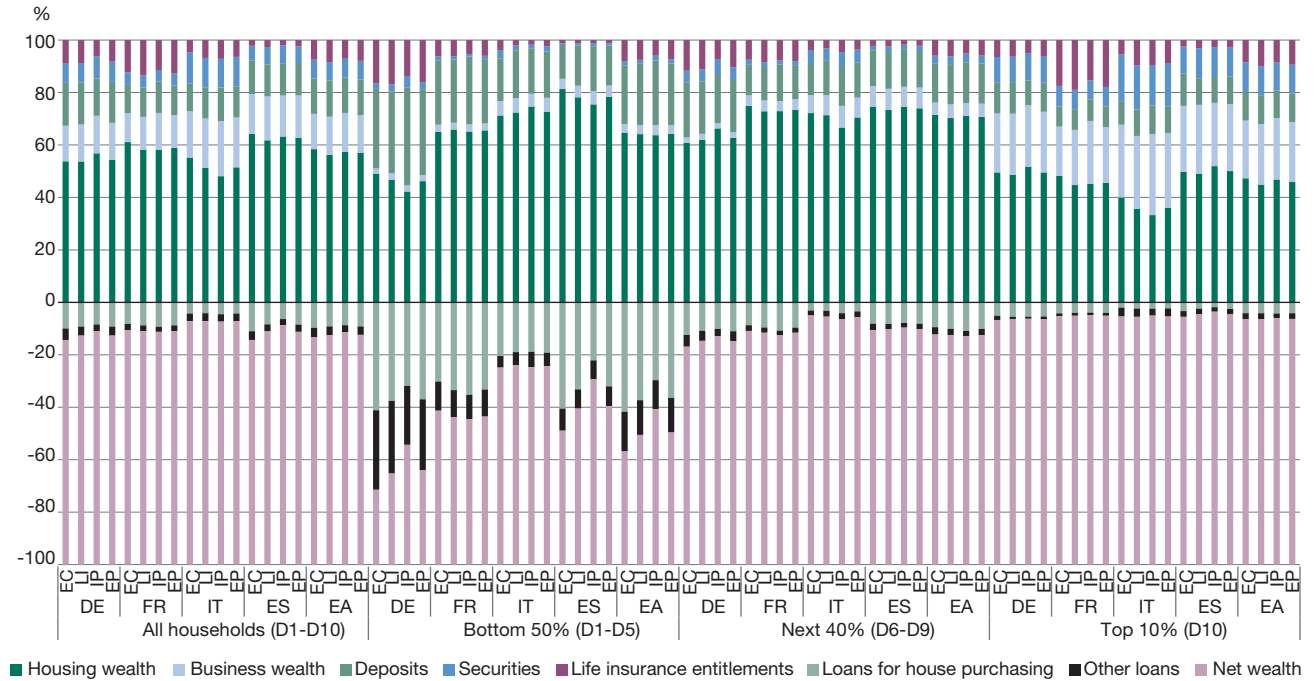
Asset allocation and liability structure

Across all households, asset-side portfolio compositions remained relatively stable over the reporting period, with

⁷ Based on Sharpe ratios (excess return over the risk-free rate per unit of return volatility), housing wealth and life insurance entitlements delivered by far the highest risk-adjusted real returns over the entire observation period, followed at a considerable distance by listed shares, investment funds, business wealth, bonds and deposits (not shown in the graph).

Figure 2
Households' asset allocation and liability structure

Shares in percent; arithmetic means; broken down by wealth groups, countries and time periods



Notes: ¹ Country codes: DE: Germany; ES: Spain; FR: France; IT: Italy; EA: euro area. ² Time period breakdown and codes: EC: euro area crisis (2011Q1-2014Q2); LI: Low interest rate phase (2014Q3-2021Q2); IP: Inflation phase (2021Q3-2024Q2); EP: Entire observation period (2011Q1-2024Q2). ³ The portfolio shares on the liability side were multiplied by (-1) and are therefore shown in the negative range. ⁴ The asset class "securities" comprises listed shares, debt securities and investment fund shares.

Source: Author's calculations based on European Central Bank (n.d.).

most variations driven by price changes in real estate, business wealth and securities (Figure 2). Persistent differences, however, existed across wealth groups. The bottom 50% held on average about 95% of their wealth in real estate, deposits and insurance entitlements, with housing dominating but varying across countries: highest in Spain (78%) and Italy (73%), followed by France (66%) and Germany (46%). Investments in securities and business wealth were marginal, ranging from 4% to 7% on average.

The middle class's asset portfolio closely resembled that of the bottom 50%, with slightly higher shares in real estate, business wealth and securities, and slightly lower shares in deposits and insurance. In contrast, the top 10% held markedly lower shares in real estate (36% in Italy, around 50% in other countries), deposits and insurance products, while their holdings of securities (7%–16%) and business wealth (21%–25%) were substantially higher.

On the liability side, persistent differences across wealth groups were evident, with only modest changes over

time. Indebtedness was highest among the bottom 50%, particularly in Germany. Measured by the debt–equity ratio, Germany ranked highest (1.9), followed by France (0.8), Spain (0.7) and Italy (0.3). The middle class was far less indebted, with ratios from 0.17 in Germany to 0.06 in Italy, while the top 10% had very low ratios, ranging from 0.05 in Spain to 0.07 in Germany. Most minor variations occurred within the bottom 50%, with German and Spanish households deleveraging significantly over time.

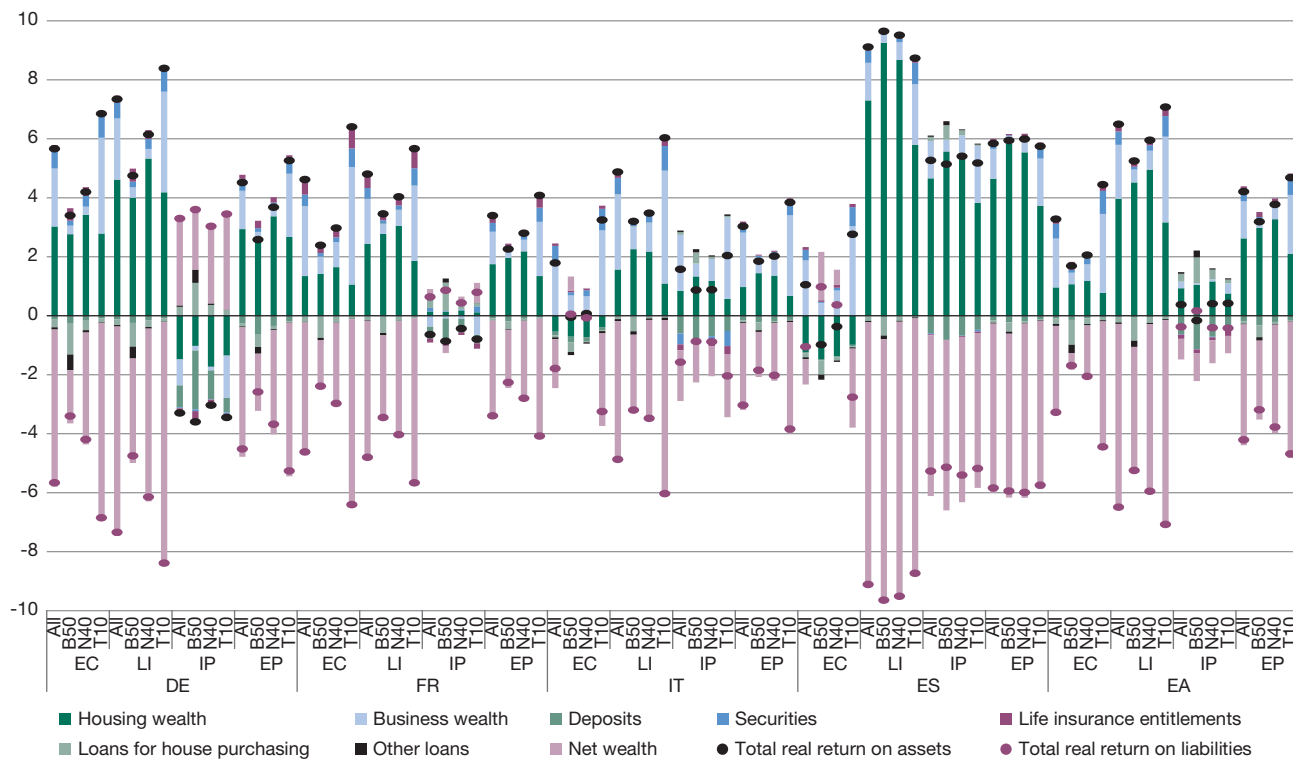
Real return on assets – drivers and developments

Households' real asset returns showed considerable heterogeneity across wealth groups and countries (Figure 3). Considering the entire observation period, four main differences emerge. First, while average real asset returns were positive in all countries and wealth groups, their correlation with household net wealth differed fundamentally across countries. In Germany, Italy, France and the euro area, returns were positively correlated with household net wealth, whereas in Spain the correlation was negative,

Figure 3

Real return contributions to the total real return on assets and the total real return on liabilities

Arithmetic means in percent per year and in percentage points; broken down by countries, time periods and wealth groups



Notes: ¹ Total real return on assets and total real return on liabilities in percent per year (arithmetic means); contributions of individual assets and liabilities in percentage points. ² The return contribution of each asset represents the return weighted by its portfolio share in the total sum of all assets. The sum of these contributions equals the total real return on assets. The return contribution of each liability item represents the return weighted by its portfolio share in the total sum of all liabilities. The sum of these contributions equals the total real return on liabilities, which by definition equals the total real return on assets. ³ Due to the multiplication of the return contributions of all liabilities as well as the total real return on liabilities by (-1), negative values in the figure represent positive returns/contributions, while positive values represent negative returns/contributions (as, for instance, during the inflation phase). ⁴ The asset class “securities” comprises listed shares, debt securities and investment fund shares. ⁵ Wealth group codes: All: All domestic households (D1-D10); B50: Bottom 50% (D1-D5); N40: Next 40% (D6-D9); T10: Top 10% (D10). ⁶ Time period breakdown and codes: EC: euro area crisis (2011Q1-2014Q2); LI: Low interest rate phase (2014Q3-2021Q2); IP: Inflation phase (2021Q3-2024Q2); EP: Entire observation period (2011Q1-2024Q2). ⁷ Country codes: DE: Germany; ES: Spain; FR: France; IT: Italy; EA: euro area.

Source: Author’s calculations based on European Central Bank (n.d.); Organisation for Economic Co-operation and Development (n.d.); LSEG (n.d.).

with the top 10% earning slightly lower returns than the bottom 50% and the middle class.

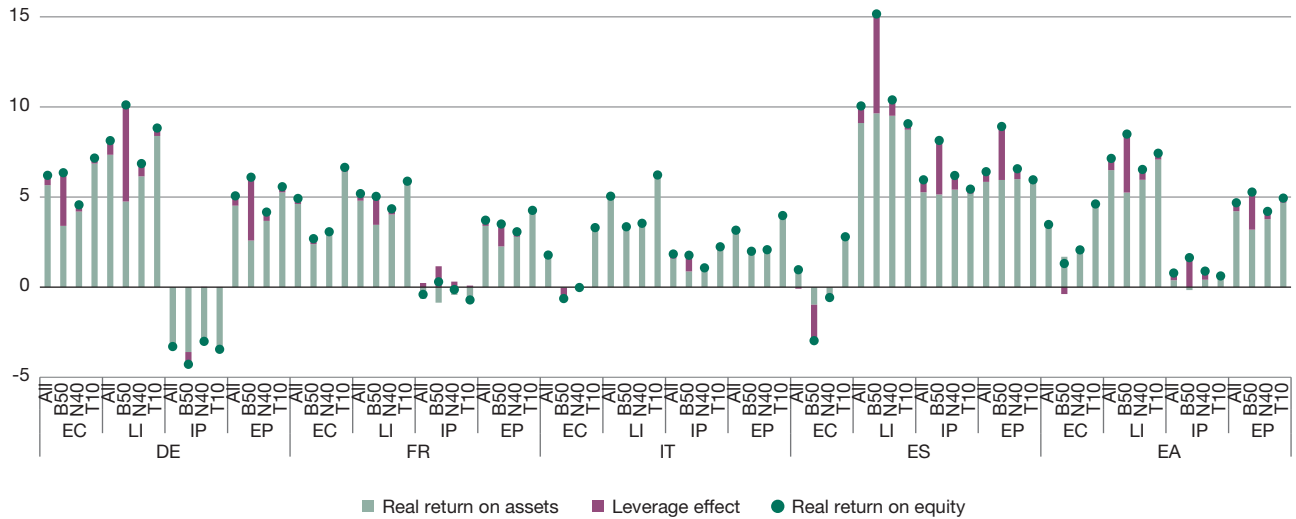
Second, both between-country and within-country return differences were substantial. In Italy, returns were the lowest within each wealth group category, ranging from 1.8% for the bottom 50% to 3.8% for the top 10%, followed by France (2.3%-4.1%), Germany (2.6%-4.7%) and the euro area (3.2%-5.3%). In Spain, returns were highest across all groups but reversed in order, at around 6% for the bottom 50% and middle class, and 5.7% for the top 10%. Consequently, the return gap between the top 10% and bottom 50% was smallest in Spain (-0.2 percentage points), followed by the euro area (1.5 percentage points),

France (1.8 percentage points), Italy (2.0 percentage points) and Germany (2.7 percentage points).

Third, housing wealth was the main return driver for the bottom 50% and the middle class across all countries, with contributions varying by portfolio share and housing yields. In Spain, its impact was strongest – both absolutely and relatively – due to the highest portfolio shares and yields. For the top 10%, returns were largely driven by business wealth and securities, reflecting higher portfolio shares and yields, while real estate played a minor role. Safe, low-yield assets, in particular, deposits contributed marginally negatively, ranging from -0.6 to -0.2 percentage points for the bottom 50%, -0.3 to -0.2 percentage

Figure 4
Real returns on assets and real returns on equity

Arithmetic means in percent per year and in percentage points; broken down by countries, time periods and wealth groups



Notes: ¹ Real return on assets in percent per year and in percentage points; real return on equity in percent per year; leverage effect contributions in percentage points; all returns and contributions are reported as arithmetic means. ² The relationship between the real return on assets, the real return on equity, and the leverage effect is given by equation (1) in the text. ³ Wealth group codes: All: All domestic households (D1-D10); B50: Bottom 50% (D1-D5); N40: Next 40% (D6-D9); T10: Top 10% (D10). ⁴ Time period breakdown: EC: euro area crisis (2011Q1-2014Q2); LI: Low interest rate phase (2014Q3-2021Q2); IP: Inflation phase (2021Q3-2024Q2); EP: Entire observation period (2011Q1-2024Q2). ⁵ Country codes: DE: Germany; ES: Spain; FR: France; IT: Italy; EA: euro area.

Source: Author's calculations based on European Central Bank (n.d.); Organisation for Economic Co-operation and Development (n.d.); LSEG (n.d.).

points for the middle class, and -0.2 to -0.1 percentage points for the top 10%.

Fourth, on the liability side, the contribution of net wealth to the overall return on liabilities – identical by definition to the overall return on assets – was considerably lower for the bottom 50% and the middle class than for the top 10%, reflecting their much higher leverage.

Turning to variations across different time periods, asset returns, for the most part, rose markedly across wealth groups and countries from the euro area crisis to the low interest rate phase. In Germany and the euro area, they remained strongly positive and kept increasing. In France, the bottom 50% and middle class followed a similar pattern, while returns for the top 10% declined slightly. In Italy and Spain, returns for the bottom 50% and middle class shifted from negative during the euro area crisis to strongly positive in the low interest rate phase. With the onset of the inflation phase, returns turned negative in Germany and France across all wealth groups – more sharply in Germany due to a housing price correction – while in Italy and Spain they fell but stayed positive, supported by housing and business wealth.

Real return on equity – trends and the role of leverage

Similar to real asset returns, real equity returns showed substantial differences across wealth groups and countries (Figure 4). Considering the entire observation period, four key findings emerge. First, although average real equity returns were positive across all groups and countries, a U-shaped relationship between equity returns and household net wealth – previously documented only for Germany (Radke, 2025) within the euro area – was also found in France and for the euro area as a whole. In all three jurisdictions, the middle class earned lower equity returns than both the bottom 50% and the top 10%. In Germany and the euro area, the bottom 50% even outperformed the top 10%, while in France the reverse applied. In Italy and Spain, equity return patterns closely mirrored asset returns, showing a positive correlation with net wealth in Italy and a negative correlation in Spain.

Second, there were substantial differences in the absolute level of real equity returns. The highest average returns among the top five wealth groups were earned by the Spanish bottom 50% (8.9%), the Spanish middle

class (6.6%), the German bottom 50% (6.1%), the Spanish top 10% (6.0%) and the German top 10% (5.6%). The lowest returns among the bottom five wealth groups were recorded for the Italian top 10% (4.0%), the French bottom 50% (3.5%), the French middle class (3.1%), the Italian middle class (2.1%) and the Italian bottom 50% (2.0%). Ignoring wealth-group breakdowns, Spain showed the highest national average (6.4%), followed by Germany (5.1%), the euro area (4.7%), France (3.7%) and Italy (3.2%).

Third, the average impact of leverage – measured as the gap between real equity and asset returns ($r_E - r_A = (r_A - r_D)$ (D/E), see Equation (1)) – was strongest among the bottom 50% in all jurisdictions except Italy: 3.5 percentage points in Germany, 3.0 percentage points in Spain, 2.1 percentage points in the euro area and 1.2 percentage point in France. For the middle class and top 10%, it was much smaller, ranging from 0.1 to 0.6 percentage points and from 0.1 to 0.3 percentage points, respectively. The effect was most pronounced in groups with the highest leverage ratios, while the interest rate differential played a minor role. This differential was highest in Spain for all wealth groups (approximately 5.0 percentage points), followed by the German top 10% (4.4 percentage points), the euro area top 10% (3.9 percentage points), and the French top 10% (3.3 percentage points), and lowest for the Italian middle class (0.7 percentage points) and bottom 50% (0.5 percentage points).

Turning to variations across different time periods, the pattern of real equity returns closely mirrored that of real asset returns. During the transition from the euro area crisis to the low-interest rate phase, equity returns rose across most wealth groups and countries. In Germany and the euro area, they were strongly positive and increased for all groups. In France, returns for the bottom 50% and middle class were as well positive and rose, while those of the top 10% fell. In Italy and Spain, returns were initially negative for the bottom 50% and middle class but turned positive during the low interest rate phase. During the inflation phase, returns declined across all groups and countries, turning negative for the French top 10% and all German groups, which were hit hardest – mainly due to a negative interest rate differential observed only in Germany. In Spain, Italy and the euro area, returns fell but remained positive overall.

Conclusions and qualifications

Is euro area household wealth accumulation truly as impaired as often claimed? The present analysis of real asset and equity returns suggests otherwise. First, over the entire observation period, there is no evidence of adverse changes in household wealth, despite pronounced macroeconomic shocks. On average, all wealth groups in

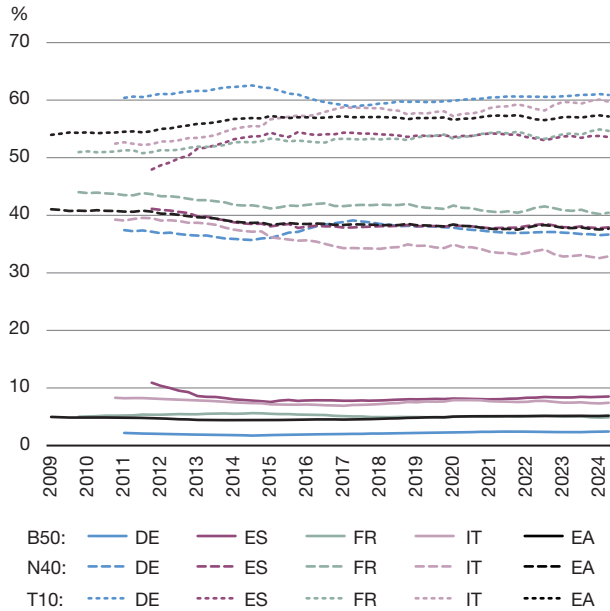
countries achieved positive real asset returns and even higher equity returns, however, with notable cross-country and cross-group variation. Nor was there an “expropriation of savers”: despite persistently negative real deposit rates, their impact on total returns was marginal and outweighed by positive returns from other asset classes.

Second, turning to variations across different time periods, all wealth groups – except the bottom 50% and middle class in Spain and Italy – recorded positive real returns during the euro area crisis. Returns then increased substantially across most groups and countries during the low interest rate phase, remaining positive throughout, suggesting that the Eurosystem’s stabilisation measures, among other factors, may have supported household wealth accumulation. By contrast, during the inflation phase, real returns fell sharply and turned negative in Germany and France, where monetary tightening likely also played a key role.

Third, substantial return heterogeneity exists across wealth groups. Real asset returns are positively correlated with net wealth in Germany, Italy, France and the euro area, but slightly negative in Spain, suggesting that financial literacy may play a role, though unevenly across countries. A U-shaped relationship between real equity returns and net wealth appears in Germany, France and the euro area, while the correlation is positive in Italy and negative in Spain. These divergences reflect both heterogeneous asset return developments and differing leverage effects.

Fourth, the presumed socio-economic challenges from return heterogeneity, particularly for the bottom 50%, appear less clear-cut. Based on the correlation between real equity returns and household net wealth, *ceteris paribus*, the middle class’s relative position seems most at risk in all jurisdictions, while return developments currently favour the bottom 50% in Germany, Spain and the euro area, and the top 10% in Italy and France. However, whether these return advantages and disadvantages translate into lasting shifts in wealth distribution depends largely on the strength of compounding, which in turn reflects how much income is saved and reinvested versus consumed. Since richer households tend to save more, current advantages of the bottom 50% may have limited impact on their wealth share. Moreover, their equity returns are more vulnerable to interest rate reversals due to higher leverage. Besides, return heterogeneity is only one of many factors shaping wealth distribution and can be outweighed easily by other forces such as technological change, globalisation, fiscal and social policy, wars and economic crises (Acemoglu, 2002; Bourguignon, 2015; Chancel, 2019; Piketty, 2014, 2015).

Figure 5
Wealth groups' shares in total national household net wealth



Notes: ¹ Country codes: DE: Germany; ES: Spain; FR: France; IT: Italy; EA: euro area. ² Wealth group codes: B50: Bottom 50% (D1-D5); N40: Next 40% (D6-D9); T10: Top 10% (D10). ³ Interpretation: The time series T10 for Italy, for example, denotes the share of the richest 10% of households in Italy in total Italian household net wealth, where net wealth is defined as the sum of non-financial and financial assets minus debt.

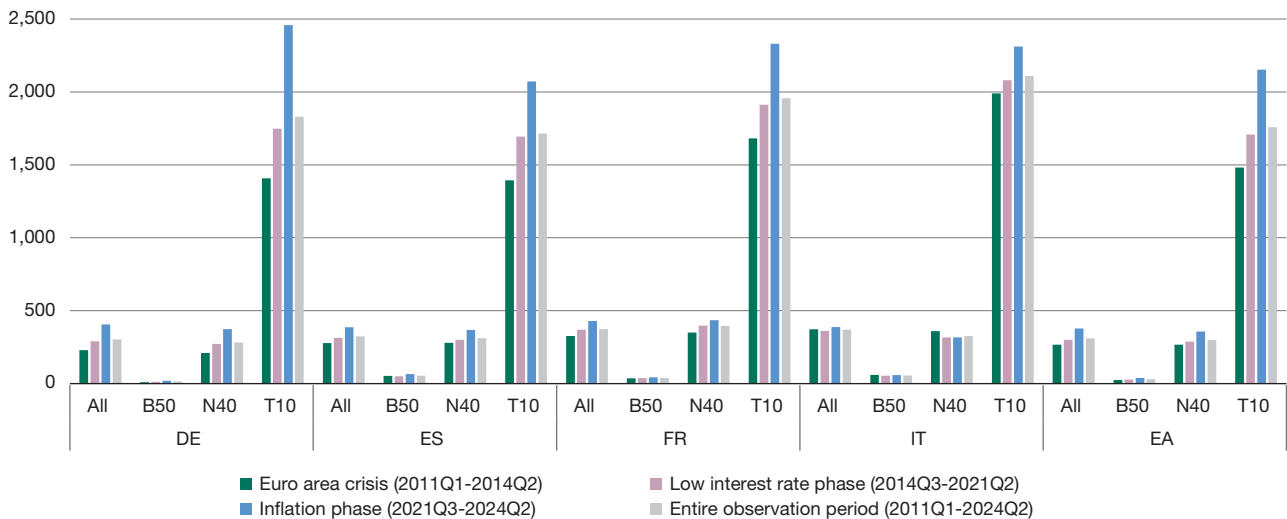
Source: European Central Bank (n.d.).

Although household wealth accumulation may appear less bleak than expected, particularly for the bottom 50%, a simple comparison of absolute real returns overlooks their differing economic implications depending on initial wealth levels. For instance, a 3% return on a small portfolio adds little, while the same rate on a large portfolio generates substantial additional wealth. Given the high inequality of household wealth within and across euro area countries, a closer look at current distribution trends is warranted to place return developments in a broader context.

When examining the individual wealth groups' share in national net wealth, over the entire observation period, the top 10% held on average 53% of net national wealth in France and Spain, 56% in Italy and the euro area, and 60% in Germany (Figure 5). The middle class accounted for 35% in Italy, 38% in Germany, Spain and the euro area, and 42% in France. The bottom 50% held 8% in Italy and Spain, 5% in France and the euro area, and only 2% in Germany. Over time, in all jurisdictions, the top 10% share rose slightly, the middle class's share declined, and the share of the bottom 50% remained largely stable. In absolute terms, average household net wealth over the entire period ranged from €1.7 million (Spain, euro area) to €2.1 million (Italy) for the top 10%, from €280,000 (Germany) to €400,000 (France) for the middle class, and from €13,000 (Germany) to €55,000 (Italy, Spain) for the bottom 50% (Figure 6). The top 10% steadily increased their absolute net wealth. The middle class also gained in all countries except Italy, where wealth has remained lower

Figure 6
Mean net wealth per household across different wealth groups

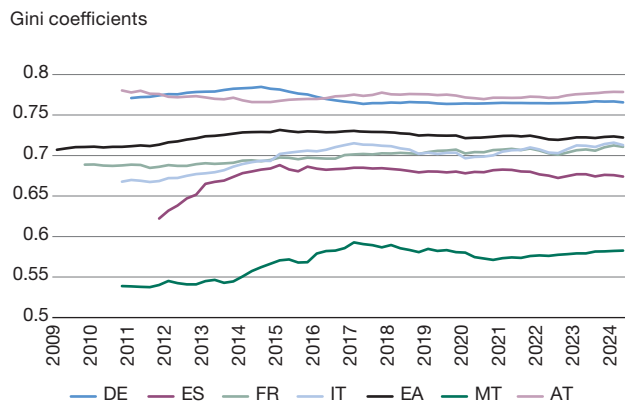
Arithmetic means in thousand euros; broken down by countries, wealth groups and time periods



Notes: ¹ Country codes: DE: Germany; ES: Spain; FR: France; IT: Italy; EA: euro area. ² Wealth group codes: All: All domestic households (D1-D10); B50: Bottom 50% (D1-D5); N40: Next 40% (D6-D9); T10: Top 10% (D10).

Source: Author's calculations based on European Central Bank (n.d.).

Figure 7
Cross-country wealth inequality in the euro area



Notes: ¹ Country codes: DE: Germany; ES: Spain; FR: France; IT: Italy; EA: Euro area; MT: Malta; AT: Austria. ² The Gini coefficient ranges from 0 (equal distribution) to 1 (maximum inequality); the Gini coefficients' underlying wealth series are measured as net wealth per household (sum of non-financial and financial assets minus debt per household). ³ Maltese and Austrian data represent the lower and upper bounds of wealth inequality in the euro area (based on the average Gini coefficient calculated over the entire observation period).

Source: European Central Bank (n.d.).

since the onset of the low interest rate phase. The bottom 50% saw rising absolute wealth in Germany, France and the euro area; in Spain and Italy it initially declined but later recovered.

Gini coefficient analysis shows that wealth inequality has generally been below the euro area average in Spain, Italy and France, but above it in Germany (Figure 7). Germany had the second-highest inequality in the euro area, just behind Austria, while all other countries ranked above Malta, which recorded the lowest levels. Across the euro area, inequality has gradually increased, except in Germany and Austria, where it slightly declined. Since 1995, wealth inequality in Europe has risen, despite a global decline driven mainly by reductions in wealth concentration in East Asia, the Middle East, and North and Sub-Saharan Africa. Nevertheless, European wealth inequality remains the lowest compared to other world regions (World Inequality Lab, n.d.).

In sum, from a policy perspective, measures aimed at boosting real investment returns for poorer households – such as improving financial literacy or promoting housing and securities accumulation through subsidies and tax incentives – may modestly raise asset and equity returns but are unlikely to substantially alter wealth distribution trends in the near term, given large differences in absolute household net wealth and uncertainties surrounding the compounding effect. To achieve a less unequal wealth

distribution – by strengthening the bottom 50%, stabilising the middle class and limiting further concentration at the top – it is advisable to reassess, and if necessary reverse, policies introduced since the early 1980s that likely fuelled rising inequality, including privatisations, deregulations and cuts in progressive taxation (Chancel et al., 2022; Piketty, 2014; Piketty & Saez, 2014; Saez & Zucman, 2016).

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Carolina Arias Burgos*

The Gender Power Gap and the Law in the European Union

Gender equality is enshrined in EU law, but how close is the Union to fulfilling its promise? Drawing on the Gender Equality Index and the Women, Business and the Law report, this article examines the current state of gender equality across EU member states, identifying where progress has been achieved and where significant gaps remain. The findings reveal persistent disparities, particularly in decision-making, economic opportunities and the effective implementation of legal provisions. The analysis highlights the importance of reliable data, transparency and targeted measures in bridging the gap between formal rights and women's lived experiences across the Union.

Gender equality is a fundamental right enshrined in the European Union (EU) treaties and explicitly included in the Charter of Fundamental Rights of the European Union (2000) under Article 20 (Equality before the law) and Article 23 (Equality between women and men). The European Commission is committed to building a union of equality, promoting equal economic independence for women and men, closing the gender pay gap, advancing gender balance in decision-making, ending gender-based violence and promoting gender equality globally.

At the heart of the EU's strategy lies gender mainstreaming, an approach that seeks to identify, address and rectify gender inequalities through informed policymaking. Data is instrumental in this effort, enabling institutions to monitor trends, assess policy effectiveness and drive future initiatives.

This article examines key gender indicators published by renowned institutions to assess the current state and trends in equal opportunities and rights for women and men. Additionally, it explores the measures implemented

by EU countries to address and mitigate gender inequalities, providing a comprehensive overview of the ongoing efforts and challenges in achieving gender parity.

Gender Equality Index

The European Institute for Gender Equality (EIGE) is the EU's specialised agency dedicated to promoting gender equality. EIGE's work combines research, data and tools to assist policymakers in designing inclusive and transformative measures that advance gender equality across all aspects of life. One of its key contributions is the Gender Equality Index (GEI), a comprehensive tool to track progress in gender equality across various fields within the EU.

This article analyses the results of the 2024 edition of the GEI, based on 2022 data. After the completion of this article, EIGE published the 2025 edition, a major methodological update, including data from 2023 and 2024, revised indicators, new data sources and a stronger emphasis on individual-level data in the money and time domains. The two editions are therefore not directly comparable. However, the new edition confirms and further reinforces the conclusions presented here. Footnotes referencing the updated GEI results are included only where the conclusions differ.

The GEI evaluates EU countries across six core domains: work, money, knowledge, time, power and health. Using 31 indicators grouped into 14 sub-domains, it assigns scores from 1 to 100, with 100 representing full equality between women and men. Each domain and sub-domain score is calculated as the average of relevant indicators, culminating in a single figure that summarises a country's overall performance in gender equality.

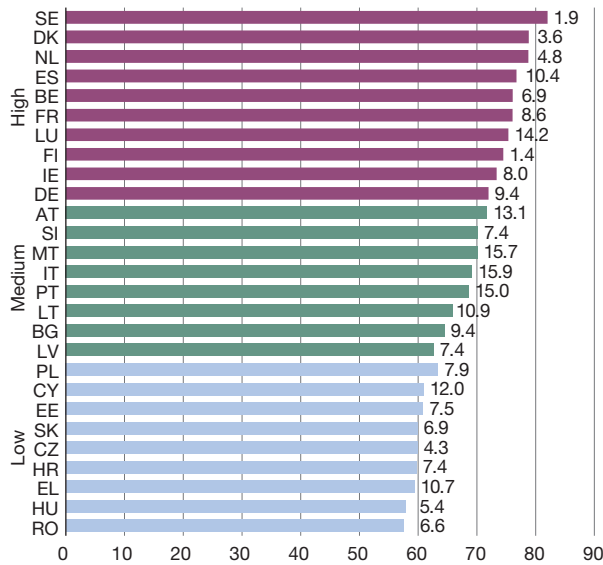
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Carolina Arias Burgos, European Union Intellectual Property Office, Alicante, Spain.

Figure 1
Gender Equality Index in EU countries (2022) and
change in score 2010-2022



Source: Author's calculations based on EIGE (2024).

Overall, the GEI stands at 71 points for the EU, marking an increase of 7.9 points since 2010. The range, defined as the difference between the highest score (Sweden with 82 points) and the lowest score (Romania with 57.5 points), was 24.5 points in 2022. This represents a reduction of seven points from 2010, when the range was 31.5 points. This range highlights the varying levels of gender equality across the EU. Over those 12 years, there has been a modest but significant improvement in gender equality in EU countries. Not only is gender equality advancing, but the countries' scores are also becoming more aligned, driven by progress in lower-scoring countries (Greece, the lowest in 2010 with 48.6 points), whose improvement was more than quadruple that of the top-scoring country (Sweden with 80.1 points in 2010).¹

It is also worth noting that Sweden has consistently scored at the top in all editions of the GEI, while Greece was the lowest-scoring country from 2010 to 2022. However, after a remarkable 4.5-point increase in 2021, Greece surpassed Hungary and Romania; the latter has

¹ The 2025 edition of the GEI indicates a different trend: over a 15-year period, growth has been weaker among low-scoring countries, while medium- and high-scoring countries have recorded stronger improvements. Consequently, convergence remains limited, with the gap between the highest-scoring (Sweden) and the lowest-scoring (Cyprus) countries narrowing only marginally, by 1.5 points.

occupied the bottom position for the last two years. Only Sweden reached 80 points throughout the entire time-frame. In 2010, 16 countries scored below 60 points, including two that scored below 50. By 2022, there were still six countries scoring less than 60 points.

Figure 1 displays the GEI score for each EU country in 2022 as well as the change in their score during the period 2010-2022. The largest gains over the whole period are observed in Italy, Malta and Portugal, each improving by more than 15 points.

No country has seen a decline in its overall performance, with a beta-convergence process occurring in which countries with initially higher scores in 2010, such as Sweden, Denmark and Finland, show smaller increases in their GEI scores. However, some countries that scored low in 2010, including Romania, Hungary and Czechia, have made only limited progress and continue to lag behind in gender equality.

To better summarise the positions of the 27 EU member states across the six domains, countries with similar scores in 2022 are grouped into three clusters: low, medium and high. Figure 1 uses different colours to represent these three clusters.

The classification of countries into clusters is based on their performance across the six domains, using multivariate cluster analysis. The clustering reflects the nuanced performance across the six domains rather than the overall GEI score alone, leading to some notable observations. Poland, despite having a higher overall GEI score than Latvia, is included in the low cluster due to its very low score in the power domain (below 40 points). Latvia, on the other hand, is in the medium cluster. Also, Austria's GEI score is very close to that of Germany, but its low score in the power domain (57.1 points) justifies its classification in the medium cluster. As explained below, the power domain is a key factor in determining the different situations of women in EU countries, as it reflects their participation in decision-making processes.

Table 1 shows the average Gender Equality Index for countries in different clusters: the low cluster average is 60, the medium cluster average is 68, and the high cluster average is 76. For the six domains, the average values increase from low to medium to high clusters, with the largest differences in the power domain.

The low cluster stands out for its low average score in the power domain (34), which measures gender balance in decision-making and leadership positions. This domain is composed of three sub-domains: political, economic

Table 1
Gender Equality Index and its domains: Average scores by cluster, 2022

Average scores 2022	Low	Medium	High
Gender Equality Index	60	68	76
Work	73	75	79
Money	76	77	87
Knowledge	60	61	68
Time	62	65	68
Power	34	57	76
Health	84	85	91

Source: Author's calculations based on EIGE (2024).

and social, assessing women's participation in these three spheres. Many countries show particularly low shares of women in areas such as the boards of the largest quoted companies, central banks and Olympic sports organisations. The minimum value in the power domain corresponds to Hungary (27.1), which also records the lowest score in the political sub-domain (24.9). Estonia represents the lowest value of the economic sub-domain (16.9), while Greece represents the lowest value in the social sub-domain (26). The economic sub-domain shows the weakest performance overall, with two countries, Romania and Estonia, scoring below 20.

The medium cluster shows the highest difference compared with the high cluster in the power domain (19-point difference). In the money domain, it also shows significantly lower values than in the high cluster (10-point difference), with a score similar to the low cluster. The money domain reflects access to money and levels of economic and financial resources from earnings, pensions or benefits. It is composed of two sub-domains: financial resources and economic situation. Each one is measured by two indicators covering average earnings and income for the financial resources sub-domain, and poverty and inequality for the economic situation sub-domain. The three lowest-scoring countries belong to the medium cluster: Bulgaria, Latvia and Lithuania.

The health domain reaches an average of 91 points in the countries within the high cluster, which also displays more balanced scores across all domains. However, the domains of knowledge and time still exhibit lower average scores due to issues such as segregation in tertiary education and the unequal distribution of unpaid care and household work. The health domain consists of three sub-domains: status, behaviour and access, which are measured by indicators such as (healthy) life expectancy; smoking and drinking habits, physical activity levels, and

fruit and vegetable consumption; as well as unmet needs for medical and dental care. The access sub-domain consistently exceeds a score of 90 in all EU countries, while the behaviour sub-domain shows the most significant differences.

When compared to the clusters generated using 2010 data, recent data shows some notable shifts: three countries (Germany, Ireland and Luxembourg) moved from the medium to the high cluster, and four countries (Bulgaria, Lithuania, Latvia and Portugal) moved from the low to the medium cluster. The domain that contributed most significantly to the shift to the high cluster was power while the time domain explains Bulgaria's shift to the medium cluster.

No country dropped from the high to the medium cluster, indicating that countries with the highest levels of gender equality are unlikely to reverse progress on women's rights. However, four countries (Cyprus, Czechia, Estonia and Hungary) moved down from the medium to the low cluster, now ranking among the lowest scorers in the power domain. Among these countries, Estonia highlights the decline in the gender distribution of time, reflected in a reduction of almost ten points in this domain.

The domain that saw the greatest improvements in the GEI was power, but only in the medium cluster (29 points) and the high cluster (17 points). By contrast, the low cluster saw only a two-point increase, with some countries still lagging behind in this area.

The importance of this domain in the overall trend is underscored by the fact that countries that are top improvers (Italy, Malta, Portugal and Luxembourg) also saw substantial improvements in the power domain's score, while countries lagging in the power domain (Slovakia, Romania, Hungary and Czechia) have lower overall GEI scores. The power domain has the widest range of scores among EU countries, with almost 60 points separating the highest and the lowest values, and a slight decrease since 2010. This indicates that there is still considerable room for improvement, particularly in low-scoring countries, with ten countries scoring below 50 in 2022.

The analysis of EU countries' trends makes clear that the power domain plays a crucial role in achieving gender equality. This is also supported by a strong correlation (over 90%) between countries' scores in this domain and their overall GEI, with steadily increasing values from 2010 to 2022 highlighting the importance of women's participation in decision-making processes for advancing gender equality and closing the gender gap.

On the other hand, the time domain saw significant progress among the low cluster countries from 2010 to 2022,² with an average score increase of 15 points. This domain assesses the involvement of women and men in care and social activities. The top improving countries are Greece and Portugal, each with an increase of 30 points. In this domain, the range between the highest and lowest scores has nearly halved since 2010, indicating a convergence in performance among EU countries that helped to reduce the overall GEI divergence.

The GEI helps to identify the domains and countries that need the most attention, either due to poor performance or trends that diverge from the EU average. It is crucial to consider the varying starting points of countries in terms of gender equality and recognise that progress takes time. By grouping countries into homogeneous clusters, more meaningful comparisons can be made between peer countries.

Although European countries have made progress in gender equality, full equality has not yet been achieved, and the journey towards it is complex. Some progress could be attributed to public policies, such as the introduction of women's quotas or gender balance agreements, which have probably helped accelerate equal representation in parliaments, governments, management boards, research-funding organisations or sports federations, thereby reducing the gender gap in the power domain and breaking the glass ceiling. Additionally, greater male participation in caregiving tasks reflects a shift in societal attitudes, often paving the way for legal changes.

“Women, Business and the Law” report

Achieving gender equality demands the parallel advancement of both public policies and social attitudes. The World Bank's (2024) “Women, Business and the Law, 2024” (WBL) report evaluates the legal environment and the effectiveness of its implementation in 190 economies, including those in the EU. This evaluation highlights how the effectiveness of laws, not just their existence, directly shapes women's opportunities and rights compared with men. The report underscores a persistent challenge: when laws are enacted without robust enforcement, they fail to translate into real progress. This gap between legislation and implementation reveals that legal reform alone is insufficient; only through consistent enforcement can policies drive meaningful change and close the gender equality gap. WBL measures complement the previous analysis of gender equality trends among EU member states based on the GEI.

Since 1971, the WBL report has assessed laws affecting women's economic opportunities across eight key indicators: mobility, workplace, pay, marriage, parenthood, entrepreneurship, assets and pension. The 2024 edition introduces two datasets, WBL 1.0 and WBL 2.0. The latter revises some indicators, adds two new topics (safety and childcare) and introduces new measures to track the implementation gap.

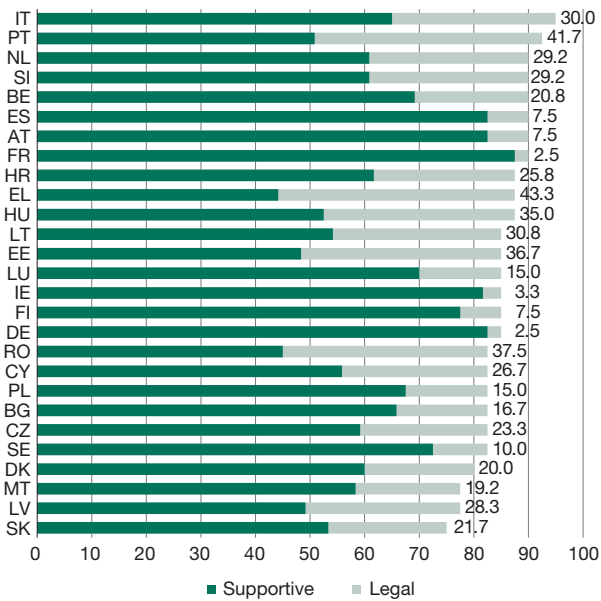
WBL 2.0 introduces the first-ever assessment of women's status in both the laws on the books (*de jure*) and the frameworks supporting their implementation (*de facto*). This assessment is based on insights from over 2,400 experts. The WBL 2.0 indicators are summarised in two index scores (legal and supportive), with 100 representing the highest possible score for gender-equal laws. The legal framework score is derived from 40 questions across ten indicators, while the supportive framework encompasses 30 questions. Additionally, a third index incorporates expert opinions; however, the coverage in terms of submissions per country is uneven, and the results lack coherence. While WBL 2.0 offers a more complete assessment, WBL 1.0 provides historical data starting from 1971, enabling trend analysis by country, although it is limited to legal measures.

After this article was finalised, the World Bank released the 2026 edition of the WBL report, incorporating updated data collected between October 2023 and October 2025 and introducing methodological innovations to improve precision, comparability and policy relevance. The revised edition presents comparable legal indices for the years 2024, 2025 and 2026, revealing that no EU member state experienced a decline in its overall score or a substantial shift in its ranking. Notably, the 2026 edition also refines the measurement of enforcement mechanisms, although data for two EU countries remain unavailable. While future research may benefit from extending the analysis to the enforcement index, utilising the most recent data and improved metrics for both the GEI and WBL, it is important to acknowledge that substantial institutional changes rarely occur within short timeframes. Crucially, the WBL data for the period 2023-2025 are not directly comparable with the GEI data referenced to 2022 due to differences in temporal scope. Consequently, this article uses data from comparable periods, specifically 2022 for the GEI and 2023 for the WBL.

Italy ranks first in WBL 2.0, with a legal indicator of 95. Among the ten top countries globally, Canada is the only non-European nation. Focusing on EU member states, the average WBL 2.0 legal indicator is 85.4, compared with a global score of 64.2. This varies across countries, ranging from 75 in Slovakia to 95 in Italy, with all EU member

² In contrast, the 2025 edition of the GEI shows only modest improvements in the time domain over a 15-year period.

Figure 2
Women, Business and the Law 2.0 legal and supportive frameworks: Scores and gaps, 2024



Source: Author's calculations based on the World Bank (2024).

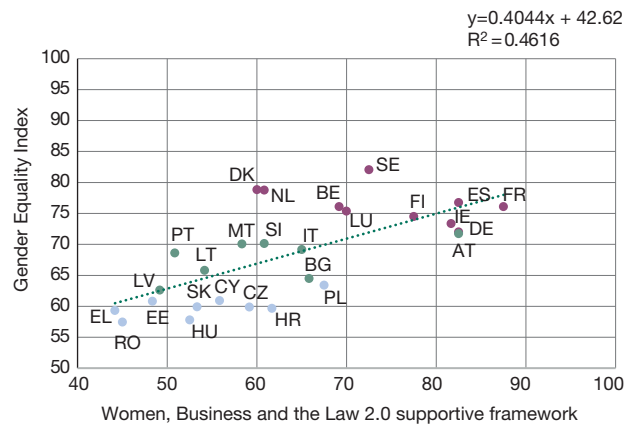
states scoring well above the global average but showing significant differences across the ten fields evaluated.

Laws are the necessary first step towards women's economic empowerment. But inadequate implementation and weak enforcement could be critical barriers to the realisation of women's rights and opportunities. Although laws are passed to ensure equality, they are of little use if they are not implemented and supported. The WBL 2.0 supportive framework evaluates the measures that support the implementation of gender equality laws across the ten indicators.

The supportive framework records a global score of 39.5, revealing an implementation gap of 24.7 points, representing the difference between the legal and supportive average scores. All economies have substantial room for improvement, with EU countries reaching an average score of 63.6, resulting in an implementation gap of 21.7 points.³ Despite the supportive framework in EU member states scoring 24 points higher than the global average, the implementation gap is only three points narrower,

³ The findings of the 2026 edition of the WBL report reveal a broader implementation gap in EU countries, averaging almost 29 points, while the global average implementation gap stands at 20 points.

Figure 3
Women, Business and the Law 2.0 supportive framework (2024) vs Gender Equality Index (2022)



Source: Author's calculations based on EIGE (2024) and the World Bank (2024).

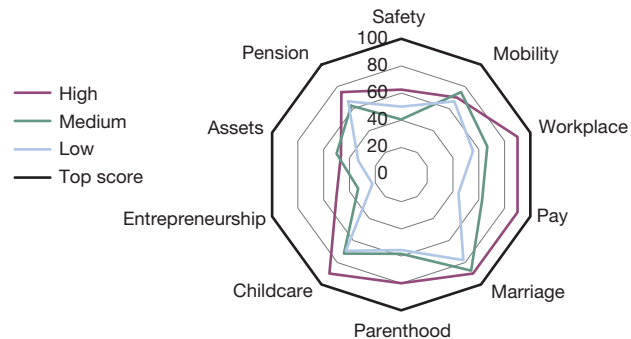
highlighting the need to strengthen the enforcement of laws in some low-scoring countries.

The ranking of EU countries based on supportive measures diverges from that of legal indicators, reflecting the gap between de jure and de facto situations. France leads with the highest supportive score of 87.5 and a gap of only 2.5 points, while Greece has the lowest at 44.2, also exhibiting the largest implementation gap of 43.3. A detailed analysis reveals that only six EU countries have a gap of less than ten points between their legal and supportive scores: France, Germany, Ireland, Austria, Finland and Spain, as illustrated in Figure 2. Those same six EU member states are also the top-scorers in the supportive framework, with five to seven domains scoring a perfect 100.

The average score of the supportive framework aligns more closely with the actual situation of women, as indicated by the GEI. As illustrated in Figure 3, higher scores for supportive measures correlate with higher GEI values, with different colours representing the three clusters previously defined by GEI indicators. This contrasts with the comparison between the legal framework score and the GEI, demonstrating that passing laws alone is insufficient to guarantee gender equality.

France ranks as the top country when evaluated by both GEI and supportive measures, while Romania and Greece are among the lowest-scoring countries in both areas. A clear example of the mismatch between legal indicators and the actual situation of women is Greece: despite achieving a high legal WBL indicator value of 87.5, it re-

Figure 4
Women, Business and the Law 2.0 supportive framework: Average domain scores by cluster, 2024



Source: Author's calculations based on EIGE (2024) and the World Bank (2024).

mains the lowest-scoring EU country in terms of implementation measures and the third-lowest in the GEI.

In spite of the general alignment of GEI and supportive measures, a few countries display a mismatch between both scores. For instance, the Netherlands and Denmark achieve relatively high GEI scores despite offering limited supportive measures. This can be attributed to specific low scores in supportive measures: the Netherlands scores zero in safety, while Denmark scores zero in entrepreneurship. Conversely, Poland implements more supportive measures than the EU average, but this is not reflected in its GEI score, which remains below the EU average, and it is classified in the low cluster due to poor performance in the power domain, as previously discussed.

The positive relationship between supportive measures and GEI is also evident at the aggregated level when comparing the average scores of countries within each GEI cluster. Countries in the low cluster have an average score of the supportive framework of 54.2; those in the medium cluster average 60.8; and countries in the high cluster score 74.4 points.

As illustrated in Figure 4, countries in the low cluster have the lowest score in entrepreneurship (22.2), assets (33.3) and pay (44.4). The most significant disparities are seen in pay, with nearly a 20-point difference between the low and the medium clusters and almost a 30-point difference between the medium and high clusters. This domain has the most top-scoring countries, with a total of 13, of which two belong to the low cluster, three belong to the medium and eight out of ten countries in the high cluster score 100 in the pay domain.

In contrast, the domains of mobility, marriage and pension have more similar average scores across the three clusters. The high cluster excels with average scores of 90 in workplace, pay, marriage and childcare while struggling to reach a score of 50 in entrepreneurship and assets, which are also the two domains with lower average scores for all EU member states, with 35.8 and 43.2 points respectively, with three top-score countries in the former while no country scores 100 in assets.

A detailed examination of the WBL indicators reveals a significant disparity between legal frameworks and their practical implementation across the EU. In nine out of ten indicators within the supportive framework, scores fall below their legal counterparts, with the most pronounced gap observed in the domain of assets: while all EU countries have achieved a perfect legal score of 100 in this area, the average score for supportive measures drops to 43.2, resulting in an alarming implementation gap of 56.8. This gap between law and practice reveals systemic barriers that prevent women from fully accessing their rights, particularly in economic domains.

Interestingly, safety is the only domain where the EU average gap is negative. Here, the legal framework scores a mere 44.4, while supportive measures reach 51.9. This inversion, observed in 11 EU countries, suggests that this is an area that requires comprehensive reform and robust enforcement to ensure the physical and psychological security of all women.⁴

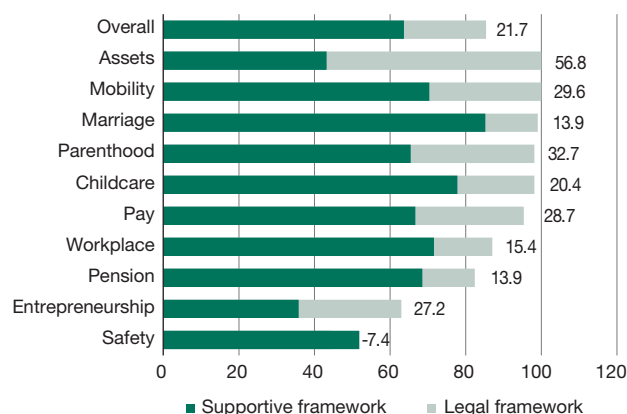
These findings, visualised in Figure 5, demonstrate that while legal frameworks are essential, they must be accompanied by targeted, well-funded supportive measures to bridge the gap between policy and reality.

Across the 27 EU member states, legal indicators for mobility and assets score a perfect 100, ensuring equal rights in travel and residence, inheritance and property ownership.⁵ Nearly all EU countries have achieved top marks in the domain of marriage, with the only exception being Italy, despite it being the highest-scoring country overall; similarly, most countries score high in parenthood, with the exception of Finland and Malta. At the other end, not a single EU country scores 100 in safety, and three countries score zero.

⁴ The results observed in the 2026 edition of the WBL report remain consistent with these findings, underscoring the persistent challenge of achieving substantial changes within a short timeframe.

⁵ WBL scores are calculated for 190 economies to reflect the diverse legal environment of women. However, the fact that some indicators achieve a perfect score of 100 in all EU member states suggests that they are not designed to stress differences within the EU.

Figure 5
Women, Business and the Law 2.0: Scores and gaps by domain, EU averages, 2024



Source: Author's calculations based on the World Bank (2024).

This reveals that EU countries' laws generally guarantee gender equality in mobility and property, and in most countries, women's rights are equal to men's in terms of marriage and parenthood. However, many countries still fail to adequately enact laws to protect women against violence, an issue that requires urgent policy attention.

The highest scores in supportive measures are observed in marriage, where 18 countries achieve a perfect score of 100 and the average across the 27 EU countries stands at 85.2.

In contrast, the entrepreneurship-supportive indicator shows the lowest scores, aligning with the lower scores observed in the GEI power domain. This indicator has an average score in EU countries of 35.8, with eight member states scoring zero and only three countries scoring 100 (France, Spain and Italy). France and Spain rank second and third in the GEI power domain, with 30-point increases between 2010 and 2022, while Italy ranks eleventh with the second-highest increase of more than 40 points in this domain.

The supportive entrepreneurship domain is evaluated based on three indicators: the publication of sex-disaggregated business data (met by half of the countries); government-led programmes supporting female entrepreneurs (implemented by just a quarter of countries); and national government strategies focused on women's financial services (rarely implemented). This results in women entrepreneurs facing systemic barriers, from a lack of access to finance and training to insufficient data transparency. Without targeted support, legal equality in business remains an empty promise.

Greece exemplifies the consequences of weak enforcement. Although it scores 87.5 on overall legal measures, placing it above most countries classified in the high GEI cluster, its supportive score of 44.2 reveals the EU's widest implementation gap (Figure 2). This disparity is especially evident in entrepreneurship: Greece achieves a perfect score of 100 on legal measures, yet scores zero on supportive actions. For example, a 2020 law mandates gender quotas for corporate boards, but the lack of transparency and sex-disaggregated data make enforcement difficult to verify. As a result, women hold only 22% of board seats in the largest quoted companies, contributing to Greece's low GEI power domain score of 33.2.

Similarly, although Greek law guarantees equal access for women and men to credit and entrepreneurial activities, the absence of targeted support programmes for women entrepreneurs persists as a major barrier. Despite recent progress, Greece continues to rank as the third-lowest EU country in overall GEI (below 60), with particularly weak scores in the power and money domains. These outcomes underscore a critical truth: laws alone do not transform lives. Without effective enforcement, even the most progressive legislation fails to deliver real equality.

In contrast, France demonstrates consistent performance in both GEI and WBL indices, reflecting the positive impact of policies on women's actual lives when properly implemented. France has the highest score in supportive WBL measures, achieving a perfect score of 100 in entrepreneurship and the highest value in assets. At the same time, its current sixth position in the global GEI is supported by a second place in the power domain and the top score in the economic sub-domain, driven by the highest share of women on boards of the largest companies (46%). Notably, France has risen four positions in the power domain since 2010. The adoption of gender quotas for corporate boards, along with the availability of gender data on business activities and government programmes supporting female entrepreneurs, including access to financial services, has significantly improved the situation of women in the country.

Another domain with significant room for improvement in the implementation of laws is assets. No EU country has reached the top score: three countries score zero, and about half of the countries comply with only one out of three indicators in this domain. Policies to encourage women to register immovable property are present in most countries, while awareness measures to improve women's access to information about marital and inheritance rights, as well as sex-disaggregated data on property ownership, are available in only six countries.

Lastly, the safety domain stands out as the EU's most alarming outlier, with a negative implementation gap. This is explained by the lowest score in legal measures, 44.4, with nine countries scoring 0 or 25, and none reaching 100. Among legal measures in this domain, it is worth underscoring that only six countries address femicide in their legal systems, and only nine address child marriage. Although sexual harassment and domestic violence are covered in the legal systems of more than half of EU countries, implementation remains weak. The average implementation score in the safety domain is 51.9, with fewer than half of the EU member states having a government entity responsible for programmes addressing violence against women or an annual budget allocated for such programmes. The low scores in both legal and supportive measures remain dangerously insufficient across EU countries.

Conclusions

The extensive gender data available across EU countries offers valuable insights into the status of women in various fields. It enables meaningful comparisons between legal frameworks, their implementation, and the actual lived experiences of women when multiple indicators are analysed together.

The GEI (EIGE, 2024) highlights substantial progress in women's conditions across EU member states over the last decade, with France and Spain standing out for their strong performance. However, it also underscores that several countries, such as Hungary, Romania and Czechia, continue to lag in ensuring effective representation of women in decision-making roles, limiting progress towards gender equality.

Data from the Women, Business and the Law report (World Bank, 2024) reinforces that legislative reforms alone are insufficient to ensure gender equality. Supportive measures play a vital role in turning legal provisions into tangible improvements. Bridging the implementation gap, particularly in areas like entrepreneurship and assets, requires government programmes tailored to the specific needs of women entrepreneurs and better access to gender business data, as well as information on marital and inheritance rights.

Article 23 of the EU Charter of Fundamental Rights (European Union, 2012) underpins the enforcement of gender quotas in large companies, which can only be achieved through transparency and the publication of sex-disaggregated business data. Such targeted measures in favour of the under-represented sex could significantly reduce the gender gap in the GEI power domain and

strengthen women's empowerment across EU member states.

Another key recommendation from the WBL analysis is the urgent need to address femicide and domestic violence within all legal systems, ensuring dedicated funding for prevention and support programmes.

The EU must act decisively, not just to pass laws, but to guarantee their implementation, enforcement and support. Only then can the EU truly embody a union where equality before the law is fully realised in women's lives.

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America's Self-Inflicted Brain Drain

Immigrants, who account for 14% of the U.S. population, are responsible for 36% of aggregate innovation¹ and are 80% more likely than native-born Americans to start a business.² Nearly half of all Fortune 500 companies were founded by immigrants or their children, and 59% of Artificial Intelligence (AI) PhD graduates working in U.S. industry are international students. History offers a stark warning about what happens when these flows are disrupted: immigration quotas in the 1920s caused a 68% relative decline in U.S. patenting.³ The United States now risks repeating that history as it dismantles, piece by piece, the talent pipeline that built its competitive advantage.

Consider the most recent visible blow to that pipeline. In September 2025, President Trump imposed a \$100,000 fee on new H-1B visa petitions: the primary mechanism through which U.S. firms hire skilled foreign workers. The administration framed it as a measure to protect American workers and ensure the program attracts “the best of the best.” The fee adds an enormous new barrier on top of an already broken system; annual caps of 85,000 visas have been oversubscribed every year since 2004, with demand typically running at two to three times the supply. A large body of research tells us the impact of making H-1B visas harder to obtain. When U.S. multinational companies faced tighter H-1B restrictions in the past, they offshored more, hiring more at their foreign affiliates. On average, multinationals created roughly 0.4 foreign affiliate jobs for every unfilled H-1B position in the U.S.; the most internationally oriented firms replaced nearly one-for-one.⁴ Restrictive immigration policy does not keep jobs in America. It pushes them out.

Small startups are hit hardest. Unlike multinationals, they cannot easily offshore. Evidence from H-1B lotteries between 2014 and 2018 shows that startups that lose the H-1B lottery are less likely to achieve a successful exit via initial public offering or acquisition and less likely to receive additional venture capital funding.⁵ The \$100,000 fee will accelerate these dynamics. For large technology companies, the fee may be an irritation absorbed into the cost of doing business even as they accelerate the offshoring of skilled work and talent. For smaller firms, for universities, and for hospitals and research institutions that rely on H-1B workers, the fee is potentially prohibitive. And it sends a signal, to firms and to workers alike, that the United States is raising the drawbridge.

But the damage extends far beyond the H-1B program itself. The pathway from international student to skilled immigrant worker in the United States is long and institutionally dependent: students arrive on F-1 visas, earn a degree, gain work experience through Optional Practical Training (OPT), and eventually transition into employer-sponsored work visas and, ultimately, permanent residency. My recent research with Caroline Fry on AI scientists emphasizes this: many PhD-holding immigrants at top U.S. AI firms arrived not through direct hiring abroad but as graduate students who transitioned into industry through university networks. The university is where the pipeline begins, and it is the part of the system now under the greatest strain.

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3 Moser, P., & San, S. (2020). *Immigration, Science, and Invention: Lessons from the Quota Acts*.

4 Glennon, B. (2023). How Do Restrictions on High-Skilled Immigration Affect Offshoring? Evidence from the H-1B Program. *Management Science*, 70(2), 907–930.

5 Dimmock, S. G., Huang, J., & Weisbenner, S. J. (2022). Give me your tired, your poor, your high-skilled labor: H-1b lottery outcomes and entrepreneurial success. *Management Science*, 68(9), 6950–6970.

New international student enrollment at U.S. universities fell 17% in the fall of 2025: the largest single-year decline outside the pandemic on record. International graduate student enrollment dropped 12%. These are not small fluctuations. They reflect visa interview suspensions, travel restrictions affecting nationals of dozens of countries and a political climate that signals hostility rather than welcome. The administration has signaled its intent to curtail or eliminate OPT, the bridge program that allows graduates to transition into the workforce.

My work with Robert Flynn, Raviv Murciano-Goroff and Jiusi Xiao reveals just how damaging perceived hostility to migrants can be, even without formal policy changes. We find that ethnically Chinese students became 15% less likely to enter U.S. doctoral programs after U.S.-China tensions escalated. Crucially, the decline is concentrated among the most talented, i.e. those with the most external options. And they do go elsewhere: other countries, especially Anglophone ones, absorb this redirected talent. These effects cannot be explained by policy changes alone; they reflect a climate of perceived hostility that deters talent before any visa form is ever filed.

If the United States is driving talent away, the obvious question is who stands to gain. For European policymakers, this should be both an opportunity and a cautionary tale. The opportunity is real: applications from U.S.-based researchers to the European Research Council's early-career grants have nearly tripled in recent years, as reported by STAT News. The European Commission has launched a "Choose Europe for Science" program targeting top international researchers. France has launched its own platform and introduced a bill to create a formal "scientific refugee" status. There are early signs of Europe becoming more attractive: Nobel laureates Esther Duflo and Abhijit Banerjee have announced they would leave MIT for the University of Zurich, and Aix-Marseille University received nearly 300 applications from researchers seeking refugee status.

But Europe should be clear-eyed about the structural barriers that have historically prevented it from capitalizing on moments like this. The EU Blue Card scheme has seen modest uptake compared to Canada or Australia's fast-track systems. Many international students educated in Europe leave after graduation, as documented by the ICMPS, citing bureaucratic barriers and limited career prospects. And compensation gaps remain large: U.S.-based AI positions typically pay 30% to 70% more than equivalent roles in Europe. The lesson from the United States is not simply that restrictive immigration policies push talent away. It is that talent pipelines are institutional achievements that take decades to build and can be destroyed with remarkable speed. The U.S. system, for all its flaws – the H-1B lottery, the low employment visa and green card caps, the employer-tied visas that leave workers vulnerable – nonetheless created an effective mechanism for channeling global talent into productive firms and innovative ecosystems. It did so because firms, universities and government programs operated as interconnected intermediaries, each reinforcing the others. Dismantling any part of this system has cascading effects on the whole.

Europe has a historic window. But seizing it requires more than welcoming statements and one-off fellowship programs. It requires building coherent, continent-wide talent infrastructure: making the EU Blue Card a genuinely attractive and well-publicized pathway with harmonized standards across member states, streamlining mobility so that a non-EU researcher does not face a fragmented patchwork of national procedures to move within Europe, and investing in the compensation and research funding that makes European positions competitive, not just available.

The global geography of innovation is being reshaped in real time. My research suggests that when the United States restricts access to skilled immigrants, innovative activity and human capital shift abroad, and with them, the knowledge spillovers and ecosystem effects that drive long-term economic growth. Countries that position themselves to absorb this redirected talent will reap outsized benefits. Those that do not will miss the opportunity. The United States is conducting a remarkable experiment: testing whether its leading innovation economy can maintain its position while systematically alienating the global talent on which that position depends. The question for Europe is whether it will treat this as someone else's problem or as an opportunity.

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