ESRB
European Systemic Risk Board
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EUROPEAN CENTRAL BANK
EUROSYSTEM

# Financial stability risks from geoeconomic fragmentation

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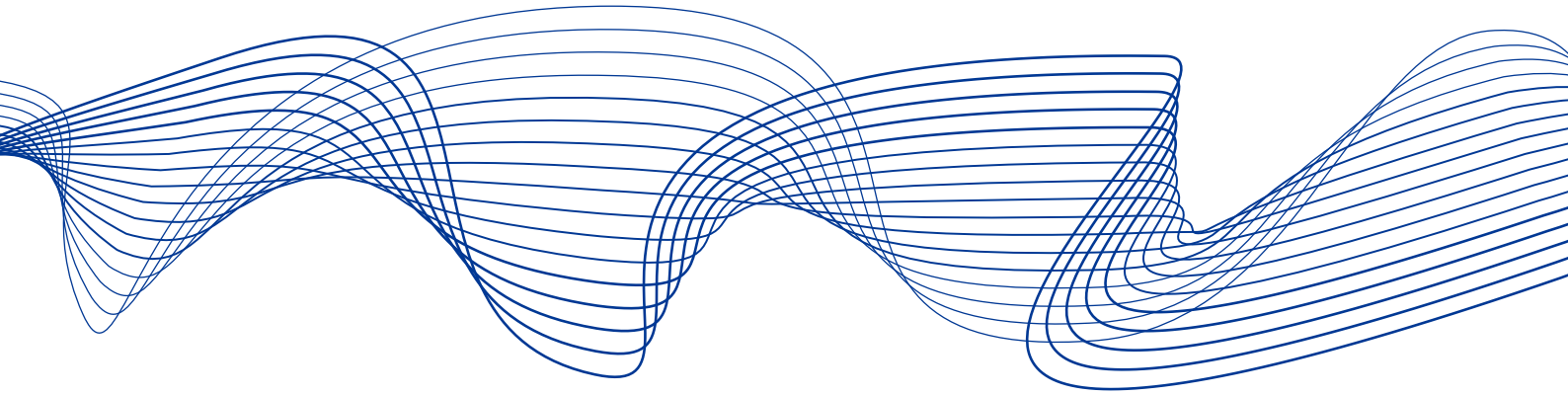

ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation

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# Executive summary

**Geoeconomic fragmentation and geopolitical risk have emerged in recent years as defining challenges for economies worldwide, profoundly reshaping the global economic and financial landscape.** Heightened geopolitical tensions, trade frictions, and regulatory divergence have created a world where political and economic spheres are increasingly intertwined. These developments have transformed the nature of uncertainty faced by policymakers and financial institutions, as geopolitical shocks transmit through global markets, disrupt trade and investment flows, and potentially impact financial stability.

**This report examines the link between geopolitical and geoeconomic risks and financial stability.** It introduces a comprehensive framework for regular monitoring of geopolitical risks, integrating a wide array of quantitative indicators with a rich empirical modelling foundation to evaluate the impact on the financial sector. The framework is conceived as an instrument for policymakers and financial authorities, enabling a systematic assessment of how geopolitical developments affect macro-financial conditions. The work makes three main contributions to risk monitoring. First, it establishes a monitoring toolkit for indicator-based analysis of geopolitical risks that can be readily integrated into existing financial stability frameworks. Second, it explores the macro-financial transmission of geopolitical shocks using state-of-the-art econometric models. Third, it draws on granular datasets to document how banks and non-banks adjust to geopolitical shocks and periods of elevated policy uncertainty.

**The framework categorizes geopolitical risks into five broad groups, each capturing facets and channels that can amplify macro-financial vulnerabilities and impact financial stability.** The categories are: (i) military conflicts and wars; (ii) infrastructure vulnerabilities; including energy and digital systems; (iii) trade disruptions and sanctions; (iv) capital and financial risks; and (v) political or societal factors. Together, these dimensions shape the complex landscape of geopolitical risk. The framework also identifies the main channels through which these risks affect financial stability – financial, real-economy, and operational. This report focuses on the financial channel, where spillbacks occur through tighter financial conditions, higher risk premia, and financial market stress. As a result, financial institutions may face heightened credit, market, liquidity, or operational risks. Moreover, existing vulnerabilities and feedback loops can act as amplifiers, transforming localised disturbances into systemic risks with the potential to threaten financial stability.

**The empirical analysis relies on a broad set of 40 geopolitical indicators covering the five risk categories identified in the framework.** These metrics include high-frequency market-based measures and slower-moving cyclical and structural indicators. Statistical and econometric selection criteria were used to identify the most relevant indicators for visual monitoring tools and econometric analysis. The geopolitical indicators heatmap (GEO heatmap) can be embedded in

broader risk monitoring frameworks to support ongoing financial stability assessments.

**The monitoring tools used in the analysis confirm that the prevailing geopolitical risks have intensified in recent years, as captured by trends in geoeconomic fragmentation, geopolitical tensions and heightened policy uncertainty.** Measures of policy uncertainty have especially surged during 2024 and 2025, driven primarily by a sharp increase in global economic and trade policy uncertainty. These developments have been accompanied by a 27% rise in trade disputes at the World Trade Organization between 2015 and 2024 combined with regulatory divergence.

**A significant dichotomy emerges between a measured rise of geopolitical risk and the impact for the economy and financial stability.** While indicators of uncertainty have surged and model-based results indicate substantial downside risks for the real economy, measures of financial volatility have remained contained or quickly reverted after short-lived spikes. Growth-at-Risk (GaR) estimates – capturing real GDP growth at the lower tenth percentile – show that the inclusion of geopolitical indicators lowers expected growth outcomes compared with estimations without such risk factors. Since 2014, the contribution of geopolitical indicators to these dynamics has increasingly acted as a drag on GaR, reducing it by one to two percentage points. On the financial side, heightened geopolitical shocks and policy uncertainty tends to raise systemic stress, resulting in lower loan growth and tighter lending conditions. These results point to significant tail risks for the real economy from geopolitical sources.

**The transmission of geopolitical risks and economic policy uncertainty varies notably across EU Member States, reflecting differing levels of risk exposures and financial sector resilience.** Based on the empirical evidence, economies with higher trade openness or higher public indebtedness appear more vulnerable to amplification effects. The evidence also shows that geopolitical risk can reduce financial integration and economic synchronisation within the euro area, amplifying output losses and financial stress. While heterogeneous exposure to geopolitical risk among EU Member States can partly explain these divergences, it suggests that reduced synchronisation and financial integration may compound the macro-financial effects of geopolitical shocks beyond their direct impact.

**To evaluate the resilience of financial systems, the empirical analysis is complemented with sensitivity analyses and macro-financial stress tests.** These stylized scenario exercises illustrate how macro-financial variables and risks surrounding them evolve under simulated geopolitical shocks. In addition, they identify the contribution of the financial system as an amplifier of the dynamics and the benefits of stabilising financial stress to mitigate the effects. Taken together, the results highlight the stabilising role that a sound and well-capitalised financial system can play in limiting adverse macro-financial outcomes.

**Financial markets provide a critical lens through which to observe how geopolitical shocks propagate and affect interlinkages between market segments.** Volatility spillovers between asset classes – bonds, commodities,

equities, and exchange rates – spiked during major recent events such as the COVID-19 pandemic and the Russian invasion of Ukraine in 2022. These episodes illustrate how geopolitical shocks can break down established relationships between markets and significantly impact cross-market interconnectedness. An additional analysis focuses on the transmission of US political risk. It is based on prediction market data, which are designed to track the emergence of new geopolitical risks and to analyse their impacts across financial markets. The analysis shows that political risk shocks linked to US trade tariffs not only affect US equity prices and exchange rates but also spill over into euro area equity markets.

**A granular perspective on financial institutions confirms that both banks and non-banks adjust their behaviour in response to geopolitical shocks by reducing lending, especially across borders.** The effect on lending was strongest among euro area banks with less capital headroom or large exposures to high-risk countries. Banks reduced both the probability of new lending relationships (by around 6%) and the average loan amount (by 9%). Similarly, spillovers from heightened US policy uncertainty led to a reduction in credit from euro area banks. On the liability side of banks' balance sheets, market-based funding tends to decline in response to increases in economic and trade policy uncertainty and rising geopolitical risk, particularly as regards foreign-currency funding. For non-bank financial institutions, the shift towards domestic concentration following the Russian invasion of Ukraine was pronounced, with exposures to the rest of the world falling by 17%, compared with 7% for domestic exposures, driven primarily by investment funds, pension funds and insurers. This re-orientation towards domestic markets – as opposed to a rebalancing from higher to lower-risk cross-border exposures – reduces exposure to external shocks but may also constrain diversification and the system's ability to mitigate risk.

**While this report provides a comprehensive assessment of the financial stability implications of geopolitical risk and geoeconomic fragmentation, certain gaps remain.** The availability and comparability of geopolitical indicators vary considerably over time and across countries, suggesting the need for further efforts to build methodologically harmonised datasets and tailor monitoring frameworks to national specificities by selecting specific indicators for different countries. Moreover, new sources of risk are emerging rapidly, including digital fragmentation, cyber threats, and the societal dimensions of geopolitical shifts. Economic, financial, and regulatory divergence – whether through trade restrictions on critical materials, financial regulation of new instruments, or climate-related policy shifts – may further complicate the landscape. It could therefore be worthwhile to complement indicator-based monitoring with more elaborate scenario analyses involving specific risk materialisations, as they would enhance the capacity to anticipate emerging geopolitical and financial stability risks.

**By offering a structured, empirically grounded approach to understanding the financial stability implications of geopolitical risks, the monitoring toolkit presented in this report provides a foundation for future research and policy development.** Policymakers and financial institutions can employ this framework to detect and categorize the main sources of risk in an evolving landscape of

geopolitical risk to assess cross-market and cross-border spillovers, estimate the impact on financial institutions and calibrate macro-prudential responses. In an era of accelerating fragmentation and persistent geopolitical uncertainty, proactive risk management and strengthened cooperation across jurisdictions are essential to preserve financial stability and sustain economic resilience.

# 1 Introduction

**Geoeconomic fragmentation and geopolitical risks have emerged as critical challenges for economies worldwide, reshaping the global economic and financial landscape in profound and interconnected ways.** The era of globalisation in the late 20th and early 21st centuries created strong interdependencies between the EU and global economies, including its financial system. Ongoing shifts in policy priorities and regulatory frameworks are not only affecting trade and global supply chains, but also giving rise to risks and uncertainties that reverberate across societal and political structures, impacting financial systems and their stability.

**This report provides a comprehensive toolkit for analysing the relationship between financial stability, geopolitical risks and uncertainty.** It offers a framework for understanding the transmission of different types of geopolitical and geoeconomic risks with direct and indirect effects on the EU's economy and its financial system. To effectively measure and monitor the risks associated with geopolitical developments, including geoeconomic fragmentation, a comprehensive database has been created, encompassing a wide range of indicators organised by geopolitical dimension. The indicators were selected to achieve a broad view of geopolitical risk, combining high-frequency market signals with slower-moving structural trends. This approach ensures thematic coverage and empirical relevance for assessing the transmission of geopolitical developments and provides a monitoring framework for the Eurosystem and the European Systemic Risk Board (ESRB).

**Building on a robust empirical analysis, the report identifies and assesses several transmission channels through which geopolitical risks propagate to financial systems.** The suite of models used includes a range of geopolitical indicators and analyses their transmission to the financial system, along with their implications for financial stability. It uses microeconometric and time series analysis, such as structural vector autoregressions (VARs) or factor-augmented VARs, to assess the impact of geopolitical risks on the main macro-financial developments.

**The report is structured as follows.** Section 2 presents the conceptual framework, providing a detailed description of the drivers and transmission channels and offering insights into the mechanisms that link geopolitical events to financial stability. Section 3 covers a rich set of indicators along the main geopolitical risk categories, namely military conflicts, infrastructure, trade, capital and finance, as well as political and societal factors. Section 4 provides empirical analyses quantifying the impact of geopolitical shocks on the euro area countries and on other EU Member States, including the risks facing their economies and financial systems. Section 5 focuses on transmission and spillovers within the financial system, while Section 6 examines the responses of financial institutions, including both the banking sector and non-banking financial institutions, to geopolitical risks.

# 2 A framework for assessing geopolitical risks to financial stability

**This report sees geopolitics as a broad concept, encompassing the use of all available instruments by nation states to pursue their interests and expand their power and influence.** These instruments include military strength, as Caldara and Iacoviello (2022) define geopolitical risk as "the threat, realization, and escalation of adverse events associated with wars, terrorism, and any tensions among states and political actors that affect the peaceful course of international relations". Moreover, geopolitics also involves instruments of hybrid warfare, such as cyberattacks, physical sabotage and the spread of disinformation. Additionally, geopolitical objectives are often pursued through economic means, including trade policies, sanctions and currency manipulation – collectively referred to as geoeconomic instruments. By adopting a broad definition of geopolitics, this report also considers geoeconomic risks.[1]

**The primary aim of this report is to analyse the impact of geopolitical risk on financial stability.** This includes examining the effects of sudden geoeconomic shocks, as well as the gradual process of geoeconomic fragmentation, which Aiyar et al. (2023) define as "a policy-driven reversal of global economic integration often guided by strategic considerations". Geoeconomic fragmentation can therefore be seen as a form of strategic disintegration driven by geopolitical motives, as defined by Mohr and Trebesch (2025).

**The framework encompasses the key transmission channels through which geopolitical and, more specifically, geoeconomic risks affect financial stability.** This includes the amplifiers and dampeners, and the effects on capital flows, financial markets and institutions. This section first describes the shock and trend characteristics of geopolitical risks and divides them into five different categories. Second, it sets out the impact of geopolitical risks on uncertainty and volatility, as well as the way in which this impact is propagated through various transmission channels. Third, it discusses the risks to financial institutions, the amplification and damping mechanisms, as well as the impact on financial stability.

**Geopolitical risks may arise from the materialisation of shocks that entail a slow-moving structural rise in fragmentation.** Sudden materialisation may take the form of unexpected shocks, such as the start of a military conflict, whereas fragmentation develops as a trend or pattern, potentially multifaceted, over prolonged periods of non-cooperation, sanctioning or coercion. Recent events linked to fragmentation include Brexit and the COVID-19 pandemic.

**The analysis in this report combines several dimensions of geopolitical risks, encompassing a wide range of events and actions that can undermine**

[1] A more detailed description of the concepts of geopolitics and geoeconomics can be found in the Annex 1 to this report.

**political, economic and financial stability.** The different types of geopolitical risks fall into five different categories: (i) military conflict and war; (ii) infrastructure; (iii) trade; (iv) capital and finance; and (v) politics and society (**Figure 1**).[2] These risks can have a profound impact on financial institutions, markets and, more broadly, financial stability.

**Figure 1**
Categorisation of geopolitical risks


Source: ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.

**Categorising geopolitical risks ensures clearer identification of transmission mechanisms and potential spillovers.** Indirect effects on financial stability often emerge through trade or political channels. Escalating geopolitical tensions may, for instance, lead to protectionist policies that fragment global trade, reduce economic growth and increase uncertainty, affecting credit conditions and asset valuations. Direct effects, by contrast, may stem from sudden shifts in capital flows or heightened risk perception during military conflicts. An unexpected invasion may, for example, trigger a flight-to-safety, causing sharp movements in exchange rates and bond yields, and tightening global financial conditions.

**The transmission channels of shocks may induce uncertainty, on the one hand, and volatility, on the other.** Uncertainty arises from a lack of predictability as regards future geopolitical developments and their outcomes, affecting expectations and increasing risk aversion among businesses, households and market participants. Volatility refers to verifiable rapid and unpredictable changes in, for example, asset prices, trade and capital flows, commodity prices, foreign exchange rates, energy prices, interest rates and risk spreads. It is useful to conceptually differentiate these two aspects given that this helps clarify how geopolitical risks influence the behaviour of economic agents and financial markets. Uncertainty is a more general phenomenon related to the behaviour of economic agents in the face of unknown events, whereas volatility is an observable measure for assessing deviations from historical averages of financial or economic variables.

**Geopolitical risks in general, and geopolitical shocks in particular, can have particularly strong effects and produce an unusual degree of volatility and uncertainty among economic agents, and for the real economy and financial**

[2] A more detailed description of the different types of geopolitical risks can be found in the Annex 1.

**markets.** Given the nature of geopolitical shocks, they seem to produce an unusually high degree of volatility and uncertainty which is often far removed from economic market knowledge and information. Unlike standard economic disturbances, geopolitical shocks often originate outside the economic system and are amplified through the weaponisation of interdependencies – for example, restricting access to energy, raw materials or semiconductors to exert geopolitical pressure. They tend to trigger sudden supply disruptions, as illustrated by Russia's drastic reduction of gas supplies to the EU in 2021-22, which led to a surge in inflation. Moreover, geopolitical tensions can undermine confidence in financial markets and erode trust in global trade rules, creating systemic uncertainty.

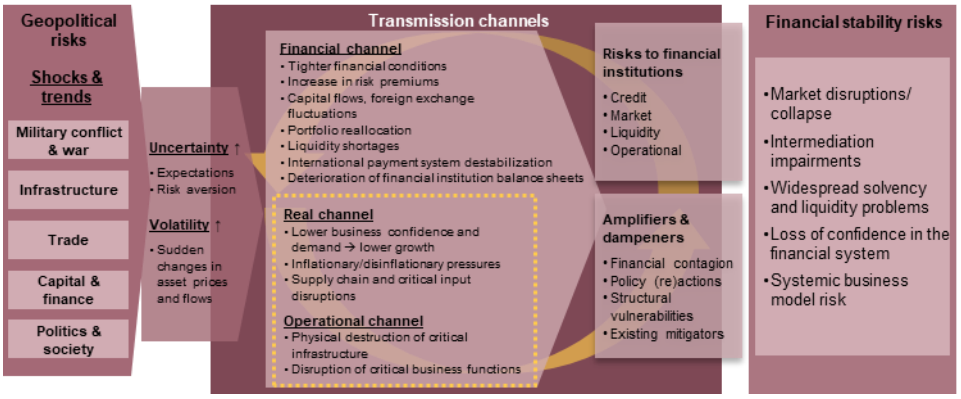
**A fragmentation of trade along geopolitical lines would exert significant and persistent effects on real GDP, trade, and inflation (International Relations Committee, 2024).** Trade fragmentation is perhaps the best-known example of the materialisation of geopolitical shocks. Model-based simulations show that in a world economy fragmented along geopolitically opposed blocs, real output would be durably lower. This reflects the loss of efficiency arising from the breaking up of global value chains, with spillovers particularly strong in highly interconnected economies. Global trade volumes would decline sharply, given that barriers and frictions not only reduce bilateral flows but also distort the structure of production. A shock to trade fragmentation would cause persistent inflationary pressures for countries imposing higher barriers to trade, given that the economy only progressively adjusts to reduced competition, higher production costs and strategic restrictions on key inputs. In addition, counterfactual analysis shows that a fragmented world economy would face larger and more frequent supply shocks, triggering higher output and inflation volatility given that a fragmentation of supply chains reduces the ability of economies to absorb shocks. Finally, even if no trade barriers are put in place, the mere perception of trade policy uncertainty can weigh on macroeconomic outcomes (Caldara et al., 2020). This is because uncertainty induces precautionary behaviour, such as firms delaying investment and households increasing precautionary savings, which depresses growth and trade dynamics. This uncertainty also feeds into financial markets, raising risk premiums and tightening financial conditions, thereby amplifying its real economic effects.

**Beyond the real and operational channels, the transmission of geopolitical risks can be particularly strong through the financial channel, owing to the uncertainty and volatility these risks create.**[3] While the real and operational channels generally give rise to indirect risks for the financial system, the financial channel exerts a more immediate and direct influence on the system, making this channel particularly important for financial stability assessments (**Figure 2**). Transmission through the financial channel can be analysed effectively through the dual lens of uncertainty and volatility. Uncertainty undermines investor sentiment and heightens risk aversion, leading to higher risk premiums and precautionary liquidity hoarding. Volatility amplifies these effects by triggering market sell-offs and

[3] This concept is in line with the transmission channels identified by ECB Banking Supervision – the financial market channel, the real economy channel, and the safety and security channel – in assessing the impact of geopolitical risk on credit, liquidity, market, business model, operational risks and governance. See Buch (2024) and the article entitled "Addressing the impact of geopolitical risk" on the ECB website.

heightening stress in key funding markets. Together, these dynamics drive flight-to-safety behaviour, sharp capital flows, fluctuations in foreign exchange rates and risk repricing in asset markets. The resulting wider spreads and credit tightening – often intensified by fire sales – result in a deterioration in financial conditions and elevated default rates, ultimately straining the balance sheets of financial institutions.

**Figure 2**
EU geopolitical risks and fragmentation analysis framework




Source: ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.
Note: The transmission channels in the dashed box were not the focus of the analysis conducted by the ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.

**The prominence of the financial channel for macroprudential analyses has important implications for risk measurement and indicators.** Financial stability analyses focus on the (valuation) effects on the balance sheets, solvency and liquidity of financial institutions. In addition, consideration of bilateral investment positions is appropriate in order to accurately assess spillover risks and cross-border effects. Feedback loops and interactions between the financial, real and operational channels may amplify the initial impact of geopolitical shocks, especially if they interact with vulnerabilities in the financial system.

**In addition to broader market dynamics, geopolitical risks generate specific vulnerabilities for financial institutions.** Rising default rates and falling asset prices increase credit and market risk, while funding stress and margin calls heighten liquidity risk. Cyberattacks and operational disruptions further amplify operational risk. The transmission of these risks may be intensified by financial contagion, inadequate policy responses and structural fragilities, such as high leverage or concentrated exposures.

**The risks to financial institutions in combination with amplifying factors could culminate in systemic risks that pose a threat to financial stability.** Financial distress can spread across institutions and markets, leading to severe disruptions and a loss of confidence in the financial system. Financial institutions may struggle to perform their intermediary functions effectively and face threats to their business model, with an adverse impact on the provision of credit and financial services to the real economy. Persistent financial stress can further delay recovery and erode trust in the financial system, leading to bank runs, capital flight and further instability that may ultimately require the intervention of public authorities.

# 3 Assessing geopolitical risks to EU countries

## 3.1 Classification of geopolitical risk indicators

**Monitoring and analysing geopolitical risks requires a coherent set of indicators that are both conceptually meaningful and empirically relevant.** The selection presented in this section is designed to obtain a broad view of geopolitical risks and their interaction with macro-financial and structural vulnerabilities in EU Member States. The selection of indicators ensures broad thematic coverage and combines well-established measures with more novel proxies, including high-frequency market-based signals and slower-moving structural variables, to track sudden developments as well as persistent trends.

**The indicator set covers all the categories in the framework set out in Section 2 and adds a general risks category.** The wide-ranging set of indicators captures geopolitical risks in each of the framework's topical categories and also includes a category covering general risks that groups together broad, global measures capturing uncertainty and volatility. The full classification therefore consists of six categories: (i) general; (ii) military conflicts and wars; (iii) infrastructure; (iv) trade; (v) capital and finance; and (vi) politics and society.

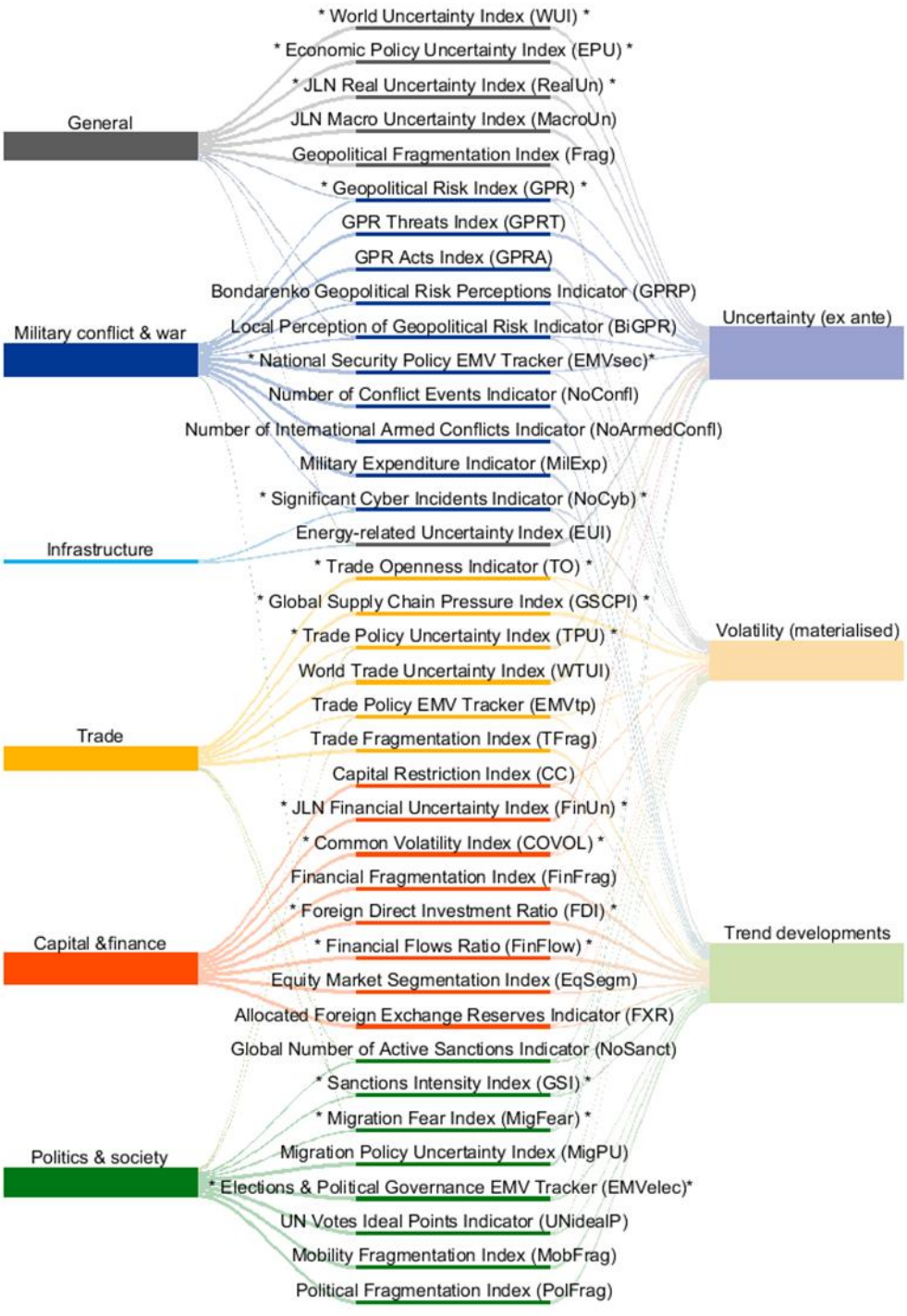
**In addition to thematic grouping, the indicators are also classified by the nature of the signal they provide.** Building on the definitions given in Section 2, each indicator was assigned to uncertainty, volatility or trend. Uncertainty measures capture ex ante risk perceptions, typically reflecting changes in sentiment before shocks materialise, but may themselves have economic and financial effects (Sections 4 and 5). Volatility indicators represent the realised impact of events, often visible in financial market data or other high-frequency datasets. Trend indicators capture slow-moving or structural shifts, such as long-term changes in trade openness, fragmentation or defence spending. **Figure 3** provides a visual representation of this classification that links the six thematic categories (shown on the left of the chart) to the individual indicators (shown in the centre of the chart) and to the three signal types (shown on the right of the chart). This mapping shows how certain indicators fit into multiple categories or combine multiple signal properties.

**The indicators selected cover a diverse range of sources and methodologies, which is critical for interpreting their behaviour.** The set of indicators covers long time periods – for some indicators, starting in the 1960s. It comprises 17 news-based indices, 12 model-based measures, three composite indicators, six indicators from official statistics and four events-based measures (**Table 1**). *News-based indices*, such as the Geopolitical Risk (GPR) Index, the Economic Policy Uncertainty (EPU) Index, the World Trade Uncertainty Index (WTUI) and the Sanctions Intensity Index (GSI), rely on media coverage and therefore measure geopolitical events indirectly, based on the focus of the selected media source. *Model-based measures*, including

the Jurado, Ludvigson and Ng (JLN) Macroeconomic Uncertainty indices – Real Uncertainty (RealUn), Macro Uncertainty (MacroUn), Financial Uncertainty (FinUn) – and the Common Volatility (COVOL) are derived from model-based estimation and capture underlying risk dynamics across different frequencies. *Composite indicators*, such as the Global Supply Chain Pressure Index (GSCPI), combine multiple inputs into a single measure, providing a broader perspective on risk conditions. *Indicators from official statistics*, such as the Military Expenditure, Trade Openness (TO) and the Allocated Foreign Exchange Reserves (FXR) Indicators, offer slow-moving structural information anchored in official, internationally comparable data (see also Box C). The *events-based* category includes the Number of Conflict Events (NoConfl) Indicator, the Number of International Armed Conflicts (NoArmedConfl) Indicator and the Global Number of Active Sanctions (NoSanct) Indicator, which directly record the occurrence of specific geopolitical events or measures. Recognising these distinctions is essential for interpretation and relevance when integrating such indicators into monitoring tools and empirical models. Beyond the individual indicators, it may be necessary to explicitly account for the exposure to the risks, relevant in e.g. the transmission channel through cross-border financial positions, discussed in more detail in Box A.1 in the Annex.

**Figure 3**

Categorisation of geopolitical risk indicators for the EU geopolitical risks analysis framework




Source: ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.
Notes: GPR stands for geopolitical risk and EMV for equity market volatility. The categories on the left follow those of the framework used in this report (Section 2) To reflect the different types of uncertainty and volatility, the indicators are grouped into the following categories: uncertainty (ex ante), volatility (materialised) and trend development. Indicators between stars (* … *) are those included in the geopolitical indicators heatmap, while the remainder serve for more targeted analytical purposes, such as trend detection or robustness checks.

**Table 1**

Indicators of geopolitical risk and fragmentation for the EU geopolitical risks analysis framework

| | Indicator | Short | Uncertainty/ Volatility | Trend | Source/ Authors | Frequency | Type | Use in empirical analysis |
|---|---|---|---|---|---|---|---|---|
| **General** | | | | | | | | |
| 1 | World Uncertainty Index | WUI | ✓ | | Ahir, Bloom & Furceri (2018) | Quarterly | News-based | ✓ |
| 2 | Economic Policy Uncertainty Index | EPU | ✓ | | Baker, Bloom & Davis (2016) | Monthly | News-based | ✓ |
| 3 | JLN Real Uncertainty Index | RealUn | ✓ | | Ludvigson, Ma, Ng (2021) | Monthly | Model-based | |
| 4 | JLN Macro Uncertainty Index | MacroUn | ✓ | | Jurado, Ludvigson & Ng (2015) | Monthly | Model-based | |
| 5 | Geopolitical Fragmentation Index & country bloc subindexes | Frag | | ✓ | Fernández-Villaverde et al (2024) | Quarterly | Model-based | ✓ |
| **Military** | | | | | | | | |
| 6 | Geopolitical Risk Index | GPR | ✓ | | Caldara & Iacoviello (2022) | Monthly | News-based | ✓ |
| 7 | GPR Threats Index | GPRT | ✓ | | Caldara & Iacoviello (2022) | Monthly | News-based | ✓ |
| 8 | GPR Acts Index | GPRA | ✓ | | Caldara & Iacoviello (2022) | Monthly | News-based | ✓ |
| 9 | Bondarenko Geopolitical Risk Perceptions Indicator | GPRP | ✓ | | Bondarenko et al. (2024) | Monthly | News-based | ✓ |
| 10 | Bilateral Indicator of Local Perception of Geopolitical Risk Indicator & by source country or country groups | BiGPR | ✓ | | Alonso-Alvarez et al. (2025) | Monthly | News-based | |
| 11 | National Security Policy EMV Tracker | EMVsec | ✓ | | Baker et al. (2019) | Monthly | News-based | |
| 12 | Number of Conflict Events Indicator | NoConfl | | ✓ | UCDP/GED | Monthly | Events-based | |
| 13 | Number of International Armed Conflicts Indicator | NoArmedConfl | | ✓ | UCDP/PRIO Armed Conflict Dataset | Monthly | Events-based | |
| 14 | Military Expenditure Indicator | MilExp | | ✓ | World Bank Group | Annual | Official statistics | |
| **Infrastructure** | | | | | | | | |
| 15 | Significant Cyber Incidents Indicator | NoCyb | | ✓ | CSIS | Quarterly | Official statistics | |
| 16 | Energy-related Uncertainty Index | EUI | ✓ | | Dang et al. (2023) | Monthly | News-based | |
| **Trade** | | | | | | | | |
| 17 | Trade Openness Indicator | TO | ✓ | ✓ | ECB data portal, MNA Database | Quarterly | Official statistics | ✓ |
| 18 | Global Supply Chain Pressure Index | GSCPI | ✓ | | Federal Reserve Bank of New York | Monthly | Composite | ✓ |
| 19 | Trade Policy Uncertainty Index | TPU | ✓ | | Caldara et al. (2019) | Monthly | News-based | ✓ |
| 20 | World Trade Uncertainty Index | WTUI | ✓ | | Ahir, Bloom & Furceri (2019) | Quarterly | News-based | |
| 21 | Trade Policy EMV Tracker | EMVtp | ✓ | | Baker et al. (2019) | Monthly | News-based | ✓ |
| 22 | Trade Fragmentation Index | TFrag | | ✓ | Fernández-Villaverde et al (2024) | Quarterly | Model-based | |

| | Indicator | Short | Uncertainty/ Volatility | Trend | Source/ Authors | Frequency | Type | Use in empirical analysis |
|---|---|---|---|---|---|---|---|---|
| **Capital & Finance** | | | | | | | | |
| 23 | Capital Restriction Index | CC | | ✓ | Fernandez et al. (2015) | Annual | Official statistics | |
| 24 | JLN Financial Uncertainty Index | FinUn | ✓ | | Jurado, Ludvigson & Ng (2015) | Monthly | Model-based | ✓ |
| 25 | Common Volatility Index | COVOL | ✓ | | Engle & Campos-Martins (2023) | Daily | Model-based | ✓ |
| 26 | Financial Fragmentation Index | FinFrag | | ✓ | Fernández-Villaverde et al (2024) | Quarterly | Model-based | |
| 27 | Foreign Direct Investment Ratio | FDI | | ✓ | IMF BoP database, ECB data portal | Quarterly | Official statistics | |
| 28 | Financial Flows Ratio | FinFlow | | ✓ | IMF BoP database, ECB data portal | Quarterly | Official statistics | |
| 29 | Equity Market Segmentation Index | EqSegm | | ✓ | Bekaert et al. (2011) | Quarterly | Official statistics | |
| 30 | Allocated Foreign Exchange Reserves Indicator | FXR | | ✓ | IMF COFER Database | Quarterly | Official statistics | |
| **Politics & Societal** | | | | | | | | |
| 31 | Global Number of Active Sanctions Indicator | NoSanct | | ✓ | Global Sanctions Database (GSDB), Felbermayr et al. (2020) | Annual | Events-based | |
| 32 | Sanctions Intensity Index | GSI | ✓ | | Bondarenko et al. (2024) | Monthly | News-based | |
| 33 | Migration Fear Index | MigFear | ✓ | | Baker, Bloom & Davis (2016) | Quarterly | News-based | ✓ |
| 34 | Migration Policy Uncertainty Index | MigPU | ✓ | | Baker, Bloom & Davis (2016) | Quarterly | News-based | ✓ |
| 35 | Elections & Political Governance EMV Tracker | EMVelec | ✓ | | Baker et al. (2019) | Monthly | News-based | |
| 36 | UN Votes Ideal Points Indicator | UNidealP | | ✓ | Bailey, Strezhnev & Voeten (2017) | Annual | Model-based | |
| 37 | Mobility Fragmentation Index | MobFrag | | ✓ | Fernández-Villaverde et al (2024) | Quarterly | Model-based | ✓ |
| 38 | Political Fragmentation Index | PolFrag | | ✓ | Fernández-Villaverde et al (2024) | Quarterly | Model-based | ✓ |

Source: ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.
Note: EMV stands for equity market volatility.

**In addition to the geopolitical risk indicators described above, the dataset includes country-level and EU or euro area-level indicators that capture vulnerabilities, systemic financial stress and the degree of market integration.** These indicators are not themselves measures of geopolitical risk, but rather financial sector measures of transmission or outcome and can be viewed as response indicators for the purposes of econometric analysis **(Table 2)**. They allow to assess how geopolitical shocks propagate through domestic financial systems, interact with macro-financial conditions and influence the degree of EU financial integration. The indicators include composite indices of domestic financial conditions, such as the ECB's Systemic Risk Indicator (SRI) and Financial Cycle (FinC) Indicator. Volatility proxies, such as the ECB's Country-Level Financial Stress (CLIFS) Index and Composite Indicator of Systemic Stress (CISS), complement the structural measures by capturing short-term changes in financial markets. Finally, the ECB's price-based and quantity-based financial integration indices provide a structural perspective on capital market integration within the euro area.

**Table 2**

Overview of EU domestic trend and volatility indicators

| | Indicator | Abbreviation | Uncertainty/ Volatility | Trend/ Risk level | Source/ Authors | Frequency | Type | Use in empirical analysis |
|---|---|---|---|---|---|---|---|---|
| i | Common Composite Indicator | CCI | | ✓ | Constructed by authors; SRI-based | Quarterly | Composite | ✓ |
| ii | Systemic Risk Indicator | SRI | | ✓ | Lang, Izzo, Fahr, Ruzicka (2019) | Quarterly | Composite | ✓ |
| iii | Financial Cycle Indicator | FinC | | ✓ | Schüler, Hiebert, Peltonen (2020) | Quarterly | Composite | |
| iv | Country-Level Financial Stress Index | CLIFS | ✓ | | Hollo et al. (2012) | Monthly | Composite | ✓ |
| v | Composite Indicator of Systemic Stress | CISS | ✓ | | Hollo, Kremer & Lo Duca (2012) | Weekly | Composite | ✓ |
| vi | CBOE Volatility Index | VIX | ✓ | | CBOE | Daily | Model-based | |
| vii | Euro Stoxx 50 Volatility Index | VSTOXX | ✓ | | STOXX | Daily | Model-based | ✓ |
| viii | Equity Market Volatility Index | EMV | ✓ | | Baker, Bloom & Davis (2019) | Monthly | News-based | ✓ |
| ix | Price-based Financial Integration Indicator | PriceFinInt | | ✓ | Hoffmann, Kremer, Zaharia (2019) | Quarterly | Composite | ✓ |
| x | Quantity-based Financial Integration Indicator | QuantFinInt | | ✓ | Hoffmann, Kremer, Zaharia (2019) | Quarterly | Composite | ✓ |

# Box 1

## Geopolitical risk: from US-centric indices to euro area tools

**Geopolitical risks have grown more prominent in recent years, as highlighted by the war in Ukraine and the ongoing conflict in the Middle East. Measuring such risks is crucial for understanding their macroeconomic and financial impact.** Several approaches to the quantification of geopolitical risk have emerged that use news-based indicators. This box compares three prominent indicators: the Geopolitical Risk (GPR) Index (Caldara and Iacoviello, 2022), the Euro Area-specific Geopolitical Risk (EA GPR) Index (Bondarenko et al., 2025) and the local perception of Geopolitical Risk, based on the bilateral Geopolitical Risk (BiGPR) Index approach focusing on local perception of geopolitical risk (Alonso-Alvarez et al., 2025).

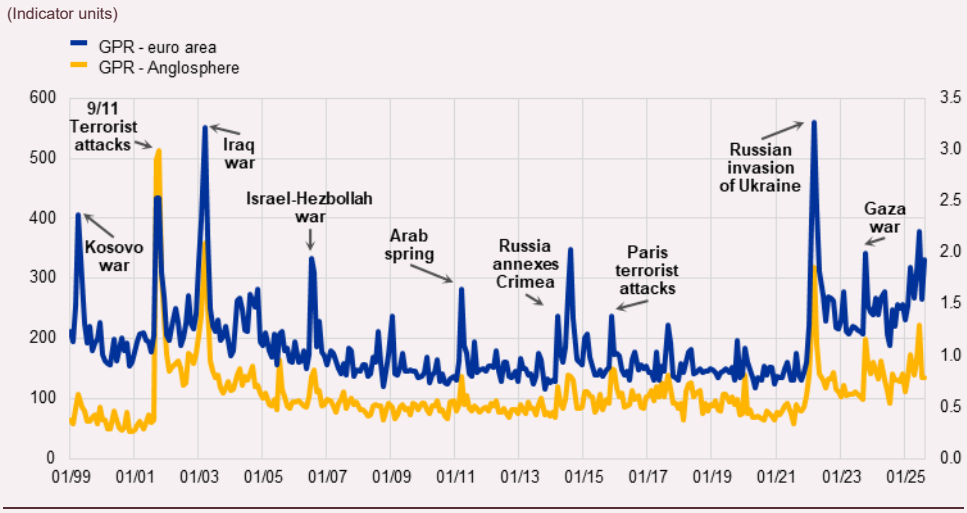
**The GPR Index reflects a US-centric Anglosphere perspective, limiting its applicability to euro area analyses.** The index uses keyword searches for terms such as war, terrorism or geopolitical tensions in newspapers from the United States, Canada and the United Kingdom. The authors developed both the GPR Index and country-specific geopolitical risk indices. The latter, however, still reflect risk as perceived through the lens of Anglosphere media. As a result, these indices are less suitable for euro area-focused analyses.

**To address the limitation arising from the US-centric indicators, a monthly EA GPR Index was constructed in Bondarenko et al. (2025).** It is based on local newspapers from five EU countries: Germany, France, Italy, Spain and the Netherlands. The Index uses country-specific keyword sets in local languages and was adapted from the original GPR phrase and is GDP-weighted.

**The EA GPR Index captures regional risk perceptions more effectively than the original (GPR) Anglosphere index.** A comparison the two indices reveals similar spikes during major global events (e.g. following the 9/11 terrorist attacks and during the Iraq War), but the EA GPR Index reacts more strongly to regionally proximate shocks, such as the Russian invasion of Ukraine and the 2023 Gaza conflict (**Chart A**). Importantly, the EA GPR Index has remained high since 2022, while the Anglosphere GPR Index has returned to lower levels. This suggests regional divergence in risk perception, likely to be driven by the proximity of the Russian-Ukraine conflict. Moreover, empirical evidence suggests that euro area geopolitical risk shocks affect euro area inflation, whereas Anglosphere geopolitical risk shocks have less impact (although this is not shown here).

**Chart A**

Geopolitical risk indices




Source: Bondarenko Y., V. Lewis, M. Rottner and Y. Schüler (2025).
Notes: GPR stands for geopolitical risk. The Euro Area GPR Index is based on the index developed in Bondarenko et al. (2024). GPR Anglosphere relates to the standard index developed in Caldara and Iacoviello (2022).

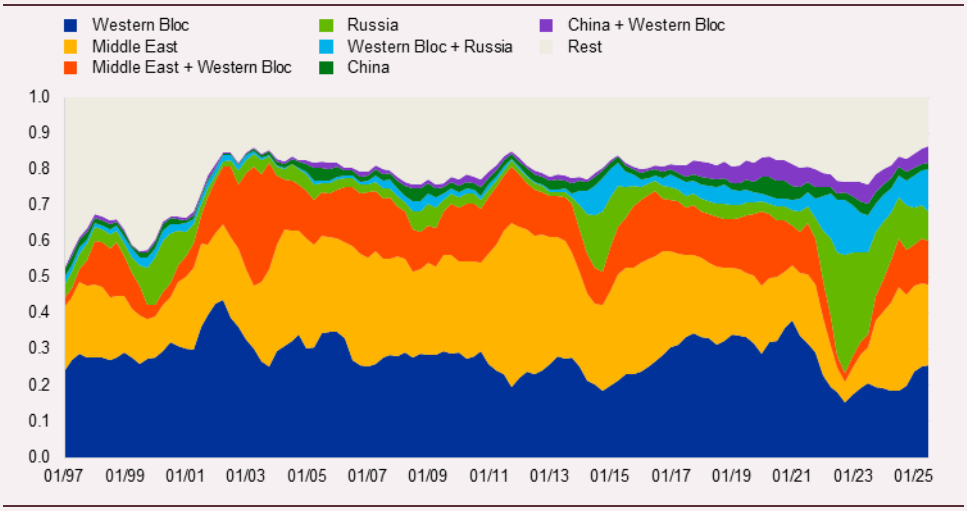
**Another novel extension is the Bilateral Geopolitical Risk (BiGPR) Index proposed in Alonso-Alvarez et al. (2025).** It considers the local, country-level perspective, but allows for directionality, with indices that measure how a specific country perceives the risk associated with another country or region. This directionality is crucial, given that the structural vector autoregression (SVAR) model applied by the authors confirms that geopolitical shocks originating from different regions tend to have different effects on different domestic economies.

**The bilateral framework can also be used to break down the geopolitical risk perceived by an individual country into its components.** The national geopolitical risk profile for the EU set out below (**Chart B**) shows that developments involving the

EU's geopolitical partners (the western bloc) consistently account for the largest share of EU geopolitical risk. The Middle East constitutes the second most important component; this was especially true in 2011 with the Arab Spring. The breakdown also highlights the importance of Russia's actions for the wider geopolitical arena: while the direct Russia component peaks during major events, such as the 2014 Crimea crisis and the 2022 invasion of Ukraine, its broader implications are reflected in the substantial directional Russia-western bloc share of euro area geopolitical risk.

**Chart B**

National geopolitical risk profile for the EU




Note: The chart shows the top non-overlapping components of the external part of local geopolitical risk (computed for Germany, Spain, France and Italy and weighted by GDP for 2023, with a one-year rolling average).

This decomposition reflects how the press attention to external geopolitical risk is allocation across the different regions. Russia´s share surged in 2022 when about a third of all external GPR references focused on the region, but has since then fallen to roughly 8%. This decline primarily reflects media fatigue, a decrease in the marginal value of news once the conflict becomes a persistent drop, even though the underlying tensions may remain high. On the other hand, the consistently large western-bloc component captures reporting on how the allied countries interpret and coordinate their responses to geopolitical events, rather than the perception that these allies are themselves a source of risk.

## 3.2 Selection of informative indicators

**A structured process guided the selection of the most informative indicators.** The initial set of indicators covers a broad spectrum of geopolitical risks and uncertainty, but many series are highly correlated or measure similar dynamics using alternative data sources or methods. To reduce redundancy and focus on those with the strongest analytical value, three main selection criteria are applied: (i) statistical: frequent selection or strong loading across multiple statistical methods; (ii) topical: clear alignment with relevant geopolitical risk categories and transmission channels;

and (iii) operational: practical attributes, such as timeliness, length of time series, consistent cross-country coverage and ease of interpretation.

**Multiple statistical and econometric methods supported the identification of core indicators.** The process has similarities to the analysis in Hodula et al. (2024) and combines correlation analysis, Granger causality tests with macro-financial variables, principal component analysis (PCA), hierarchical clustering and least absolute shrinkage and selection operator (LASSO)-based variable selection in a GaR framework.[4] Each method provides a different perspective for identifying related indicators and highlights those with greatest empirical relevance for assessing geopolitical risk. The full diagnostics, robustness checks and methodological details are provided in The Annex.

**Building on the empirical screening and diagnostic work, it is possible to identify the indicators to be retained for more detailed analysis.** The indicators selected are described in **Box B** and are considered to be the most informative for capturing the different dimensions of geopolitical risk and fragmentation. They are used to populate the geopolitical indicators heatmap referred to in Section 1.3 and as inputs into the GaR time series and quantile vector autoregression (QVAR) estimations (Section 4).

## Box 2
## Recommended indicators for geopolitical risks analysis

**The indicator shortlist balances high-frequency and structural measures across signal types.**[5] Most of the indicators selected capture uncertainty or volatility at daily, monthly or quarterly frequency, while a smaller set reflects slow-moving structural trends at lower frequency. The balance achieved also ensures representation across categories. The diversity of the indicators selected supports a comprehensive assessment of both immediate shocks and persistent vulnerabilities.

**General geopolitical uncertainty indicators –** The *Economic Policy Uncertainty (EPU) Index*[6] is based on the frequency of policy-related uncertainty terms in newspapers. In GaR applications, the global EPU Index shows a predictive value at short horizons of up to one year, particularly for large EU economies. The *JLN Real Uncertainty (RealUn) Index* is a model-based measure capturing broad-based uncertainty in real time series. While statistically demanding to construct, it provides useful short-term signals for tail-risk assessment in macro-financial conditions.

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4 *Correlation analysis* identifies potential redundancy between series. *Granger causality* tests detect predictive links with GDP and financial stress. *PCA* reduces dimensionality by extracting uncorrelated components. *Hierarchical clustering* groups indicators with similar dynamics, and *LASSO-based variable selection* identifies those groups with the strongest predictive power while penalising overfitting.

5 The indicators selected are shown between asterisks in Chart 1 in the main text of this report.

6 The sources of the indicators can be found in Table 1 in the main text of this report.

Additionally, the *World Uncertainty Index (WUI)* shows predictive strength at horizons of up to one year.

**Military conflict, war and infrastructure risk indicators –** The *Geopolitical Risk (GPR) Index* quantifies geopolitical tensions, representing uncertainty signals with broad application in empirical studies. However, it does not show high predictive power for economic activity, possibly because its data origins lie in the Anglo-Saxon news sources (see Box A for a discussion). In contrast, the *Local Perception of Geopolitical Risk (BiGPR) Indicator* is a news-based index using local-language media to measure how geopolitical events and tensions are perceived domestically. Its predictive strength is most evident at horizons of one year and longer in the pre-COVID sample, with some importance for shorter horizons. The *National Security Policy Equity Market Volatility (EMVsec) Tracker* is a subcomponent of the Equity Market Volatility Tracker and is based on news articles about national security issues, identified through correlations with market volatility measures. It shows more relevance at one-year horizons than in the short term. The *Significant Cyber Incidents (NoCyb)* Indicator is representative of cyber-related geopolitical risks. Although its empirical use is limited owing to its short time series, it captures an increasingly important dimension of modern conflicts.

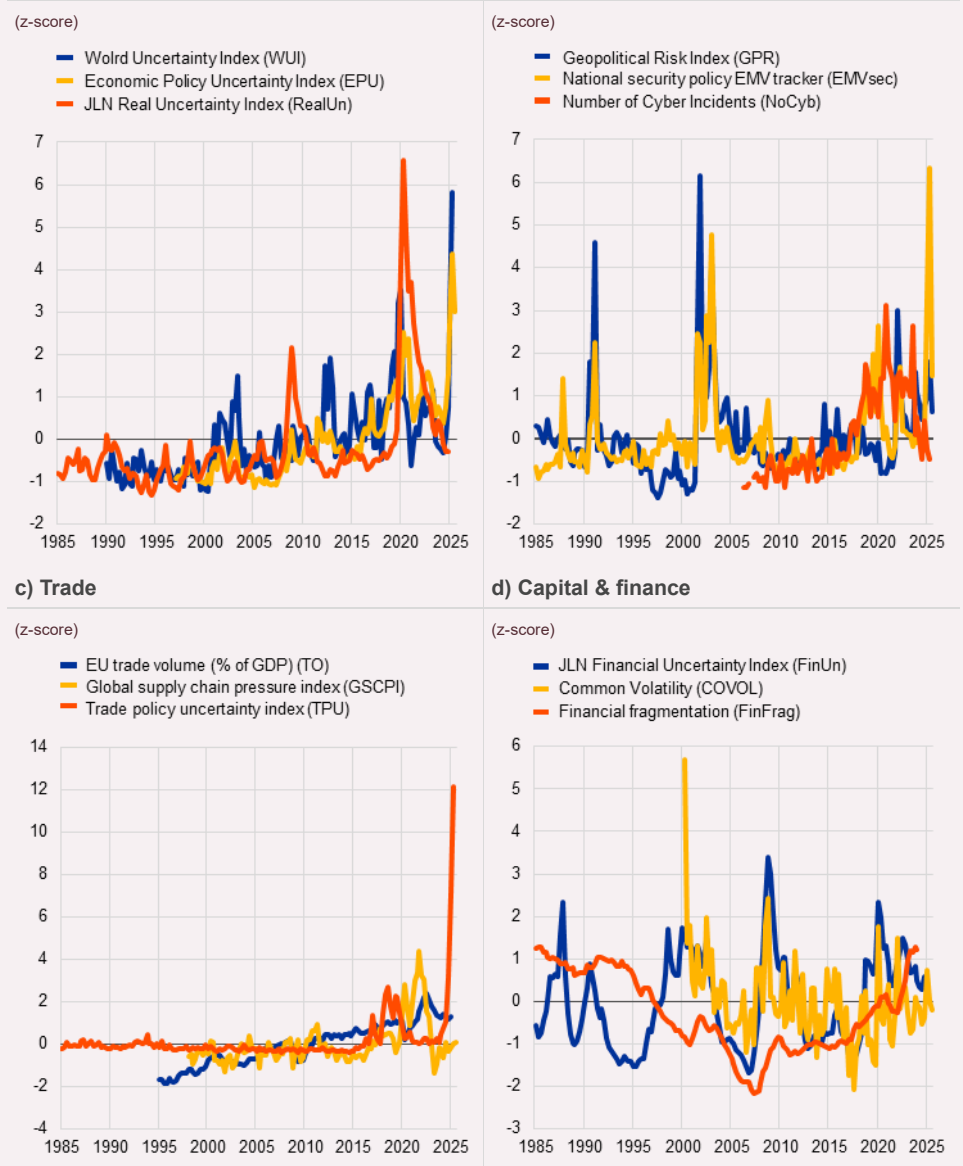
**Trade-related uncertainty and disruption indicators –** The *Trade Policy Uncertainty (TPU) Index* measures the share of newspaper articles linking trade policy with terms reflecting uncertainty and is a strong predictor at the one-year horizon. The *Global Supply Chain Pressure Index (GSCPI)*, a composite measure of the transport costs and supply chain components of the Purchasing Managers' Index (PMI) showed predictive relevance only when the COVID-19 period was excluded from the estimation sample. The *Trade Openness* (TO) *Indicator* is a widely used official statistics measure that reflects both the vulnerabilities of countries to geopolitical events and the reactions to these events.

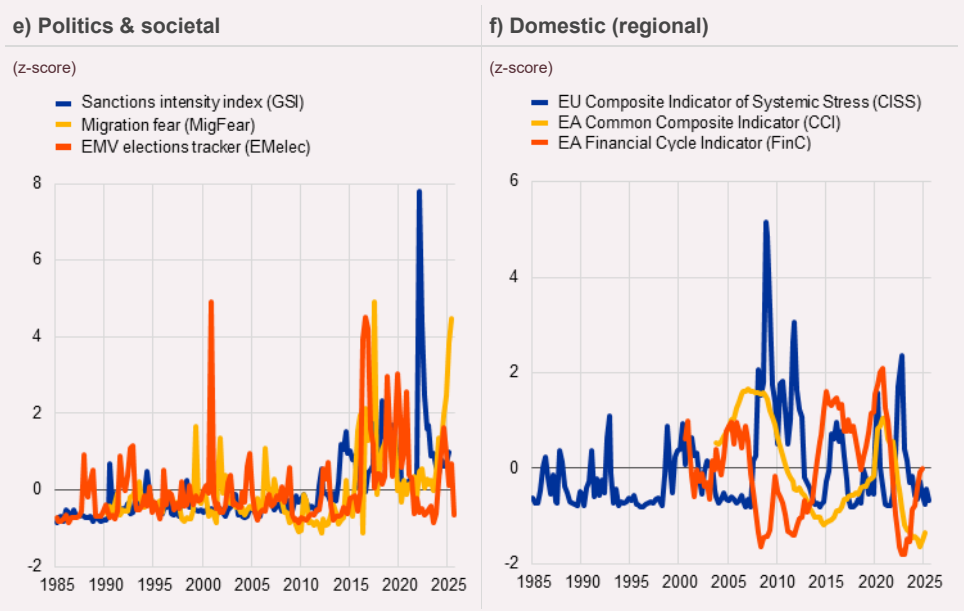
**Capital and financial market uncertainty indicators –** The *JLN Financial Uncertainty (FinUn) Index* is a model-based measure of forward-looking uncertainty in financial series, with predictive value at horizons of up to one year. The *Common Volatility (COVOL) Index*, derived from a factor model of volatility across asset classes, has weaker but still notable relevance at quarterly horizons, reflecting its sensitivity to abrupt global risk repricing. The first-quarter differences in the *Financial Fragmentation (FinFrag) Index* showed some predictive strength at the one-year horizon.

**Politics & societal indicators –** The *Migration Fear (MigFear) Index* is a news-based measure of public concern over immigration, with predictive relevance up to eight quarters ahead. The news-based *Sanctions Intensity Index* (GSI) provides signals over the same horizon. Additionally, the *Elections and Political Governance EMV Tracker (EMVelec)* shows predictive strength up to one year ahead.

**Chart A**

Main indicators used in the EU geopolitical risks analysis framework by category






Source: The sources corresponding to each indicator are given in Table 1 of the main text of this report.
Notes: EMV stands for equity market volatility. The charts represent the z-scores of the indicators concerned.

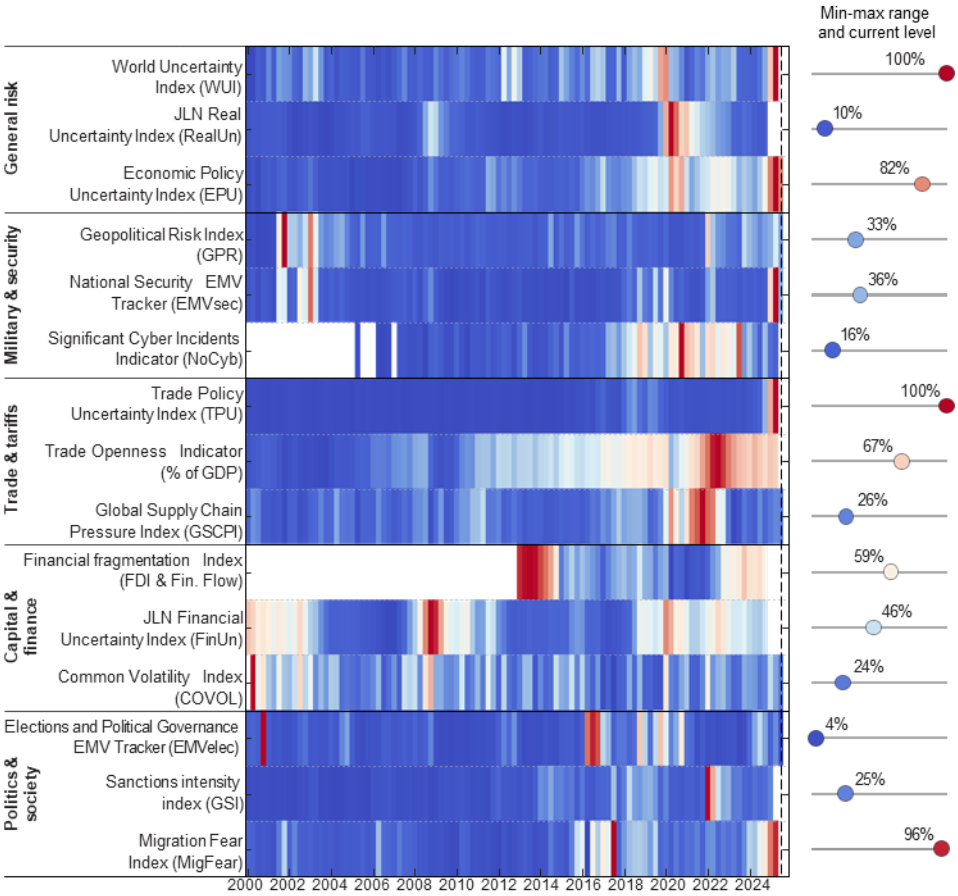
## 3.3 Current state of geopolitical risks

**The indicators selected serve to provide an initial assessment of the current state of the geopolitical risks to which EU Member States are exposed.** The assessment is conducted using the set of indicators selected and visual tools to compare the latest developments with earlier geopolitical episodes or with specific historical events.

**The combination of indicators in a heatmap reveals a gradual intensification of geoeconomic fragmentation since the global financial crisis and a surge in policy uncertainty measures during 2024 and 2025. (Figure 4).** Organised by risk category, the heatmap facilitates comparative monitoring across the selected indicators, helping identify elevated risks and thematic clusters across time. It allows users to detect concentration of risks, shocks, emerging trends and persistent structural vulnerabilities, depending on the profile of each indicator. Only indicators with sufficient data coverage and empirical relevance – as identified in Sections 3.2 and Box B – are retained in the heatmap. The heatmap reveals a significant intensification of geopolitical risks over the last decade, whereby measures of policy uncertainty have especially surged during 2024 and 2025, driven primarily by a sharp increase in global economic and trade policy uncertainty.

**Figure 4**

Heatmap of geopolitical indicators for EU geopolitical risks analysis by framework category

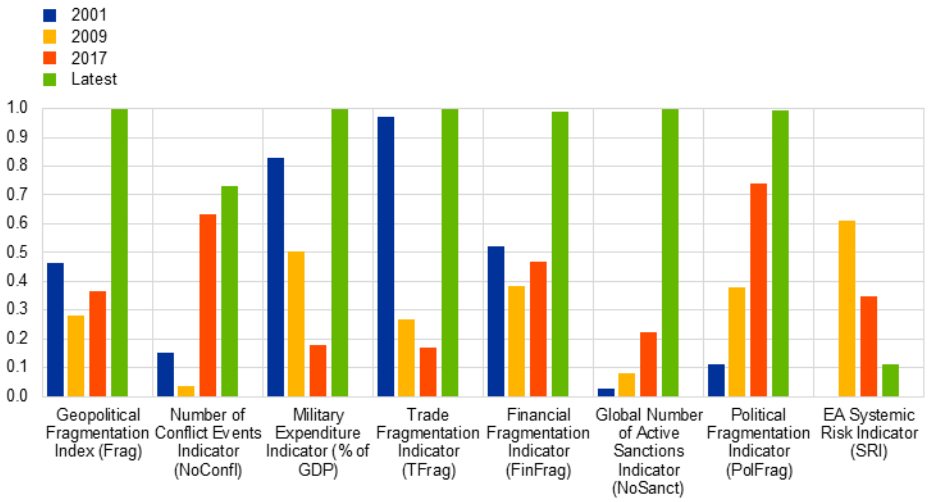



Source: The sources corresponding to each indicator are given in Table 1.
Notes: EMV stands for equity market volatility. The indicators are normalised to a range [0;1]. The indicators displayed in the heatmap are chosen for their statistical properties, timeliness, and global scope. The colour shading reflects their intensity, based on normalised values. Instead of the Financial Fragmentation (FinFrag) common factor, the heatmap reports the average of its main (standardised) components, the Foreign Direct Investment (FDI) Ratio and the Financial Flow Ratio. The Bilateral Indicator of Local Perception of Geopolitical Risk (BiGPR) is not included, given that it captures country-specific perceptions rather than regional or global risks but is retained in the recommended indicators owing to its empirical relevance. The indicators are winsorised (1-99 percentiles) to avoid distortions induced by extreme outliers. The latest observations are for the second quarter of 2025 (dashed line on the right-hand side).

**While the geopolitical indicators heatmap captures only a limited subset of long-term trend indicators, a broader set is shown in Chart 1.** Political fragmentation, for example, was already evident in the early 2000s following the terrorist attacks in the United States and the subsequent global war on terror. The global financial crisis of 2008 marked a turning point, with a reversal of globalisation processes and a sustained rise in a range of indicators, reflecting financial and mobility fragmentation, sanctions intensity, armed conflict and global economic policy uncertainty. Some of the geopolitical fragmentation pressures accelerated further with the escalation of trade tensions between the United States and China in 2017. By 2025, many trend indicators stand at or near their historical peaks of the last three to five decades, although the domestic SRI contrasts with this picture by pointing to a decline in financial imbalances.

**Chart 1**

Changes in the geopolitical trend indicators selected for the EU geopolitical risks analysis framework



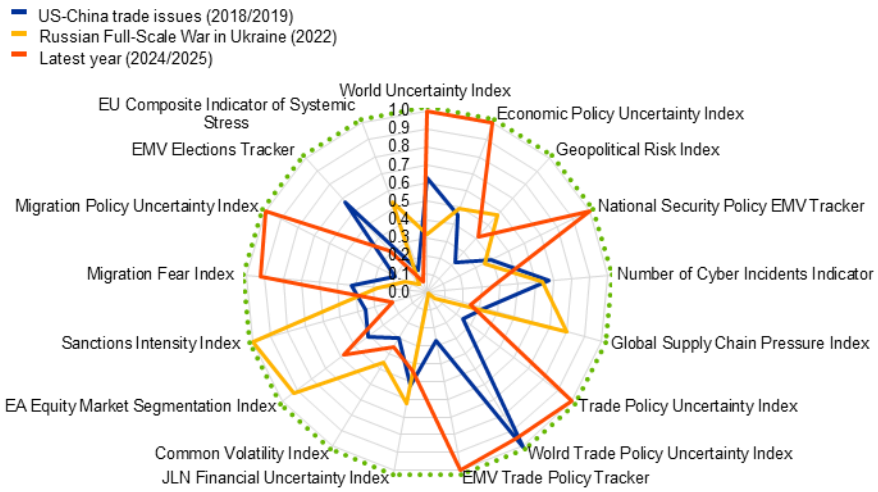

Source: The sources corresponding to each indicator are given in Table 1.
Notes: Indicator values are normalised to a range [0; 1] based on the values from 2000 to the latest available data. The chart shows annual or fourth quarter values for the year concerned.

**In contrast to the fragmentation trend indicators, volatility and uncertainty indicators make it possible to clearly identify the various events that have shaped the pace and direction of geopolitical trends.** Abrupt and widespread economic shocks, such as the 2008 global financial crisis or the pandemic in 2020, are clearly identified by the more general indicators, such as the financial and macroeconomic uncertainty indices or the Common Volatility (COVOL) Index. Outbreaks of major armed conflicts, by contrast, are better identified by spikes in the GPR indicators or in the National Security Policy EMVsec Tracker, corresponding to the Gulf War in 1991, the 9/11 terrorist attacks, the Iraq War in 2003 and the Russian invasion of Ukraine in 2022. this invasion is still ongoing, as are Israel's conflicts with Hamas and Iran, the GPR Index has remained high (close to the 90th percentile of the historical distribution).

**More recently, indicators of global uncertainty, especially those capturing trade uncertainty, have spiked, driven by the significant shifts in US foreign and domestic policies and their potential implications for the international economic and financial system. Chart 2** illustrates how different indicators have reacted to major geopolitical developments in recent years, highlighting those that registered pronounced spikes during key events. From the second quarter of 2025 (the end of the sample period), most of these indicators were at or near multi-decade highs. At the same time, the Financial Uncertainty (FinUn) Indicator stood close to the 70th percentile of the historical distribution, suggesting that the heightened uncertainty was also weighing on the predictability of financial market developments. By contrast, the Real Economic Uncertainty (RealUn) Index and Asset Price Volatility Index, appear to be unaffected as yet by recent geopolitical events, both indices remaining below their historical medians.

**Chart 2**

Response to significant events of the geopolitical risk indicators for the EU geopolitical risks analysis framework




Source: The sources corresponding to each indicator are given in Table 1.
Notes: The indicator values are normalised to a range [0; 1] based on the values from 2000 to the latest available data. The chart shows the maximum value of a given indicator in the particular event window.

**Overall, the indicators point to a two-stage dynamic in globalisation and fragmentation, represented by elevated geopolitical and policy uncertainty but more contained volatility.** The post-Cold War decades were marked by strong global integration, with rapid growth in trade openness and cross-border investment. Since the 2008 global financial crisis, however, this process has slowed, and in some areas reversed, giving way to renewed fragmentation reinforced by recent geopolitical and policy shocks. At the same time, uncertainty indicators have risen sharply across several domains, reaching historically high levels in recent years, while volatility measures have remained relatively subdued or have reverted quickly after short-lived spikes. This configuration has coincided with persistently high geopolitical risks, increasing the likelihood of tail-risk events materialising in the near term (Section 4.3). From a financial stability perspective, one mitigating factor is the fact that cyclical systemic risks in the EU remain relatively subdued, as reflected in the low readings of the financial cycle indicators in our dataset.

# 4 Transmission of geopolitical risk

**Geopolitical events vary significantly in their nature, magnitude and transmission channels, which means their effects on the economy and on financial stability are far from uniform.** Geopolitical risk propagates through familiar macro-financial channels – uncertainty, risk appetite and trade – but also has certain distinctive features, such as increased downside risks (especially tail risk), stronger fragmentation effects (sanctions, reshoring and supply chain reconfiguration) and heterogeneity across countries and sectors. Moreover, this specific type of risk can also act as an amplifier of pre-existing vulnerabilities, although the recent multitude of geopolitical events has not led to such amplification. This section analyses the impact of geopolitical shocks, measured by a range of selected indicators (Section 3), on the real economy and on the financial system. The transmission on inflation by Anttonen and Lehmus (2025) is covered in Annex and the remaining analysis uses macro-econometric models focused on the time dimension of the transmission mechanism. The findings combine results for the euro area and for individual EU Member States to document the heterogeneity not only in the different types of geopolitical shocks but also in cross-country responses.

## 4.1 Macro-financial transmission of geopolitical risk

**Beyond the effects on inflation, the global macro-financial repercussions of geopolitical shocks can be illustrated using a factor-augmented vector autoregressive (FAVAR) model.** A multi-country model, based on Metiu (2025), makes it possible to study geopolitical shock transmission by providing a data-rich environment. This enables detailed analysis of international transmission channels while accounting for cross-border linkages among major advanced economies. The framework can capture the interactions between the (GPR) Index and a number of unobserved factors estimated from a comprehensive panel data set for G7 and euro area countries.[7]

**Adverse geopolitical shocks propagate to the global economy through a financial transmission channel, particularly by raising uncertainty and risk aversion in global financial markets.** An adverse geopolitical shock – an unexpected increase in the GPR Index – results in a significant decrease in stock prices, an increase in equity market volatility and a widening of corporate credit spreads (**Chart 3**). Equity volatility returns to the pre-shock level relatively quickly, whereas the impact on stock prices is more persistent.

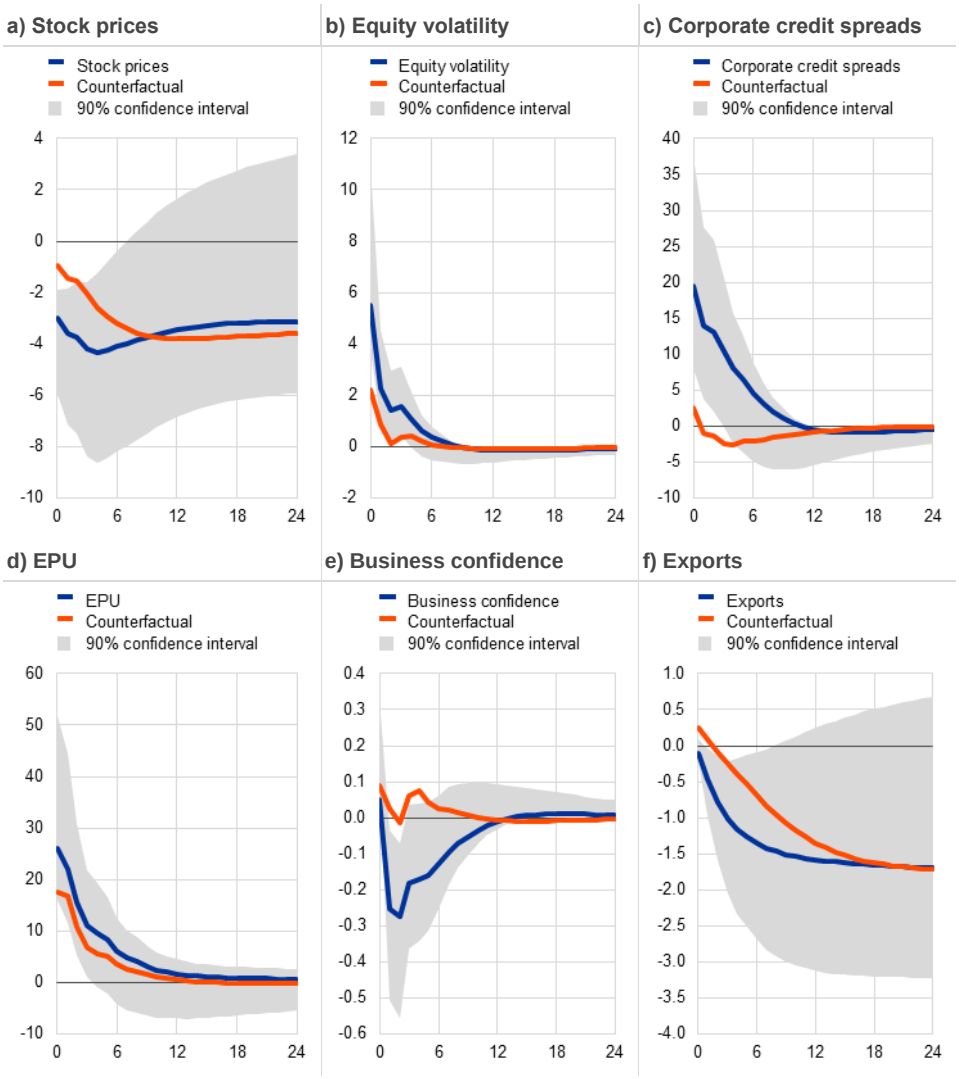
[7] Details to the model specification, the data and variable definitions can be found in Annex 2.

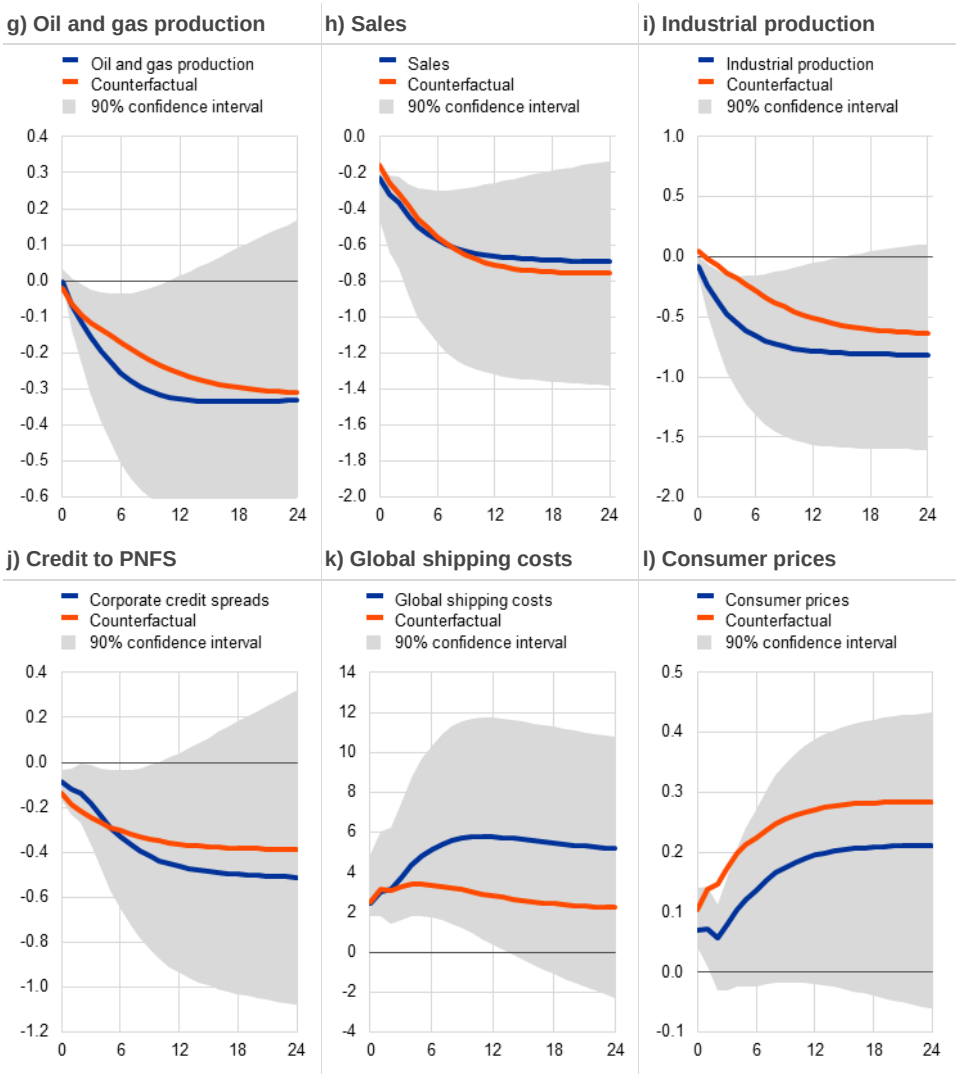
## Chart 3

International effects of an adverse geopolitical shock

**Impulse response functions after a shock increase in the Geopolitical Risk Index across the G7 and for selected EU Member States**

(measure)






Sources: Banque de France, Bloomberg Finance L.P., Federal Reserve Bank of St. Louis, United States Energy Information Administration, Caldara and Iacoviello (2022), Gilchrist and Zakrajsek (2012), the Economic Policy Uncertainty Index by Baker, Bloom and Davis (2016) and ESRB calculations.
Notes: EPU stands for Economic Policy Uncertainty Index and PNFS for private non-financial sector, The blue lines denote the impulse responses (GDP-weighted averages across the G7 and selected euro area countries including Austria, Belgium, Finland, Ireland, Netherlands, Portugal and Spain) with blue shaded 90% confidence intervals. The shock is scaled to generate an increase of 77.5 index points in the Standard Geopolitical Risk Index (GPR) on impact, consistent with the rise observed during the Russian invasion of Ukraine from January to February 2022. The red lines with circles show counterfactual impulse responses for a scenario in which the global financial factor does not react to the geopolitical risk shock. The sample that spans the period from January 1990 to November 2023.

**Macroeconomic channels also play an active role in the propagation of geopolitical shocks to the global economy.** Specifically, an unexpected increase in the GPR Index is followed by a significant increase in news-based measures of economic policy uncertainty and a decrease in survey-based measures of business confidence, weighing on the global economy from the demand side. Additionally, any such shock dampens exports and reduces global oil and natural gas production, reflecting weaker global demand. Taken together, these developments weigh on private consumption, as captured by retail sales, industrial output and credit to the private non-financial sector (PNFS). On the supply side, a sudden rise in geopolitical risk results in higher international shipping costs, supply chain reconfiguration and

sanctions on commodities; these can feed into higher consumer prices, increasing price volatility and creating inflationary pressures.[8]

**Disabling financial market responses weakens the macro-financial impact, underscoring the key role of financial markets in propagating geopolitical risk shocks.** A counterfactual experiment assesses the impact of a geopolitical risk shock while holding constant the endogenous movements in an unobserved global factor derived from financial volatilities and spreads.[9] Equity prices, volatilities, credit spreads, business confidence, exports, and production respond significantly less to geopolitical risk shocks when the global financial factor's endogenous reaction is suppressed, highlighting the amplifying effect of adverse financial market responses.

**Scenario analyses indicates that the euro area may face worsening macro-financial conditions from a variety of adverse geopolitical shocks.** The following scenario builds on a large-scale Bayesian vector autoregression (BVAR), similar in nature to the estimated global FAVAR, to analyse the impact and transmission of geopolitical shocks as observed during the Russian invasion of Ukraine.[10]

**Following an intensification of geopolitical tensions, such as the escalation of an armed conflict, the scenario analysis reveals adverse effects across financial and economic indicators (Chart 4).** Specifically, a generic conflict scenario characterized by heightened geopolitical risk is considered, drawing on the historical behaviour of the GPR and COVOL indices during the Russian invasion of Ukraine.[11] In such a scenario, equity and oil prices decline, while credit to non-financial corporates contract significantly. Short-term government bond yields decrease in response to the initial economic downturn. Notably, real GDP in the euro area is initially less affected than that of the United States, highlighting regional differences in the impact of such a scenario. However, the initial negative effect in real GDP in the United States is followed by a moderate upturn, while the euro area faces a decline towards the end of the forecast horizon. Risk indicators, including the VIX Index, the high-yield option-adjusted corporate bond spreads for the euro area and the CISS for the euro area, all rose markedly, signalling elevated financial stress (**Chart 4**).

8 Given the broad range of geopolitical events covered by the geopolitical risk index, demand-side and supply-side effects overlap in the model results. On balance, the model results suggest that inflationary effects more than offset deflationary effects.

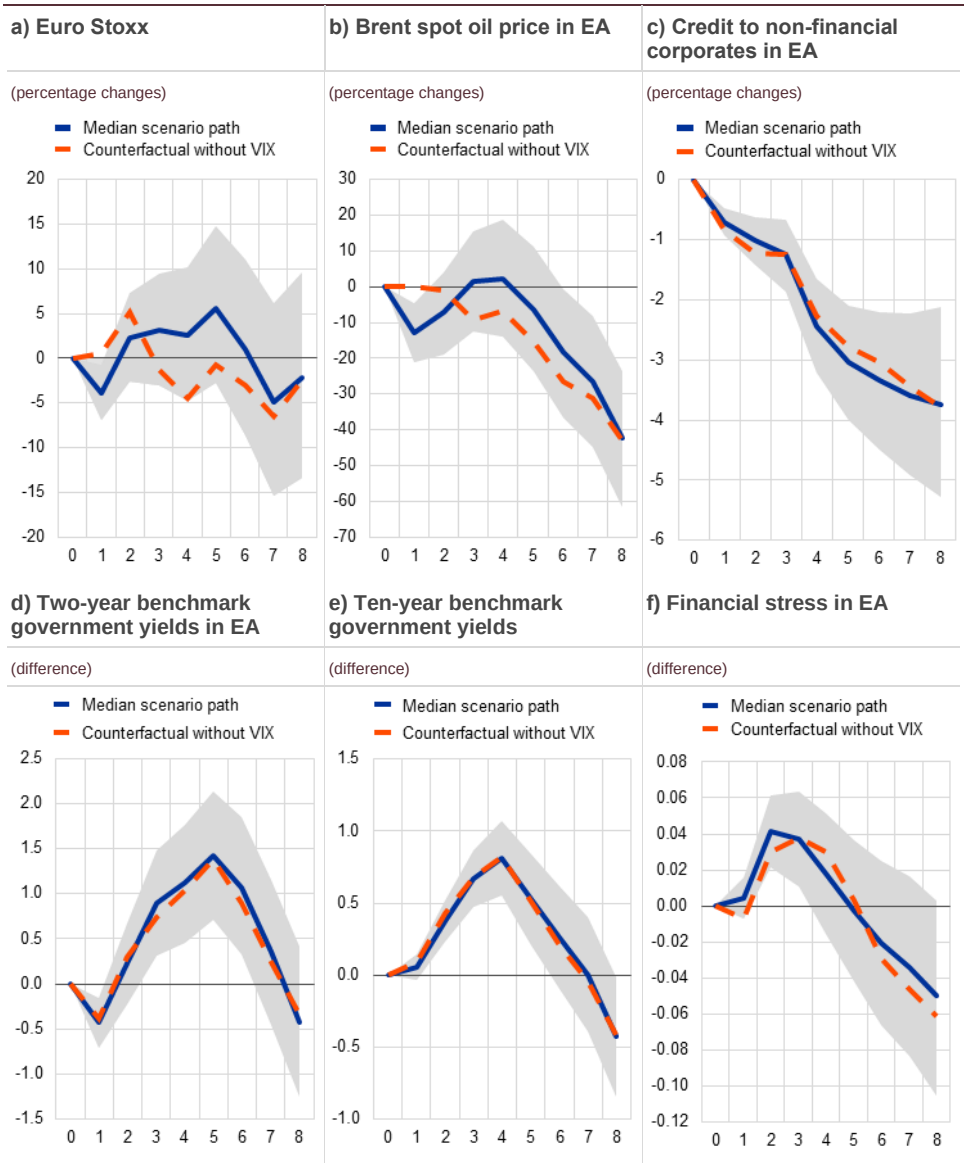
9 The counterfactual experiment is implemented using the method proposed in Camba-Mendez (2012).

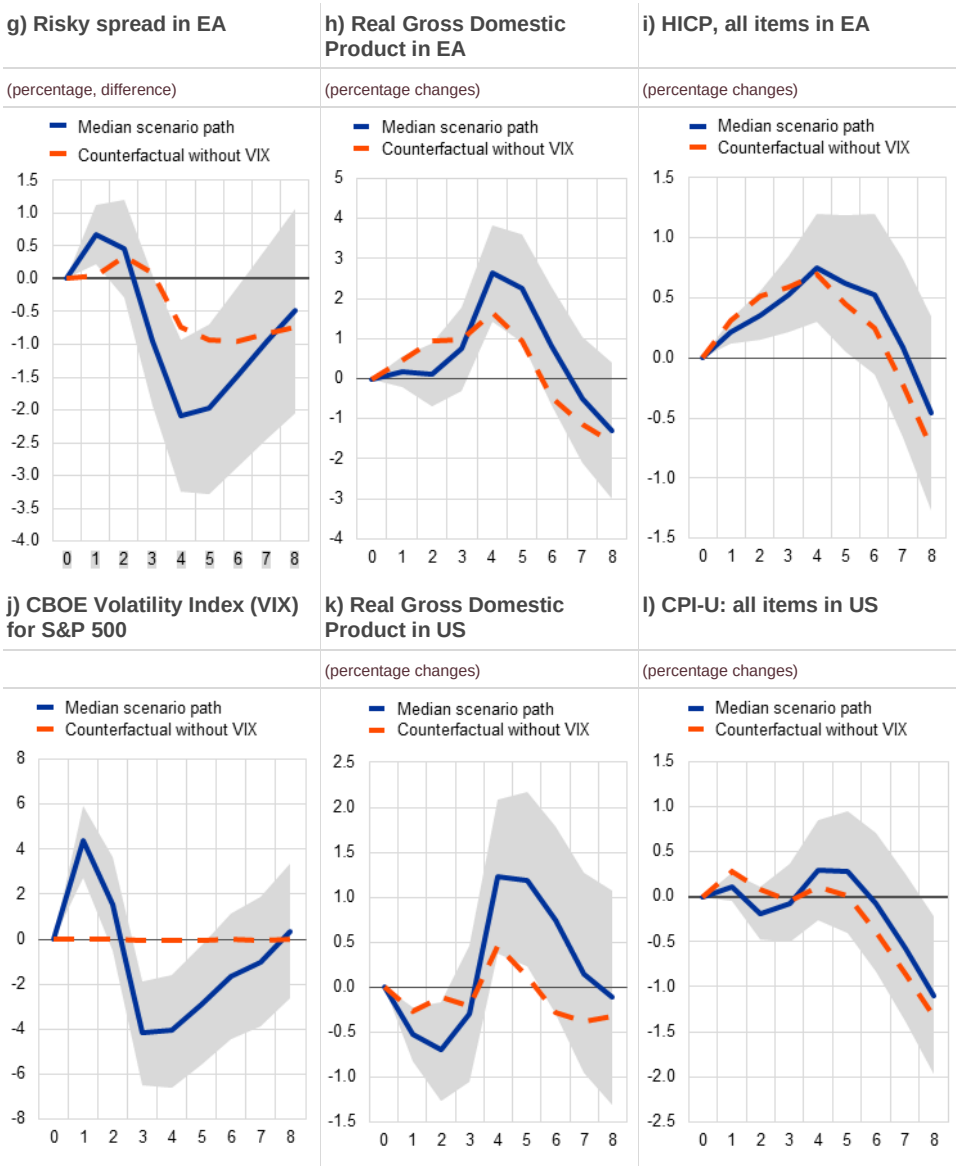
10 The following scenario focuses on a combined increase in the geopolitical risk indicator (GPR) and volatility (COVOL) as observed during the Russian invasion of Ukraine. A separate scenario focussing on an increase in Economic Policy Uncertainty as observed during COVID-19 can be found in Annex 2.

11 The scenario is constructed by estimating an AR(1) model with an intercept for the GPR Index and COVOL Index and the residual from the one-quarter-ahead forecast for the first quarter of 2022 – using data up to the fourth quarter of 2021 – calibrates the generic conflict scenario. This shock is added to the forecast for t+1 (first quarter of 2025), with subsequent quarters projected iteratively.

**Chart 4**

Macro-financial implications after an increase in the Standard Geopolitical Risk Index and COVOL Index






Sources: Caldara and Iacoviello (2022), Federal Reserve Bank of New York, Haver Analytics, Federal Reserve Economic Data and ESRB calculations.
Notes: The blue lines denote the median scenario paths. The grey shaded areas show the 68% coverage interval. The red dashed lines show the counterfactual median paths for a scenario in which the VIX Index does not respond throughout the scenario.

**Shifting from a global to a regional focus, it is essential to evaluate how geopolitical shocks affect the macro-financial environment in EU countries.** Bearing in mind the diverse nature of geopolitical risks (terrorist attacks, wars, tensions, etc.), a high degree of heterogeneity in shock transmission is clearly to be expected, closely related to each country's geographic, economic, financial and strategic position. It is possible to illustrate this impact within a multi-country vector autoregression (VAR) framework. First of all, VAR models are estimated country-by-country for 15 EU Member States using an unbalanced quarterly dataset and, subsequently, the mean group estimator is applied by computing the GDP-weighted

cross-country average.[12] Each country-specific VAR includes the GPR Index (Caldara and Iacoviello, 2022) and relevant macroeconomic and financial variables.[13] Geopolitical shocks are identified, using the same block-recursive structure as in the FAVAR model, by assuming that they are contemporaneously exogenous to macro-financial developments.

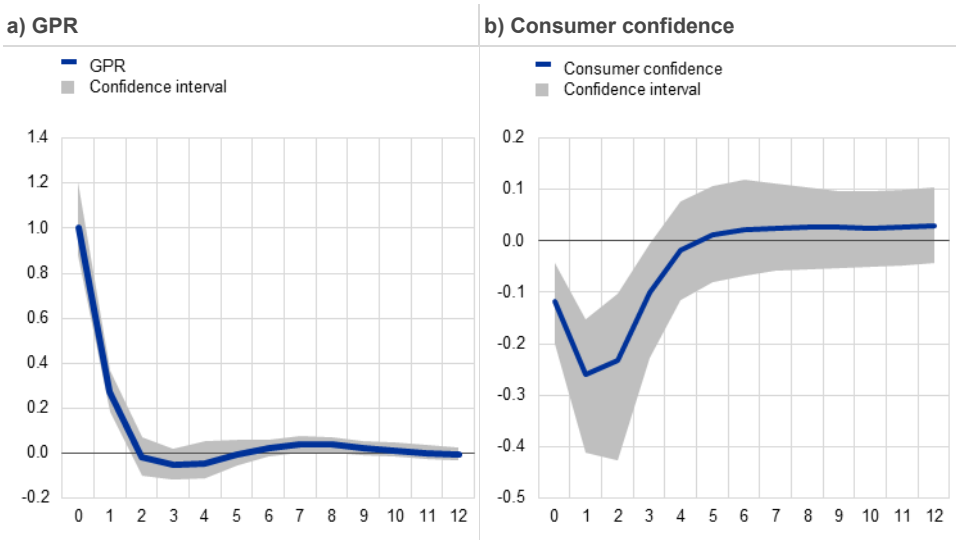
**Chart 5 presents the average effect across EU Member States of an adverse geopolitical shock, revealing a combined supply and financial shock.[14]** Elevated geopolitical tensions tighten aggregate supply conditions, reflected in declining consumer confidence and rising inflation. The shock also increases CLIFS stress indices, depresses house prices and lending, and raises borrowing costs for non-financial enterprises. Overall, these responses signal a significant tightening of financial conditions, which curtails corporate investment and activity, and heightening macro-financial instability.

**Chart 5**

Effects of an adverse geopolitical shock on EU countries

**Impulse response functions after an unexpected increase in the Standard Geopolitical Risk Index across selected EU Member States**

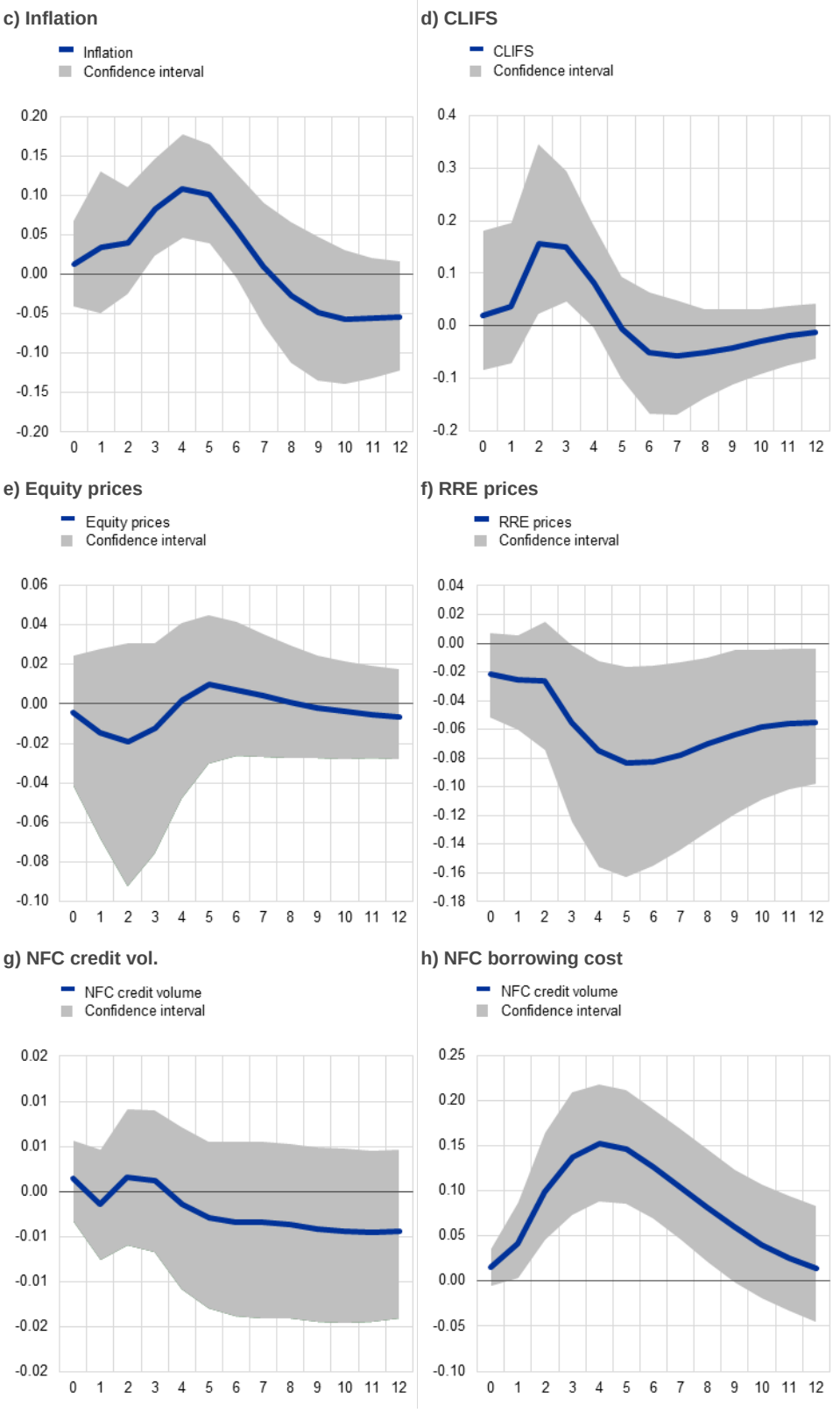
(standard deviations; quarters)




[12] Data are included for countries with at least 60 quarters of observations by the fourth quarter of 2024. The countries included are Belgium, Germany, Greece, Spain, France, Italy, Latvia, Luxembourg, Malta, the Netherlands, Austria, Portugal, Slovenia, Slovakia and Finland. Data from the first quarter of 2020 to the fourth quarter of 2020 are excluded to avoid distortions from the COVID-19 pandemic (Lenza and Primiceri, 2022). In an unbalanced panel, countries with shorter samples have less precise estimates.

[13] For each country, the model specification comprises the following variables: an index of consumer confidence as a forward-looking measure of economic fluctuations; inflation measured by the year-on-year change in the GDP deflator; the Country-level Index of Financial Stress (CLIFS); the log of equity prices deflated by consumer prices; the log of residential real estate prices deflated by consumer prices; the log of the volume of credit to non-financial corporations; a composite measure of non-financial corporates' borrowing costs (a volume-weighted average of the interest rates on new short-term and long-term loans capturing repricing and composition effects in new lending). The VAR is estimated by ordinary least squares (OLS) with two lags for each country. To facilitate comparison across countries, the data are standardised before VAR estimation.

[14] The analysis omits the distance to the source of geopolitical risk, which may be a potential limitation.




Source: ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.
Notes: GPR stands for geopolitical risk, Std dev for standard deviation, CLIFS for the Country-Level Financial Stress Index, RRE for residential real estate and NFC for non-financial corporation. These charts show the mean group impulse responses of macro-financial variables to a one-standard deviation positive geopolitical risk shock (black solid lines). The mean group impulse responses are calculated as the GDP-weighted average of the impulse responses for individual countries. The red shaded areas denote the GDP-weighted average of 68% bootstrap confidence intervals to account for cross-country heterogeneity. Equity prices, RRE prices, and NFC credit volumes are in real terms.

**The Russian invasion of Ukraine is one example of such a shock, demonstrating how geopolitical escalation can rapidly cause real economic losses and amplify financial system vulnerabilities.** For instance, Russian gas supply cuts and fears of a complete stoppage drove up gas prices, further fuelling inflation in the euro area in 2022 and 2023. In response, monetary policy implemented steep interest rate hikes, resulting in tighter financing conditions.

**There is considerable cross-country heterogeneity in the estimated impact of geopolitical shocks (Table 3).** The magnitude and persistence of these effects differed across countries. However, a model-consistent grouping relies on the confidence (demand) and borrowing costs (supply) responses. Countries with large declines in confidence and sharp increases in borrowing costs exhibited stronger credit contraction (Belgium, Italy, the Netherlands, Greece and Austria), which may be related to the risk repricing or expectations channel that tightens financial conditions. By contrast, countries with muted confidence movements and limited cost pass-through showed only modest (GDP-weighted average) credit declines (Germany, France, Portugal, Slovenia and Slovakia). Nevertheless, the heterogeneity persisted. A few small open economies – generally those with deeper and more integrated financial markets, such as Belgium, the Netherlands and Austria – were particularly vulnerable to such shocks, whereas larger economies, such as Germany and France, as well as several smaller countries, including Portugal, Slovakia, and Slovenia, appeared to be less affected. Another large country, Spain, and a number of smaller countries, such as Malta, Latvia and Finland, fell somewhere in between.

**Table 3**

EU country-level effects of an adverse geopolitical shock

**Minimum/maximum impulse responses over a 12-quarter period**

| | Confidence | Inflation | CLIFS | Equity prices | RRE prices | NFC credit vol. | NFC borrowing costs |
|---|---|---|---|---|---|---|---|
| BE | -- | ++ | ++ | - | - | - | ++ |
| AT | -- | ++ | ++ | - | - | 0 | ++ |
| NL | -- | ++ | ++ | - | - | 0 | ++ |
| LU | - | ++ | ++ | 0 | - | 0 | ++ |
| GR | -- | + | + | 0 | - | - | + |
| IT | - | ++ | ++ | + | - | 0 | ++ |
| LV | -- | + | + | - | - | 0 | + |
| ES | - | ++ | + | 0 | - | 0 | + |
| FI | -- | + | + | 0 | - | 0 | + |
| MT | - | + | + | - | - | 0 | + |
| FR | - | + | + | 0 | - | 0 | + |
| PT | - | + | + | 0 | - | 0 | + |
| SI | - | + | + | 0 | - | 0 | + |
| DE | - | 0 | + | - | 0 | 0 | + |
| SK | 0 | + | + | 0 | 0 | 0 | + |

Note: CLIFS stands for Country-Level Financial Stress Index and RRE for residential real estate. This figure shows the country-level minimum/maximum impulse responses over a 12-quarter period of key macro-financial variables to a one-standard-deviation positive geopolitical risk shock. "+/++" indicates a higher or much higher response than in other EU Member States. "−/−−" indicates a lower or much lower response. "0" indicates that the impact was generally similar to that of other EU Member States. The red and orange shading indicates the economically expected negative effect of an adverse geopolitical shock, while green indicates a positive (outlier) effect.

**The evidence presented here shows that geopolitical shocks can profoundly impact the global macro-financial environment.** Such shocks can propagate through both financial and macroeconomic channels, weighing on the real economy by weakening both demand and supply. Moreover, geopolitical shocks worsen financial conditions globally as well as in the EU, by raising financial stress levels, increasing borrowing costs and limiting credit to firms. This underscores the importance of incorporating geopolitical risk into financial stability assessments, focusing in particular on cross-country heterogeneity.

## 4.2 Tail risks to macro-financial conditions in the EU

**Geopolitical risks may also affect the tails of macro-financial variables.** This section focuses on the effects of geopolitical shocks on the predictive distribution of financial stress, systemic vulnerabilities and economic activity across the euro area and in individual EU Member States. To this end, two distinct quantile regression approaches were used, namely the panel quantile regression (PQR) and the quantile vector autoregression (QVAR), each with its own merits. The PQR accounts for non-linear effects across the different estimated quantiles, while making it possible to control for other potential drivers of tail risks. By contrast, the QVAR captures possible direct and indirect interactions between model variables giving rise to

additional non-linear impacts.[15] Across both regression approaches, the core set of variables covered financial stress (the CISS developed in Holló et al., 2012), systemic vulnerability (the SRI, established in Lang et al., 2019) and economic activity (real GDP), with corresponding indicators available at the country level.

### 4.2.1 Growth-at-risk in the EU

**Integrating geopolitical risk into the GaR framework is a natural approach to assessing the impact of tail risks to economic growth.** For this section, the GaR model specification used by the ESRB to evaluate the macroprudential policy stance (ESRB, 2021) is augmented with geopolitical risk indicators to obtain quantitative implications for systemic risks at EU and country level.

**To assess the implications of a wide range of indicators, the first step consists in identifying, in an EU panel setting, the most relevant indicators for forecasting tail risks to GDP growth.** The indicators are selected based on the set described in **Section 3** and a variable by applying machine learning techniques and a light gradient boosting machine (LGBM) regressor.[16] This approach not only allows for an accurate estimation of tail-risk projections but also identifies potential indicators with early-warning properties, signalling shifts in geopolitical and macro-financial conditions before they materialise in observed outcomes, thereby enhancing the timeliness and forward-looking capacity of the monitoring framework.

**The results of the machine learning panel variable selection exercise largely confirm the geopolitical indicator selection outlined in Section 3.** The most important contributions to four-quarters-ahead economic growth forecast come from the WTUI, the fragmentation indicators, the EPU Index and, to a lesser extent, the GPR Index and the MigFear Index (see Annex). Apart from the geopolitical set of indicators, the most relevant auxiliary variables are related to credit to households and non-financial companies, consumer confidence, the current account balance and other systemic risk indicator components (Lang et al, 2019). From an early-warning perspective, the lack of materialised shocks from geopolitical risks so far limits the ability to examine the real-time usefulness of indicators such as EPI or WTUI to directly predict downturns, although their effects on the risk distribution is becoming increasingly important.

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15 The estimates of the quantile regression rely on the seminal work by Koenker and Bassett (1978) and have been applied by Adrian et al (2019) among others. The QVAR specifications rely on methodology in Chavleishvili and Manganelli (2019), Bochmann et al. (2023) and Schüler (2025).

16 The LGBM is used owing to its advanced features, such as handling missing data, and custom loss options, such as quantile loss. It is a fast, efficient, and scalable gradient boosting algorithm used for regression tasks - it builds an ensemble of decision trees in a leaf-wise (best-first) manner and is designed specifically for speed and accuracy for efficient and scalable machine learning tasks. The best variables are selected based on a quantile loss and the empirical coverage measures, together with the Shapley values to rank the best performing indicators by their marginal contribution to the outcome of the model.

The set of indicators used in the benchmark specification for the EU GaR models is similar to those proposed in ESRB (2021),[17] i.e. augmented by the geopolitical risk indicators:

$$Q_{y_{i,t+4}} = c_i + y_{i,t} + ESI_{i,t} + SRI_{i,t} + CLIFS_{i,t} + SRI_{i,t} \times CLIFS_{i,t} + GEO_{i,t} + \varepsilon_{i,t},$$

where $SRI_{i,t}$ is the Systemic Risk Indicator that tracks (cyclical) systemic risks in EU Member States,[18] $CLIFS_{i,t}$ is the Country-Level Index of Financial Stress and $GEO_{i,t}$ represents the different geopolitical risk indicators selected.[19] For the estimation, one geopolitical risk indicator per topical category is used to explore GDP growth tail risks within the ESRB GaR framework, namely: (i) the EPU Index for general uncertainty; (ii) the GPR Index for military/infrastructure; (iii) the WTUI Index for trade; (iv) the COVOL Index for capital & finance; and (v) the MigFear Index for politics & society.

Estimating the EU panel GaR model yields some heterogeneous results in terms of coefficient plots –some of the indicators, such as the EPU Index and TPU Index (Annex 2, Chart A2), have intuitive shapes and signs for the post-2014 period (negative and upward-sloping). In accordance with a priori beliefs, the post-2014 results exhibit a clearer upward tendency and more pronounced negative effects in the tails of the growth distribution, signalling potential threshold effects partially overlapping with the onset of a financial fragmentation trend.

[17] The empirical methodology aligns with the ESRB (2021) framework to provide policymakers with quantitative metrics for assessing policy adequacy against risks and resilience. The approach employed in this paper differs in two ways. First, while the Expert Group's stance indicator measures the gap between the 50th and 10th percentiles of GDP growth, the current method studies the full distributions and emphasizes individual percentiles, particularly the 10th percentile, to better capture downside risks. Second, and also for this purpose, it focuses on an adjusted explanatory variable set: for example, the policy dimensions is not included directly and the European Commission's Economic Sentiment Indicator (ESI) is added, which enhances the quantification of downside risks relative to median predictions over shorter horizons (see Lang et al., 2022).

[18] For robustness, both the Common Composite Indicator (CCI) and the Systemic Risk Indicator (SRI) have been employed as measures of cyclical systemic risks, yielding similar results (see Annex 2).

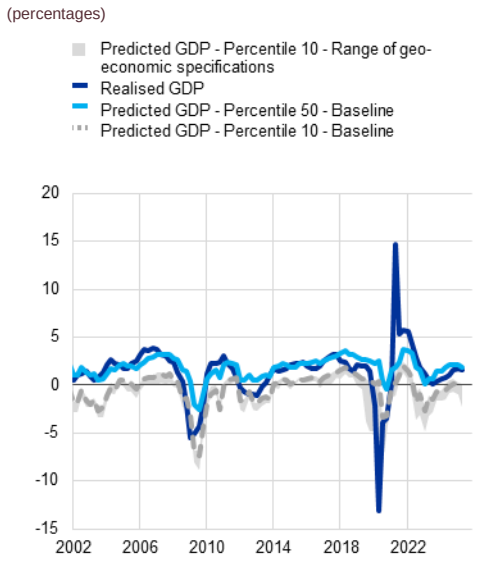
[19] The estimation includes country fixed effects to allow for country heterogeneity and make it possible to estimate the results over a range of quantiles, while standardising the data to obtain more stable results. This analysis emphasizes close-to-real-time monitoring with a four-quarter ahead forecasting horizon. The societal and political indicator, deemed more relevant for medium-term forecasts (up to eight quarters), has however been retained for the medium-term analysis, along with structural indicators that play a significant role in cross-country comparisons.

**Chart 6**

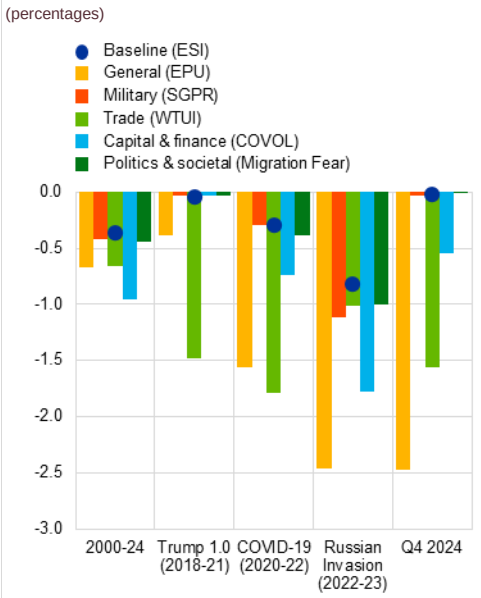
EU growth-at-risk over time and across geopolitical indicators

**Baseline EU growth-at-risk model versus models augmented with geoeconomic variables**

**a) GDP growth and GaR four quarters ahead**




**b) GaR four quarters ahead for different specifications and points in time**




Source: ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.
Note: GaR stands for growth-at-risk, ESI for Economic Sentiment Indicator, EPU for Economic Policy Uncertainty Index, GPR for Global Geopolitical Risk Index, WTUI for World Trade Uncertainty Index and COVOL for Common Volatility Index. The augmented models include geopolitical indicator variables. Panel a) displays the historical annual GDP growth rate alongside the median prediction for four quarters ahead, based on the baseline specification. It also shows the range of 10th percentile predictions across different specifications, including the baseline specification and specifications with geopolitical risk indicators, with each indicator (i to v) iteratively added by category, as shown above. Panel b) shows the average growth-at-risk (i.e. GDP growth at the tenth percentile) expressed as annual percentage changes across various historical periods, estimated under the baseline specification and the six specifications incorporating geopolitical risk indicators.

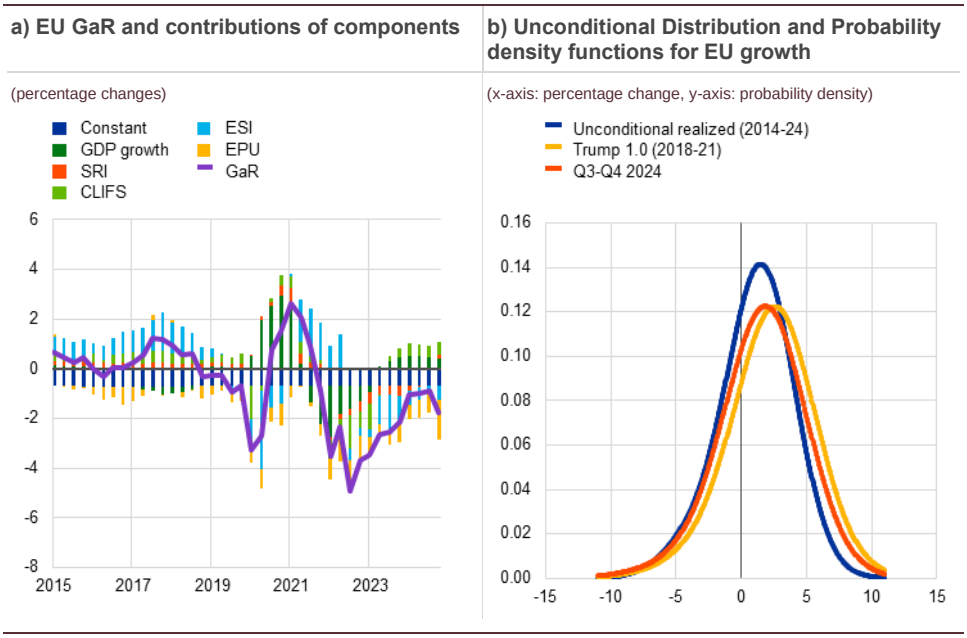
**Tail risks to GDP growth from baseline and augmented models aligned on average, but diverge during crises.** The baseline model's four-quarter forecast of median GDP growth closely tracks actual outcomes (**Chart 6, panel a**), while the 10th percentile range of estimations (including geoeconomic variables) widen significantly, particularly after 2015. This divergence highlights the growing importance of geopolitical risks over the last decade and reflects the diverse nature and contributions of those risks through time. Although the specifications converge on average, notable deviations emerge during specific events, such as during the 2018-19 trade war (**Chart 6, panel b**), the disruptions induced by the COVID-19 pandemic and the recent geopolitical tensions. Incorporating geopolitical risk factors into the estimations results in a more pronounced left tail of the GDP distribution, appropriately capturing the geopolitical risks; the baseline specification without geopolitical indicators could underestimate these risks in such environments.

Focusing on a single specification, the analysis resorts to the most promising indicator from the general risk category, namely the EPU Index. This choice was motivated by the convergence of multiple quantitative results presented throughout this report: (i) the GaR LASSO selection procedure shows that the EPU Index is especially relevant for predicting short- to medium-term risks (one-year ahead) for the nine countries included in the sample (the detailed results are given in The

Annex); (ii) the machine learning approach ranked the EPU Index third among geopolitical indicators (**Annex 2, Chart A1**) in terms of predictive power for the tails of economic growth distribution; and (iii) the panel GaR specification exhibits a significant increase in model fit when adding the EPU Index (**Annex 2, Table 2**).

**Chart 7**

Tail risks to EU GDP growth under EPU-augmented model




Source: ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.
Notes: GaR stands for growth-at-risk, SRI for Systemic Risk Indicator, CLIFS for Country-Level Index of Financial Stress, ESI for Economic Sentiment Indicator and EPU for Economic Policy Uncertainty Index. Panel a) shows the quarterly GaR (expressed as an annual percentage change), proxied by the change in the tenth percentile as estimated four quarters ahead under the EPU-augmented specification, and broken down into the contributions of the explanatory variables included. Panel b) displays the distribution of actual GDP growth alongside the predicted probability density functions (PDFs) for the two selected periods, derived by fitting the quantile regression estimates from the geopolitical specification (the EPU).

**The model specification incorporating the EPU Index predicts significantly heightened tail risks to GDP growth post-2018.** The breakdown highlights the fact that the contribution made by economic policy uncertainty has become increasingly negative since 2018, peaking during the COVID-19 period (2020) and persistently dragging down the 10th percentile of conditional growth by 0.6% to 1.6% from 2022 onwards,[20] emerging as the single largest contributor to downside risk (**Chart 7, panel a**).

**Slicing through the conditional growth distribution reveals the influence of economic policy uncertainty on extreme negative outcomes in future GDP growth.** The shifts in the GDP growth distribution were particularly noticeable during trade-related turbulence (Trump 1.0, 2018-19) and in the last two quarters of 2024 (**Chart 7, panel b**). While the risks appeared more balanced historically, they tilt to the downside in the fourth quarter of 2024, exceeding the levels observed in 2018-19. Relative to the unconditional distribution, episodes of heightened trade uncertainty show greater deviations from the median, with thicker tails, indicating higher variance in projected GDP growth and uncertainty. In late 2024, the

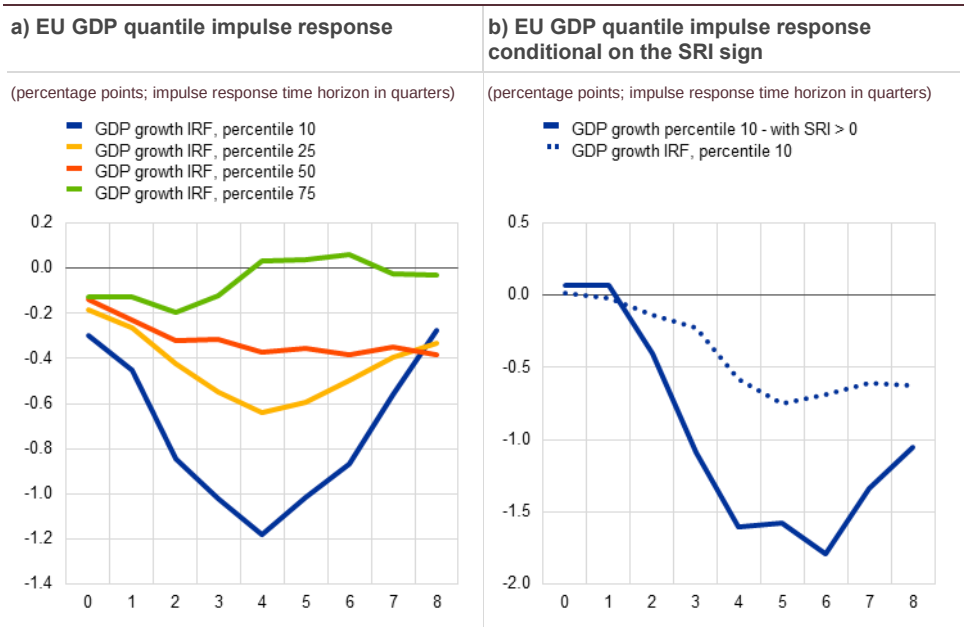
[20] Additional examples are provided in the Annex 2.

projections signalled an increased likelihood of GDP contraction, alongside a downward shift in the median and upper range, compared with 2018-19.

**Economic policy uncertainty shocks have a pronounced negative effect on GaR, particularly when vulnerabilities are elevated. Chart 8** shows the estimated impact on annual GDP growth of a one-standard-deviation shock to economic policy uncertainty both across the key percentiles (**Chart 8, panel a**) and conditional on the SRI being positive or negative (**Chart 8, panel b**). The impact of economic policy uncertainty shocks is concentrated in the 10th percentile, emphasising that these shocks primarily amplify downside risks. GDP growth shows a modest negative response to economic policy uncertainty shocks on impact, which intensifies over four quarters before gradually diminishing. This negative impact is stronger during financial risk build-up phases (i.e. when the SRI is positive), exposing greater economic vulnerability. By contrast, low levels of systemic risk partially mitigated the economy's sensitivity to such shocks. This suggests that (cyclical) systemic risk dynamics may act as a structural driver and contribute to the build-up of vulnerabilities to policy uncertainty shocks, with clear amplification effects observed for adverse growth outcomes. In this regard, the key ingredients of a potential crisis episode – underlying vulnerabilities, such as excessive credit or asset price growth, and triggers such as heightened policy uncertainty – may interact negatively, ultimately leading to significant real-economy effects, that is, the materialisation of a tail event.

**Chart 8**

Quantile impulse responses of EU GDP growth quantiles to a one-standard-deviation economic policy uncertainty shock across percentiles




Source: ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.
Notes: IRF stands for impulse response function, EPU for Economic Policy Uncertainty Index and SRI for Systemic Risk Indicator. The quantile IRFs are estimated using local projections, applying the methodology proposed in Adrian, T., F. Grinberg, N. Liang, S. Malik, and J. Yu. 2022. "The Term Structure of Growth-at-Risk", American Economic Journal: Macroeconomics 14 (3): 283–323 (2022). The quantile panel model used is the ESRB benchmark augmented with the EPU Index.

### 4.2.2 EU geoeconomic fragmentation and financial cycles

**The co-movement of macro-financial variables across countries influences systemic risk in the euro area and affects the effectiveness of stabilisation policies.** The co-movement is crucial for deciding how stabilisation policies need to be coordinated across countries to counter the impact of shocks. For example, when financial cycles diverge across countries, national macroprudential tools may help stabilise domestic conditions. A common monetary policy would, however, tend to transmit unevenly, attenuating the imbalances in some countries while amplifying those in others. By contrast, if financial cycles become too synchronised, vulnerabilities may build up simultaneously across countries, generating amplifying spillover risks and increasing the likelihood of systemic crises if these are not mitigated in a concerted effort.

**Geopolitical shocks can significantly impact the degree of co-movement in financial and business cycles across EU Member States.** Events such as the Russian invasion of Ukraine may lead to either stronger alignment or growing divergence in economic and financial variables across countries. The multi-country VAR model (**Section 4.2**) highlights clearly substantial heterogeneity in the adjustment of EU economies to geopolitical disruptions.

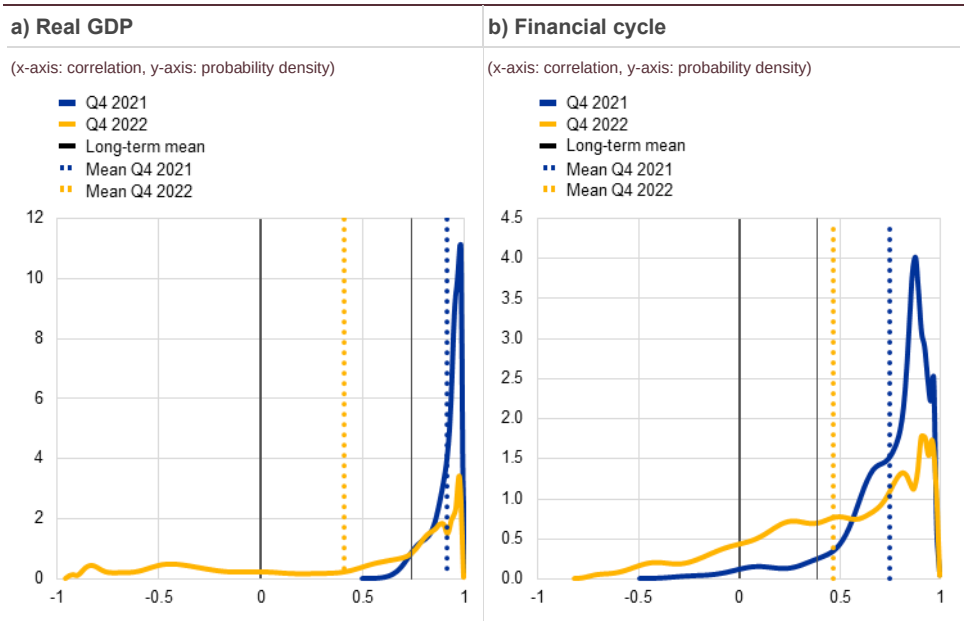
**The degree of synchronisation across euro area countries can be assessed through the distribution of pairwise-correlations over time.**[21] These show that financial cycles tend to be less synchronised across countries than business cycles, with the average cross-country correlation in business cycles of 0.74 exceeding the 0.38 for financial cycles (**Chart 9**, black vertical lines). This reflects not only the strong economic ties between EU Member States, but also the predominantly domestic nature of credit and housing markets (Mansour-Ibrahim (2023) and Schüler et al., 2020).[22]

[21] Specifically, we estimate rolling window correlations from the respective time series across euro area countries using a two-sided (symmetric) rolling window with a window size of 13 quarters. This approach employs information from both past and future periods. While this method reflects the timing of turning points well, it can only be used for descriptive analysis and not for inference.

[22] The composite financial cycle proposed in Schüler et al. (2020) captures common fluctuations in credit, house prices, stock prices and corporate bond prices – see Annex 2, Table 1.

**Chart 9**

Probability density function of pairwise-correlation distributions of real GDP and financial cycles across EU Member States




Source: ESRB calculations.
Notes: The black vertical lines are the mean correlations over the period running from the first quarter of 1999 to the fourth quarter of 2024. The dotted blue vertical lines are the mean correlations for the fourth quarter of 2021. The dotted yellow vertical lines are the mean correlations for the fourth quarter of 2022.

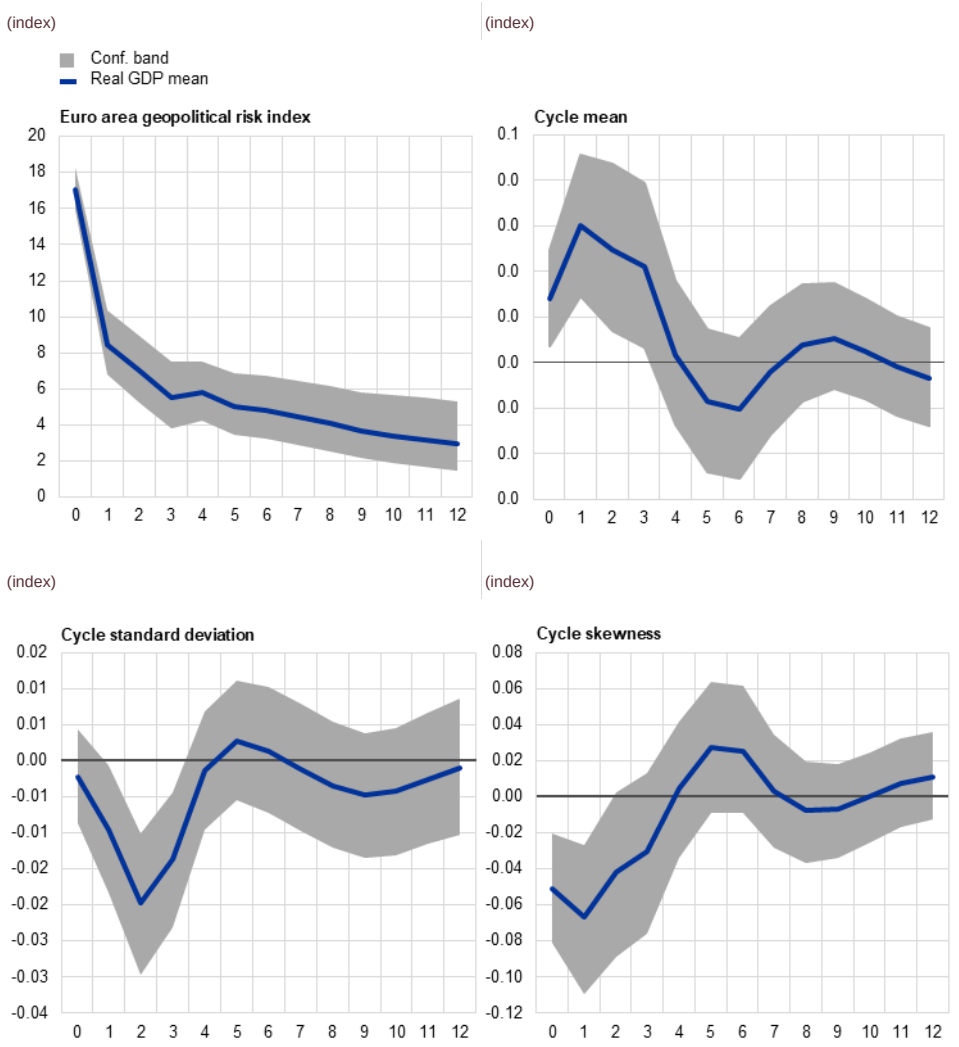
**Kernel density estimates (KDEs) offer further insight into how these correlations evolve in response to geopolitical shocks.** Before the Russian invasion of Ukraine (in the fourth quarter of 2021) the pairwise-correlation distribution of both the business and financial cycles showed strong co-movement across countries (**Chart 9**, blue line), with a left-skewed distribution (negative skewness), suggesting broadly shared dynamics across the euro area. Four quarters later (in the fourth quarter of 2022) the co-movement had declined significantly for both types of cycle, with the entire distribution shifting to the left – indicating growing fragmentation.[23] This highlights how geopolitical shocks can influence not only average synchronisation, but also the dispersion and asymmetry of cyclical alignment across countries in the euro area.

[23] While the initial decline in correlation may have been caused by the invasion itself, additional factors, such as an increase in inflation and monetary policy interest rates, may have further contributed over time.

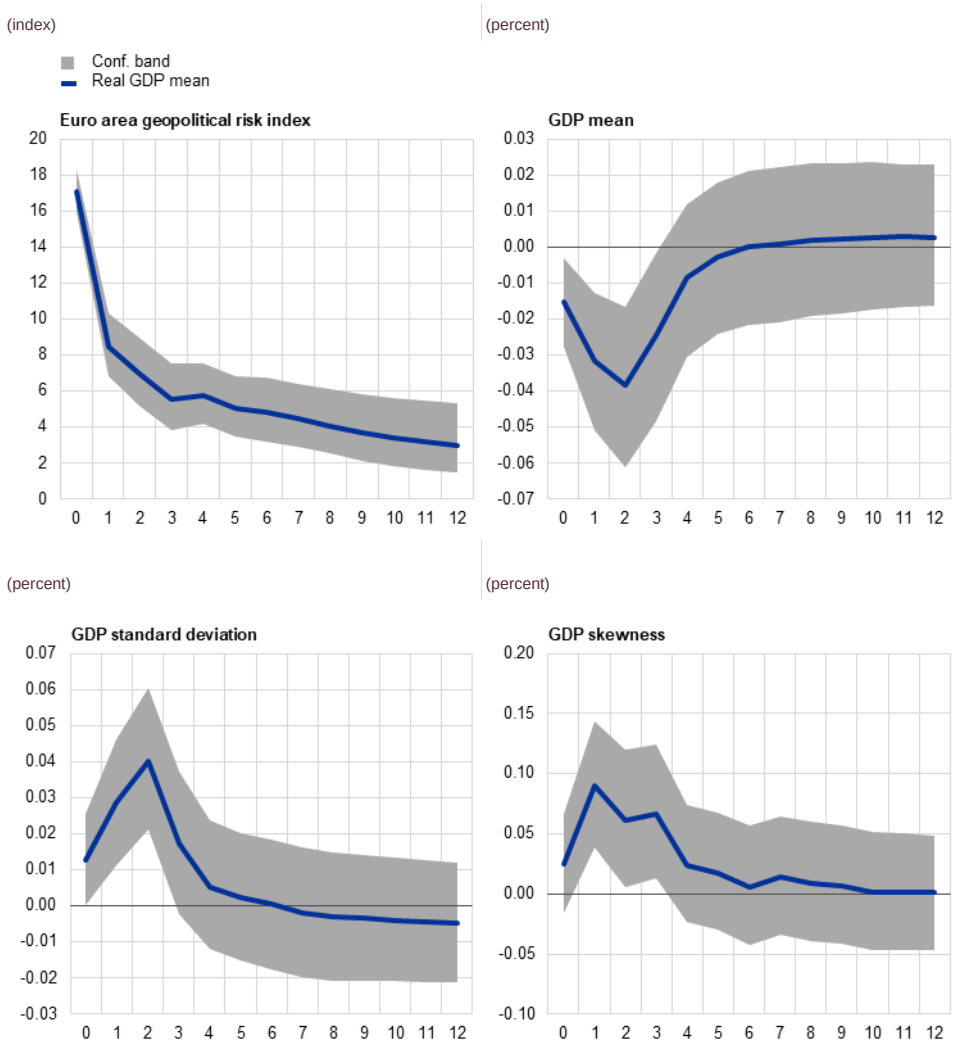
**Chart 10**

EU impulse responses of pairwise-correlation distributions to geopolitical shocks

**a) Financial cycle**



**b) Real GDP**




Source: ESRB calculations.
Notes: Conf. band stands for confidence band. The impulse responses show how the distribution of the one-sided rolling-window pairwise-correlations across euro area countries shifts in response to a euro area geopolitical risk shock. The panels showing the Euro Area Geopolitical Risk Index indicate how the shock affects that index (Bondarenko et al., 2025). The panels showing the mean, standard deviation and skewness indicate how the mean, the standard deviation and skewness of the distribution of the one-sided pairwise-correlations across euro area countries shift over time.

**While the Russian invasion of Ukraine provides an example of the extent to which geopolitical shocks can disrupt financial and business cycle synchronisation, a more systematic assessment is required to generalise these insights.** To this end, two VAR models[24] were used to estimate how euro area geopolitical risk (Bondarenko et al., 2024 and 2025) affects cross-country synchronisation over time. Each model specification included measures of the cross-country correlation of financial or business cycles – capturing not only changes in the

[24] For this exercise, we track the distribution of pairwise correlations over time using summary statistics: the average, standard deviation and skewness of one-sided time-varying pairwise correlations, constructed with a five-quarter backward-looking window. These time series are then modelled in a VAR together with the EA GPR Index developed by Bondarenko et al. (2025), placing the geopolitical risk variable first in the Cholesky decomposition. This setup allows us to analyse how the distribution of pairwise correlations responds to a geopolitical risk shock.

average co-movement, but also in the dispersion (standard deviation) and asymmetry (skewness) of pairwise-correlations across countries.

**Geopolitical shocks alter the cross-country co-movement of both real GDP and financial cycles.** In particular, financial cycles appear more synchronised (with higher cross-country correlations) following a geopolitical shock, suggesting that the development of credit and asset prices becomes more similar across countries. Nevertheless, increasing asymmetry and dispersion can be observed that points to emerging fragmentation (a decline in standard deviation and skewness). This suggests the formation of country clusters – where a subset of countries reacts more strongly to the shock, while others are less affected, likely due to different financial (or economic) structures or vulnerabilities **(Chart 10, panel a)**. By contrast, business cycles, measured through real GDP, exhibit greater initial divergence. This asymmetric response in the correlation of real GDP may reflect underlying structural differences in how countries are exposed to geopolitical tensions, for example through their financial sectors, their degree of reliance on cross-border capital, or owing to their institutional resilience.

### 4.2.3 Geopolitical risks and macro-financial tail risks

**Quantile Vector Autoregressive (QVAR) models are an approach well suited to identifying structural shocks and enabling counterfactual policy analysis.** Like quantile regression models, QVAR models capture non-linearities across quantiles in the transmission of shocks. Furthermore, these models make it possible to analyse how economic and financial variables interact in the face of geopolitical shocks. For this section, QVAR models are used to forecast the full conditional distribution of financial variables and real GDP, while also quantifying the impact of geopolitical shocks on the euro area economy and financial system. In line with the framework established in Chavleishvili and Manganelli (2019), the models incorporate real GDP growth the ECB's SRI and CISS as endogenous variables, supplemented by an exogenous geopolitical risk indicator.[25]

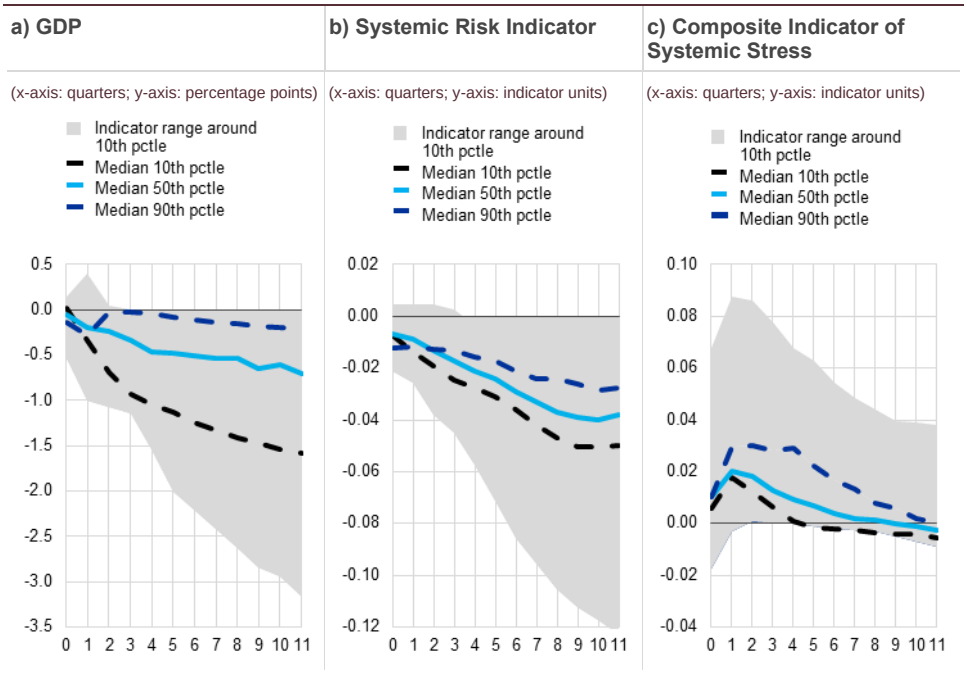
**The estimation highlights significant differences in how geopolitical indicators influence the tails of economic and financial variable distributions.** For the 10th percentile of real GDP, the impact of geopolitical variables after 12 quarters varies from -0.2% to -3.2%, with a median value of -1.6% (**Chart 11**, shaded area and blue dashed line). These pronounced and persistent downside risks are also observed for the SRI and highlight the euro area economy's vulnerability to changes in geopolitical indicators. The impact for the 90th percentile of systemic stress (the CISS), by contrast, ranges from zero to 0.07 units (the CISS is bound between zero and one). A closer analysis reveals that all geopolitical indicators generate downside risks, but not all are statistically significant. Uncertainty indicators, such as the TPU Index, WTUI and the RealUn and FinUn Indicators, have the largest impacts on GDP

[25] The range of geopolitical indicators considered included the GPR Index (Caldara and Iavcoviello, 2022), the TPUI (Caldara et al., 2022), the EPU (Baker et al., 2016), the RealUn Index and FinUn Indicator (Ludvigson et al., 2021), the WTUI (Ahir, Bloom and Furceri, 2022), the Expected Market Volatility Indicator (Baker, Bloom, Davis and Kost, 2019), the COVOL Index (Engle and Campos-Martins, 2023) and the MigFear Index (Bloom, Davis and Baker, 2015).

and the financial system, while volatility measures (EMV Index and COVOL Index) have a lesser effect, while the GPR Index has the smallest impact.

**Chart 11**

Impact of geopolitical risk and uncertainty indicators on EU macro-financial variables




Sources: Eurostat, ECB and ECB calculations.
Notes: Pctle stands for percentile. The shaded areas represent the impact of the range of geopolitical indicators on the price-based financial integration indicator. The range of geopolitical indicators considered includes the Global Geopolitical Risk Index, the Trade Policy Uncertainty Index, the Economic Policy Uncertainty Index, the Real Economic Uncertainty Index and the Financial Uncertainty Indicator, the World Trade Policy Uncertainty Index, the Equity Market Volatility Indicator, the COVOL Index and the Migration Fear Index.

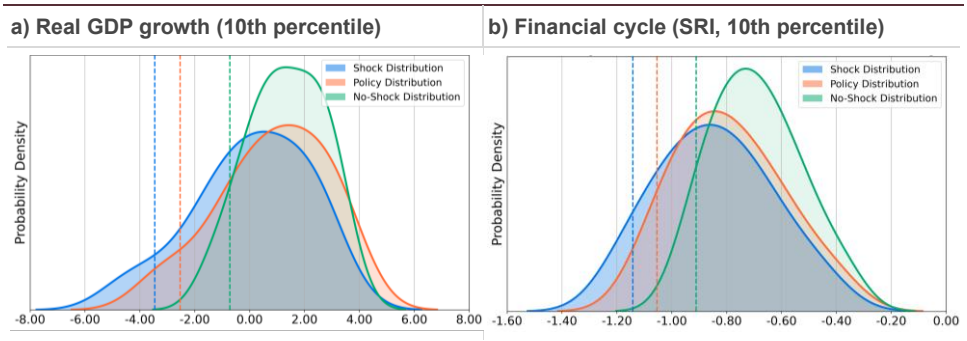
**Not only do geopolitical indicators have a wide range of impacts, they also exert asymmetric effects in terms of the risks to the upside or downside.** Quantile VAR make it possible to estimate quantile-specific effects that are visible as asymmetries around the median (**Chart 11**, black line). In the case of GDP, the distribution is left-skewed, with the lower tail (10th percentile) more distant from the median than the upper tail (90th percentile), indicating that the upside potential remains relatively insulated from shocks. A smaller asymmetry is noted for the CISS, whereas the impact on the SRI are broadly symmetric.

**Scenario analysis based on the QVAR indicates that the euro area may face worsening macro-financial conditions from a variety of adverse geopolitical shocks.** Under a scenario of a spike in economic policy uncertainty (EPU), as observed at the onset of Covid in 2020, the analysis indicates broad-based adverse impacts across financial markets and the real economy. The impact of the scenario policy is especially visible through the downward shift in the distribution of forecasted variables, but also in their effects on downward skewness (**Chart 12**). In the absence of geopolitical shocks the forecasted distributions for real GDP and the financial cycle earn a relatively symmetric shape (**Chart 12**, green lines). The policy uncertainty scenario not only shifts the distribution to the left to lower values, but also broadens it and elongates the downward tail, reaching -3.7% for GDP growth at the

10th percentile (blue lines), reflecting the downward risks to the economy. To identify the contribution of the financial sector transmission, the scenario considers a policy of stabilising financial stress, as captured by the CISS, for one quarter. This may be achieved through monetary liquidity policies by the central bank or through heightened liquidity and solvency among financial institutions. Either of such measures would attenuate the effect of financial stress and help shift the distributions to the right and, furthermore, reduce downward risks (red lines and arrow).

**Chart 12**

Distributional effects of economic policy uncertainty and stabilisation policy

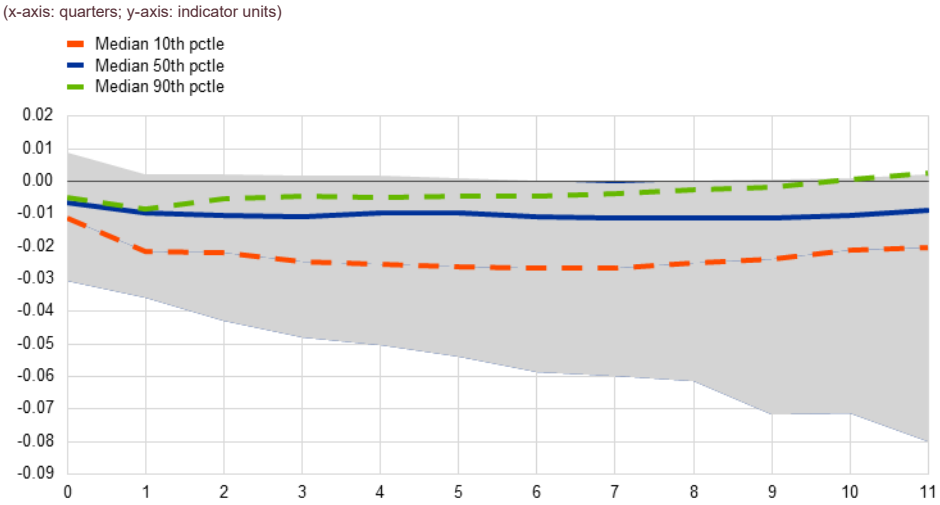



Sources: Baker et al. (2016) and ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.
Notes: The green line depicts the distributions of GDP and SRI 4 quarters ahead in an unconditional scenario. The blue distribution captures the impact of the variables under the scenario of a joint geopolitical (GPR) and volatility (COVOL) shock, and the red line represents the scenario in which, in addition, financial stress (CISS) is stabilised for one quarter at the level before the geopolitical scenario initiated.

**A second category of findings explores the role of reduced financial integration in amplifying geopolitical shocks.** This analysis is conducted in two steps. It first examines how geopolitical shocks influence measures of synchronisation (see Section 4.2.2) and financial integration within the euro area. Specifically, the synchronisation measure is the average cross-country correlation of real GDP (over a window of seven quarters) and the financial integration measure is the price dispersion of euro area financial assets and the extent of cross-border holdings across different asset markets. Second, it evaluates how the price-based financial integration indicator transmits to euro area macro-financial variables.

**Chart 13**

Impact of geopolitical risk on measures of EU financial integration




Sources: Eurostat, ECB and ECB calculations.
Notes: Pctle stands for percentile. The shaded areas represent the impact of the range of geopolitical indicators on the price-based financial integration indicator. The range of geopolitical indicators considered includes the Standard Geopolitical Risk Index, the Trade Policy Uncertainty Index, the Economic Policy Uncertainty Index, the Real Economic Uncertainty Index and the Financial Uncertainty Indicator, the World Trade Policy Uncertainty Index, the Equity Market Volatility Indicator, the COVOL Index and the Migration Fear Index.

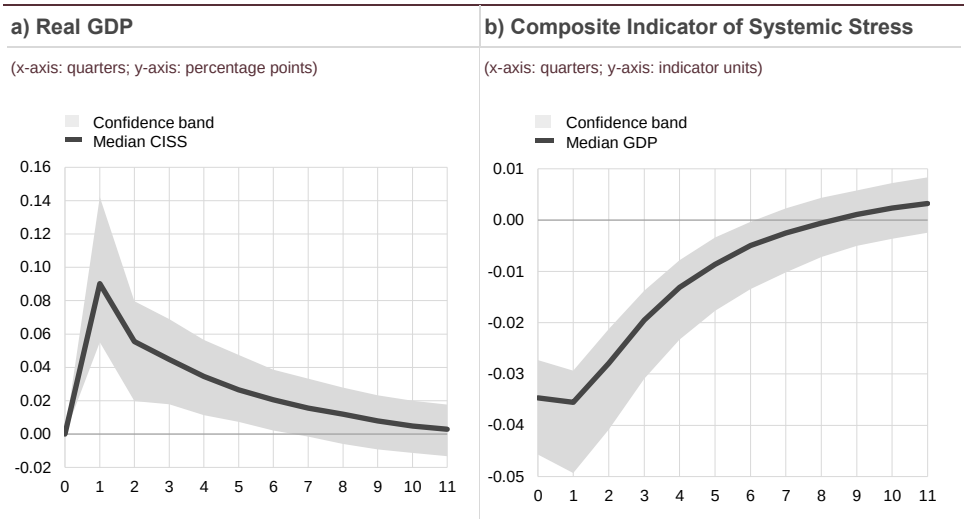
**Geopolitical risk and uncertainty are found to reduce euro area financial integration.** This is particularly true for real GDP correlation and for the price-based measure of financial integration (**Chart 13**).[26] This indicates that increased geopolitical risk raises euro area heterogeneity, which could, in turn, potentially affect macro-financial transmission.

**Further analysis reveals that an increase in the price-based financial integration indicator tends to raise real GDP but reduces financial stress (Chart 14).** A positive shock to financial integration raises real GDP temporarily and lowers financial stress in parallel. This suggests that the channel through which financial integration (and implicitly geopolitical risk) affects real GDP is mainly through the financial stress channel.

[26] The price-based composite indicator aggregates ten indicators for money, bond, equity and retail banking markets; the quantity-based composite indicator aggregates five indicators for the same market segments except retail banking. The indicators are bounded between zero (full fragmentation) and one (full integration). Increases in the indicators signal greater financial integration, see Financial Integration and Structure in the Euro Area (ECB, 2024b) and Hoffmann, Kremer, Zaharia (2019).

**Chart 14**

Impact of an increase in price-based financial integration on eruo area macro-financial variables




Source: ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.
Note: The shaded areas represent a 68% confidence band.

**The findings underscore the importance of incorporating geopolitical uncertainty into macroeconomic and financial stability assessments, particularly given that geopolitical risks have been rising relative to the past.** Policymakers should be particularly vigilant about the tail risks to GDP growth and financial vulnerabilities that arise from geopolitical shocks.

## 4.3 EU country findings

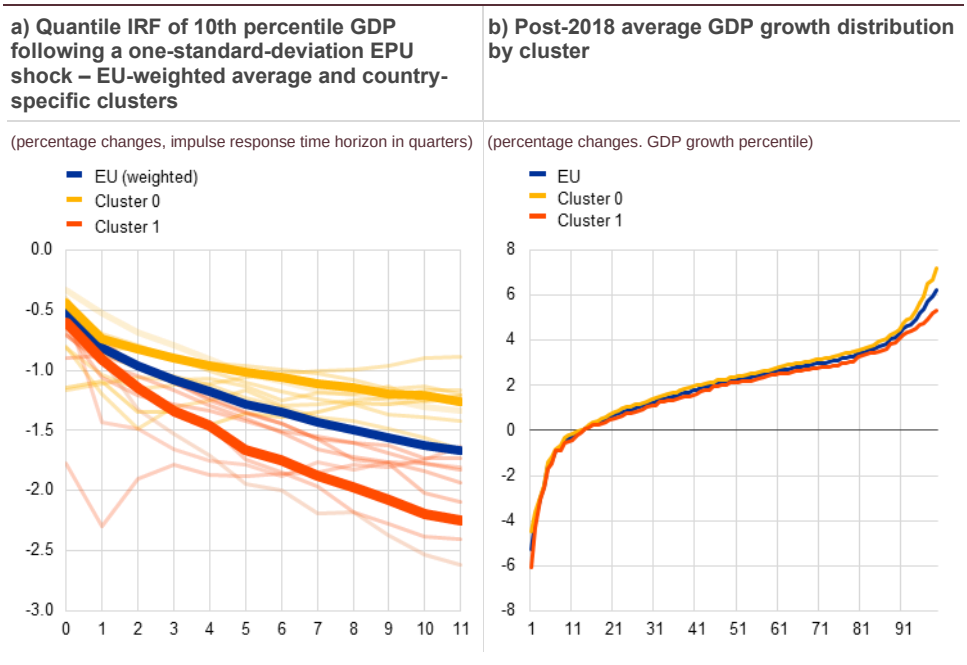
**Economic policy uncertainty shocks[27] show heterogeneous sensitivities to policy uncertainty across EU Member States.** The QVAR framework is used to explore cross-country heterogeneity in the transmission of shocks to macro-financial variables. The QVAR model used (see Section 1.4) incorporates the EPU Index. The responses of 10th percentile of GDP growth reveal sizeable heterogeneity, either owing to the impact of the economic policy uncertainty shock or because of the transmission of the shock through the macro-financial system. To gain an impression of the extent of cross-country heterogeneity, the countries were grouped into two clusters relative to the GDP-weighted EU-wide quantile impulse response function. For all countries, economic policy uncertainty shocks negatively impact macro-financial variables, although the magnitude and persistence vary by country and, correspondingly, by cluster **(Chart 15, panel a)**. Revisiting the GaR results through this lens suggests a broadly consistent clustering pattern, with most countries in the Cluster 1 identified in the QVAR exercise experiencing slightly larger declines at the

[27] The EPU was chosen for its broad coverage (general risk category), relevance for the entire EU Bloc and significant impact in explaining economic dynamics (as highlighted in the findings of this report).

lower end of their GDP distributions compared with Cluster 0, particularly in the post-2018 period, while the reverse holds at the upper end (**Chart 15, panel b**).[28]

**Chart 15**

EU country dispersion in growth-at-risk responses to an economic policy uncertainty shock




Source: ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.
Notes: EPU stands for economic policy uncertainty and IRF for impulse response function. Panel a) displays the quantile impulse response functions (IRFs) of the tenth percentile of GDP growth to a one-standard-deviation EPU shock, estimated using country quantile vector autoregressions. It highlights the EU-weighted average IRF and the two clusters, identified based on country-specific GDP responses (shown in the corresponding colours). Cluster 0 includes Germany, France, Croatia, Slovenia, Poland, Portugal, Slovakia, and Sweden, while Cluster 1 comprises Belgium, Spain, Italy, Hungary, Malta, the Netherlands, Austria and Finland, IT. Panel b) shows the average post-2018 growth-at-risk (GaR), estimated for the full country and time samples under the EPU specification, grouped by a similar country classification (with Spain and Portugal swapped).The plotted results include only countries selected based on data coverage and compatibility.

**The differences in country responses can be partly explained through structural factors that shape the transmission of uncertainty and volatility shocks to GDP growth and financial stress (CLIFS).** The volatility and uncertainty indicators considered in the analysis are financial market volatility (COVOL Index) and economic policy uncertainty (EPU Index) respectively. Specifically, **Chart 15** capture the country-level impacts of the respective shocks on GDP growth rates and the CLIFS, estimated through the QVAR model.

**Countries with greater banking resilience and lower sovereign indebtedness exhibit a mitigated impact of volatility and uncertainty shocks on GDP growth and on financial stress (Chart 16).** Countries with larger capital headroom over total assets (greater banking resilience) show a less negative impact of both common volatility and economic political uncertainty shocks on GDP growth. This is consistent with the notion that larger capital buffers enable banks to sustain credit provision and absorb shocks without amplifying cyclical fluctuations (**Chart 16**, panel

[28] Cluster 0 was made up of Germany, France, Croatia, Slovenia, Poland, Portugal, Slovakia, and Sweden. Cluster 1 comprised Belgium, Spain, Italy, Hungary, Malta, the Netherlands, Austria and Finland.

a.i). By contrast, countries with higher public indebtedness experienced amplified impacts of such shocks on GDP growth, reflecting limited fiscal space and heightened investor sensitivity in debt-burdened economies (**Chart 16**, panel a.ii).

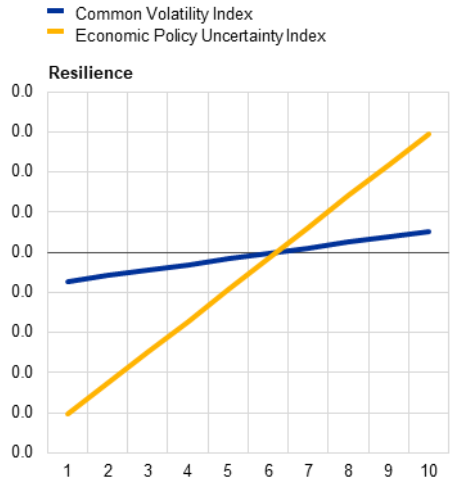
**Countries with greater banking resilience and lower public debt exhibit a mitigated impact of common volatility and economic political uncertainty shocks on CLIFS (Chart 16, panel b).** Countries with greater banking resilience and lower public indebtedness experience reduced financial market stress in response to both common volatility and economic policy uncertainty shocks. This suggests that greater fiscal space and capital headroom in the banking system help cushion markets from turbulence and uncertainty, thereby dampening the transmission of these shocks to financial stress.

## Chart 16

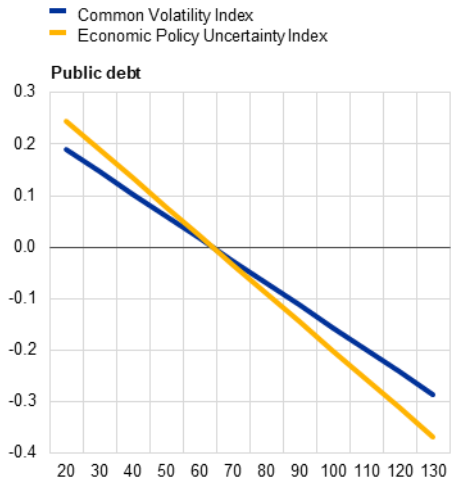
EU country-level GDP and stress responses to common volatility and economic policy uncertainty shocks, grouped by country characteristics (bank resilience, public indebtedness)

**a) Impact of public indebtedness and resilience on economic activity – real GDP growth rate averaged over eight quarters**

(x-axis: headroom capital in percent of total assets; y-axis: GDP change in percentage points)

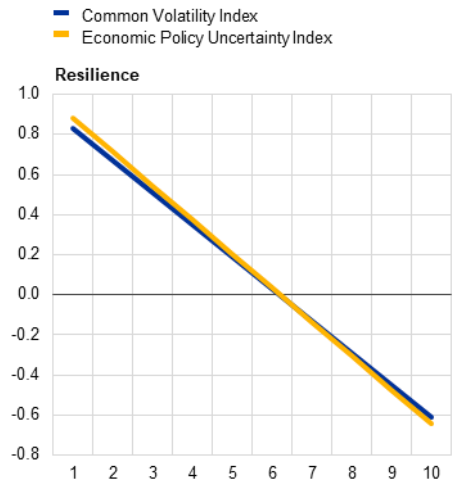



(x-axis: Public debt in percent of GDP; y-axis: GDP change in percentage points)

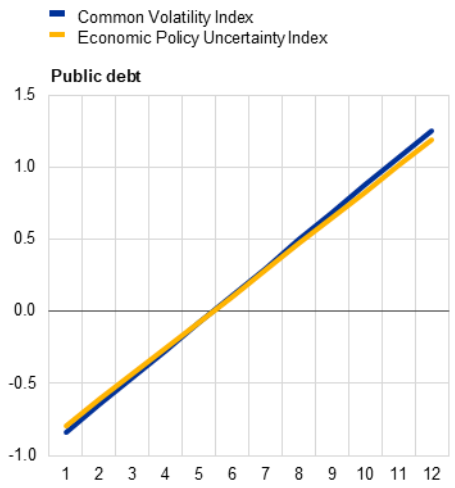



**b) Impact of public indebtedness and resilience on financial stress – Country-Level Financial Stress Index averaged over four quarters**

(x-axis: headroom capital in percent of total assets; y-axis: CLIFS change in index units)




(x-axis: Public debt in percent of GDP; y-axis: CLIFS change in index units)




Source: ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.
Notes: The charts in panel a) show the relationship between the quantile vector autoregression (QVAR) estimates of real GDP growth (average of the 10th-18th percentiles) across countries and their bank resilience (headroom capital over total asset) and public indebtedness (public debt over GDP). An increase in bank resilience of one percentage point is correlated with a mitigation of the negative yearly GDP growth rate of 0.1% and 0.3%, in response to a volatility (Common Volatility Index) and economic policy uncertainty (Economic Policy Uncertainty Index) shock respectively. An increase in the debt-to-GDP ratio of ten percentage points is correlated with an amplification of the negative yearly GDP growth rate of 0.2% for common volatility and economic policy uncertainty shocks. The charts in panel b) show the relationship between the QVAR estimates of the Country-Level Financial Stress Index (CLIFS) (the average of the 92nd-90th percentiles) across countries and their bank resilience (headroom capital over total asset) and public indebtedness (public debt over GDP). An increase in bank resilience of one percentage point is correlated with a mitigation of the CLIFS of 0.2 for volatility and economic policy uncertainty shocks. An increase in the debt-to-GDP ratio of ten percentage points is correlated with an amplification of the CLIFS of 0.2 for the common volatility and economic policy uncertainty shocks.

# 5 Financial market impact of geopolitical risks

## 5.1 Geopolitical risk and financial market spillovers

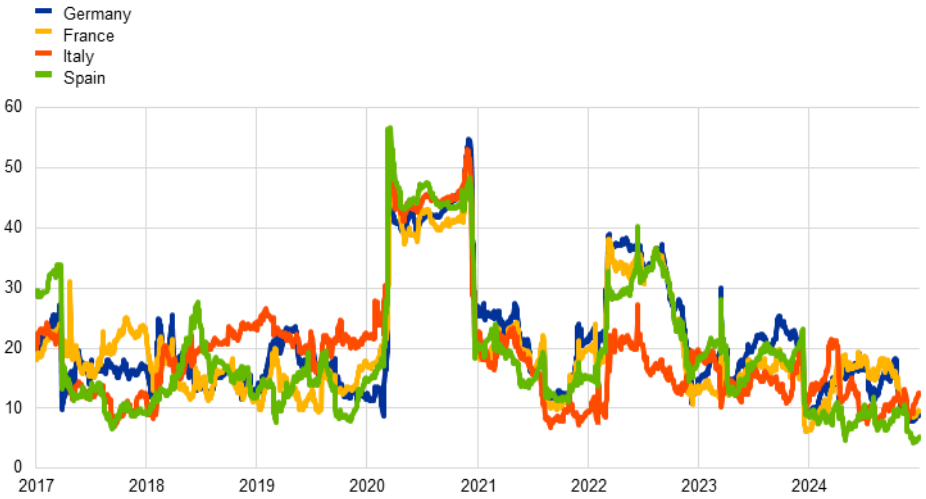
**Geopolitical risk may impact the interlinkages between financial markets, altering common channels of transmission and creating new sources of volatility.** Financial markets represent an ideal framework for analysing the impact of surprise effects, i.e. unanticipated geopolitical shocks and how they are perceived by investors. Shock episodes can have significant relevance given that they may change the expected distribution of outcomes and not just the baseline risk level. By contrast, normal (anticipated) events – widely-discussed or clearly signalled scheduled elections, diplomatic negotiations or policy shifts – may unfold within an expected risk range. Anticipated geopolitical events (such as tariffs announced and implemented according to a clear timeframe) may have macroeconomic or financial consequences, but market reactions may be mild or even absent. Conversely, surprise events, such as the Russian invasion in Ukraine, may trigger significant market reactions through sharp repricing, spikes in volatility, flight-to-safety or widening credit spreads. The ensuing macroeconomic effects may therefore differ, depending on how the situation evolves and on underlying structural factors, some of which are discussed in other sections of this report.

To investigate the potential changes in interlinkages, the analysis measured volatility spillovers among four financial markets — bonds, commodities, USD/EUR foreign exchange rates and equities — in four major economies in the euro area.[29] The Spillover Index developed in Diebold and Yilmaz (2012) is a quantitative measure of how shocks to one variable or market transmit to others within a system, reflecting the overall interconnectedness of that system. Higher values indicate strong cross-market contagion or interdependence, while lower numbers point to a more segmented market (shocks remain mostly idiosyncratic). The Total Volatility Spillover Index reflects the elevated uncertainty in the financial markets over time. In the aftermath of the COVID-19 pandemic, the Total Volatility Spillover Index rose sharply for all four countries in the analysis sample (**Chart 17**). The next increase can be observed immediately after the Russian invasion of Ukraine in February 2022, albeit with differences across countries.

[29] The analysis is conducted using the Diebold-Yilmaz (2012) methodology to estimate the spillover effects among volatility series over the period from 1 January 2000 to 31 December 2024, as well as among a subsample commencing with the onset of the COVID-19 pandemic in Europe on 1 March 2020 and extending until 31 December 2024. Given volatility clustering in asset returns, the daily volatility processes of the financial market variables are formulated using the GARCH (1,1) model. The dataset contains information for Germany, Spain, France, and Italy.

**Chart 17**

Total Volatility Spillover Index by EU country




Source: ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.
Notes: This figure shows the dynamics of the Total Volatility Spillover Index estimated using the Diebold-Yilmaz method across four financial markets — bonds, commodities, USD/EUR foreign exchange and equities — in four major economies in the euro area (Germany, Spain, France and Italy). The analysis was conducted using the full sample period, from 1January 2000 to 31 December 2024. This chart presents a subsample for the purpose of conciseness.

**In a second step, the values of the Total Spillover Index are predicted based on geopolitical risk indices.** Specifically, a lagged correlation measure across quantiles, the cross-quantilogram (CQ) method[30] (Han et al., 2016), was applied to investigate whether the extreme values of the Geopolitical Risk Acts (GPRA) Index – which measures actual conflicts and violence – helped to predict values of similar magnitude in the Diebold-Yilmaz Total Spillovers Index within the four types of financial markets.

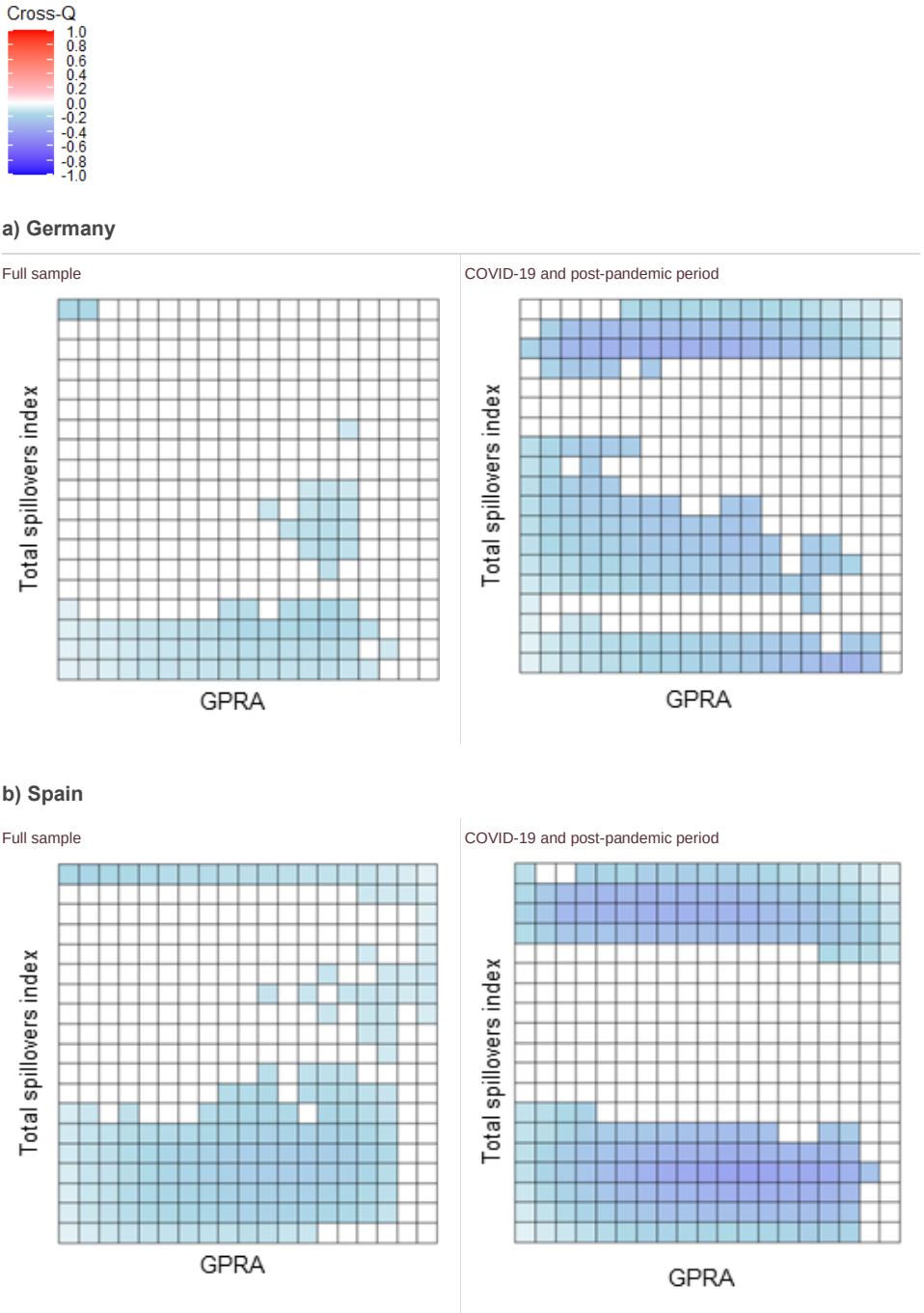
**Geopolitical risk tends to reduce co-movement across financial markets by producing divergences in returns and volatility specific to asset classes, regions and sectors, although extreme periods of stress may temporarily increase correlations (IMF, 2025).** The extreme values of the Total Spillover Index, measured by the lower and upper quantiles,[31] show negative dependence on all quantiles of the GPRA Index over the period spanning from the onset of COVID-19 to the end of 2024 (**Chart 17**), although the same relationship is noticeably weaker for the full sample. This suggests that when systemic spillovers are elevated, as measured by the Total Spillover Index, rising geopolitical risk would dampen interconnectedness, possibly owing to risk aversion or portfolio rebalancing (Affinito and Santioni, 2021).

30 The cross-quantilogram captures dependence in specific parts (quantiles) of the distributions of variables and is particularly useful in financial and macro-financial contexts, where relationships are nonlinear and asymmetric, such as in contagion or tail risk propagation.

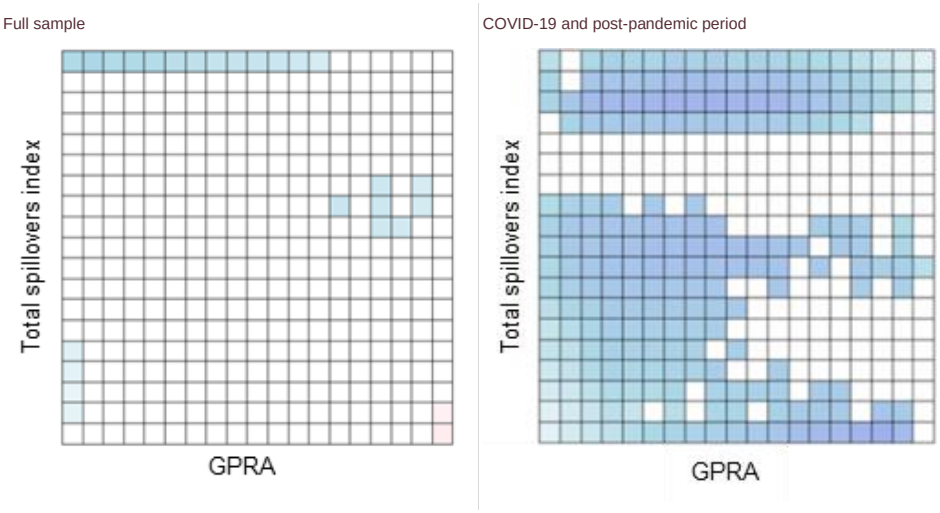
31 Quantiles of 10% and 5% were used and the results were consistent between the two. Chart 26 reports the results using the 5% quantile.

**Chart 18**

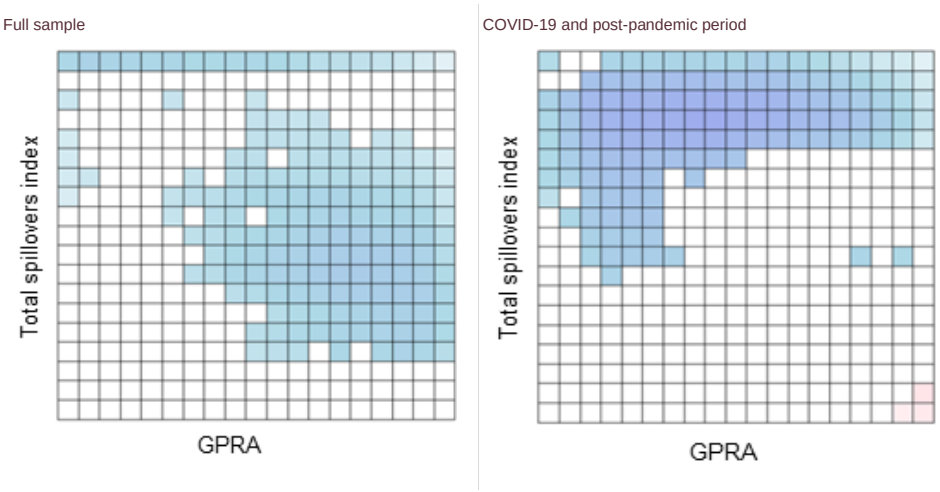
Cross-quantilogram heatmaps between a one-day lagged GPR Acts Index and the Total Volatility Spillover Index for EU Member States



**c) France**




**d) Italy**




Source: ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.
Notes: GPR stands for geopolitical risk. These heatmaps show the CQ between a one-day lagged GPR Acts Index and the Total Volatility Spillover Index. The reported CQ values are statistically significant at the 5% significance threshold. The Total Volatility Spillovers Index was estimated using the Diebold-Yilmaz methodology across national equity index returns, USD/EUR foreign exchange, international commodity index returns and 10-year sovereign bond yields. The analysis was also performed with five-day and 30-day lags, with very similar results.

**Table 4**

Global volatility indices used for EU spillover and causality estimation

| | Markets | Statistical model |
|---|---|---|
| **Country Panel Policy Index** | Country ETFs, FX rates, macro-financial proxies | Time-varying weighted volatilities, country weightings based on market capitalisation and trade |
| **Country TVP DFM Index** | Country ETFs, FX rates, macro-financial proxies | Time-varying parameter – DFM |
| **Country PCA Index** | Country ETFs, FX rates | Rolling window – PCA |
| **Energy PCA Index** | Energy ETFs and futures (for oil, gas, gasoline market) | Rolling window – PCA |

Source: ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.
Notes: ETF stands for exchange-traded fund, FX for foreign exchange and DFM for dynamic factor model. The indicators derived from principal component analysis (PCA) and from the time-varying parameter dynamic factor model (TVP DFM) portray episodes when the volatilities of assets belonging to multiple markets are affected, effectively when stress in the financial system is widespread across markets. Additionally, the Country Panel Policy Index is a country-weighted average of equity and foreign exchange (FX) volatilities, driven by countries with larger financial markets. Finally, the Energy PCA Index includes solely assets linked to oil, gas, gasoline and electricity.

**A model-agnostic method makes it possible to identify directional influence across risk proxies.** The predictive causality test, based on Judea Pearl's ΔR2 diagnostic,[32] reveals the changing architecture of geopolitical volatility. Based on the results of the test, causal channels of prediction may be identified between the financial stress variables and the geopolitical risk indicators. The set of indicators used in the analysis includes the geopolitical risk indicators indicated in Section 3 (the GPR Index and COVOL Index), as well as metrics from financial markets themselves, such as those for country exchange-traded funds (ETFs), foreign exchange rates and energy markets, all capturing different aspects of financial risk across markets (Table 4). Following the Russian invasion of Ukraine, a clear structural transition can be observed, with the Country Panel Policy Index losing systemic importance, while the GPR Index and the Energy Risk Index increase their predictive impact onother indices (**Chart 19,** thicker green arrows originated from the indices). This suggests that risks arising from the energy market and those related to the GPR Index became dominant in transmitting shocks to other market-based indicators, such as the equity and foreign exchange markets. The identification of these volatility sources would make it possible to design early warning systems tailored to specific risk regimes. A two-stage system could be operated. In a first step, single markets or countries affected by the stress would provide warning signs. However, when multiple markets or major economies are affected at the same time, the warning sign is raised to an alert. In turn, the indicators that receive spillovers, such as COVOL Index or the equity and foreign exchange market-based indicators, would signal vulnerabilities and potential channels of contagion.

The results of the causality exercise indicate that the GPR Index was the most important source of volatility spillovers and emerged structurally as a systemic risk source at the onset of the Russian invasion of Ukraine. Such exercise conducted on certain geopolitical events can provide valuable information by disentangling the

[32] Judea Pearl's $\Delta R^2$ diagnostic is a sensitivity analysis tool for causal inference that is designed to quantify how robust an estimated causal effect is to potential omitted-variable bias. The predictive causality test is a way to evaluate whether a predictor truly adds causal information beyond what is already contained in a baseline model (it generalises Granger causality by introducing a causal robustness dimension).

main sources of risk and their overall contributions based on market dynamics, and could serve to inform policy decisions when similar situations arise in the future.

**Chart 19**

Judea Pearl's ΔR2 causality network for financial stress and geopolitical risk indices


Source: ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.
Notes: DFM stands for dynamic factor model, GPR for Standard Geopolitical Risk Index, COVOL for Common Volatility Index, PCA for principal component analysis and TVP DFM for time-varying parameter dynamic factor model. The size of the arrows shows the relative strength of the causality effect and dominance. The colours of the arrows indicate the direction of the change in dominance before and after the start of the Russian invasion of Ukraine.

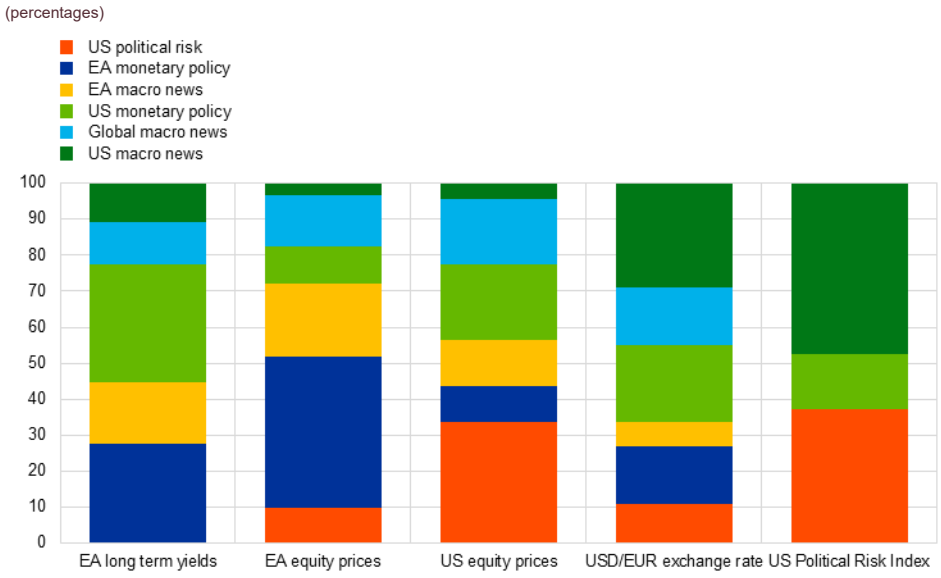
## 5.2 EU financial market reaction to US political risk shocks

**The US presidential election and tariff announcements exemplify how financial markets react sensitively to geopolitical and political risk shocks.** Although such shocks sometimes originally materialise in the United States, the impact can be measured in foreign exchange markets, and spillovers can be observed in euro area equity markets. Quantifying political risk at frequencies suitable for analysing financial markets is an inherently difficult task. Recently, word-count measures, such as the EPU Index (Baker et al., 2016) have gained popularity; owing to the weekly frequency constraint, they are unsuitable for daily financial market analysis. Furthermore, critics argue that media coverage may reflect journalistic preferences, market sentiment or political narratives rather than genuine economic uncertainty. A novel political risk index was developed for the current analysis that used prediction markets to capture US political risk and complements news-based word-count measures. Prediction markets are event markets that allow participants to bet on

events such as election outcomes.[33] By aggregating risk associated with a broad set of political events, this approach captures market participants' views on these events at daily frequency. The risk associated with the materialisation of an unanticipated event is approximated by measuring the inverse distance of market-implied probabilities from equal probability – for binary events, this is a 50% probability.[34] This approach focuses on risks, while remaining agnostic to the political outcomes of individual events. It is therefore neutral as regards any political orientation. Expanding the daily cross-asset structural Bayesian VAR framework[35] with the US Political Risk Index makes it possible to identify structural US political risk shocks and their impact on financial assets.

**Chart 20**

Forecast error variance decomposition – percentage share of explained variation




Sources: Polymarket, Bloomberg and ECB calculations.
Notes: EA stands for euro area, The chart shows the one step-ahead forecast error variance decomposition averaged over all draws from the daily Bayesian vector autoregression (BVAR) over the sample period, running from July 2023 to June 2025.

**Political risk shocks in the United States significantly affect US equity prices and exchange rates, while also creating spillover effects for euro area equity markets – alongside the more traditionally studied impacts of monetary policy and macroeconomic news.** The FEVD showed that US political risk shocks explains up to 34% of US equity price variation, 11% of USD/EUR foreign exchange rate variation and 10% of euro area equity variation over the sample period (**Chart 20**). A key feature of this model is the distinction between US political risk shocks and global macroeconomic shocks. Global macroeconomic shock was accompanied by flight-to-safety dynamics, with negative macroeconomic news resulting in US dollar appreciation against the euro. Conversely, rising US political

[33] Evidence suggest that these markets are efficient in processing information, given that research by CoinDesk shows that the Polymarket prediction market is 90% accurate in predicting how events will occur one month out, and 94% four hours before the event occurs.

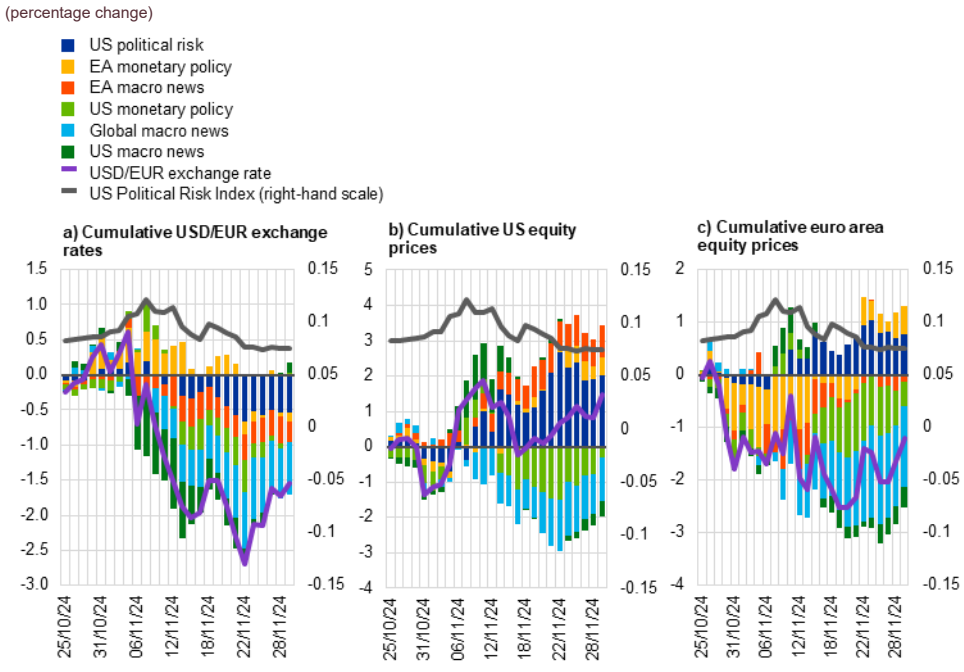
[34] See Annex 2, Section 8.5, for a more detailed description of the construction of the index and the model.

[35] The original framework developed by Brandt et al. (2021) is widely used by centrals banks and has recently also gained popularity with commercial banks and financial data providers.

risk leads to US dollar depreciation against the euro, given that the United States is perceived as being comparably less safe. The US Political Risk Index (**Chart 20**, last bar) is primarily driven by US political risk shocks, US macroeconomic news and, to a lesser extent, US monetary policy.

**Chart 21**

US presidential election, USD/EUR exchange rates, US equity prices, euro area equity prices




Sources: Polymarket, Bloomberg and ECB calculations.
Notes: EA stands for euro area and rhs for right-hand scale. All shock contributions were normalised to zero at the beginning of the analysis period, i.e. 25 October 2024.

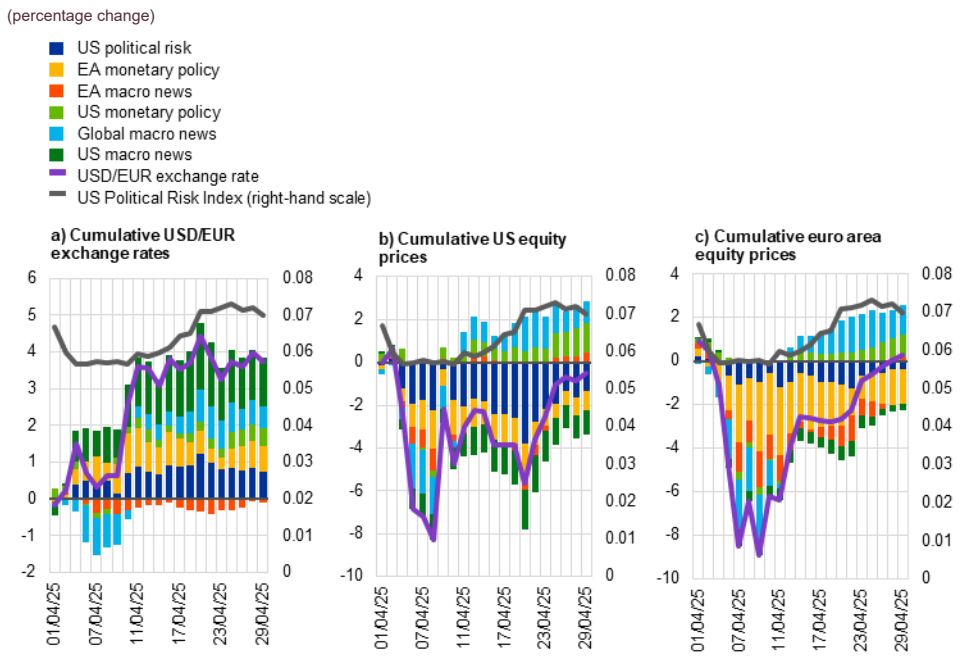
**The US presidential and congressional elections in November 2024 constituted a major political event that impacted the US Political Risk Index and financial markets.** Before election night, prediction markets on the presidential election outcome hovered around 50%, while the volumes bet on the corresponding markets increased massively, supporting a slight upward movement in the US Political Risk Index. In addition to the **"Presidential Election Winner 2024?"** prediction market , markets such as **"Popular vote winner 2024?"** and **"Trump wins every swing state?"** carried a lot of weight. With the election completed and the results becoming clear, the risk around these events was resolved and the risk index therefore came down. In response, the US dollar appreciated partially (driven by negative US political risk shocks, as shown by the green bars in **Chart 21**, panel a), positively contributing to US equity prices and spilling over to euro area equity prices.

**The announcement of the US tariffs on the 2 April 2025, and the subsequent developments, materially increased US political risk, coinciding with sharp US dollar devaluation and material price declines in both US and euro area markets.** Prediction markets – such as the **"Which countries will Trump tariff on April 2?"** and prediction markets more indirectly related to tariffs, such the **"Trump approval rating on April 4"** – contributed materially to the index over this period. In

the days following the announcement, multiple tariff-related prediction markets newly emerged and amplified these dynamics. This illustrates how US political risk shocks differ from global macro shocks owing to the exchange rate response. A shock that increases political risk causes the US dollar to depreciate compared with the euro. That political risk shock also drives a sharp decline in US equity prices, with these dynamics spilling over to the euro area (**Chart 22**, panels b) and c).

**Chart 22**

US tariff announcement: USD/EUR exchange rates, US and euro area equity prices




Sources: Polymarket, Bloomberg and ECB calculations.
Notes: EA stands for euro area and rhs for right-hand scale. All the shock contributions were normalised to zero at the start of the analysis period, i.e. 1 April 2025.

# 6 Impact of geopolitical risk on euro area financial institutions

The impact of large shocks on the economy is better understood when complemented with micro-level data that capture differences across financial institutions, non-financial firms and financial instruments, thereby shedding light on cross-sectional heterogeneity. The following sections first analyse the financial adjustment by energy and non-energy firms to the Russian invasion of Ukraine and then examine the impact of bank-specific exposures to geopolitical risk and to economic policy uncertainty.

## 6.1 Impact of the Russian invasion of Ukraine on euro area banks

### 6.1.1 Firm financing after the Russian invasion of Ukraine

**In the aftermath of the Russian invasion of Ukraine, the global economy faced a significant energy shock that triggered an international energy crisis.** The sharp rise in prices and disruptions to trade, particularly in energy commodities, reshaped markets and illustrate how geopolitical shocks transmit through commodity costs, production and financial conditions. Møller and Poeschl (2025) find that the energy-price shock increased the volatility of energy costs triggered by the Russian invasion and introduced significant and persistent uncertainty for firms. For the purposes of the current analysis, the invasion is treated as an exogenous shock, enabling a clean pre/post-event comparison through which the micro-transmission of the shock to bank lending can be studied with an event-study at the bank-firm level. Energy-intensive sectors are defined ex ante by input share: firms are flagged as energy-intensive if they operate in NACE[36] industries for which electricity and gas account for more than 5% of production inputs. The segments most affected include mining and quarrying, wood and wood products, paper and printing, chemicals, rubber and plastics, non-metallic mineral products and basic metals, as well as utilities and transport.[37]

Employing AnaCredit credit and credit risk data and ECB supervisory data[38] for the period running from the first quarter of 2021 to the first quarter of 2023, the analysis

36 Statistical classification of economic activities in the European community.

37 These are sectors corresponding to NACE codes B07-B08, C16-C24, E36-E39 and H49-H51.

38 The euro area baseline estimation is based on supervisory data for significant institutions.

starts with estimating the impact of the shock event on firm credit growth in energy and non-energy-intensive sectors, applying specification formula (1) below.[39]

Specification formula (1)

$$y_{ibt} = \beta_0 + \beta_1 POST_t + \beta_2 Energy_i + \beta_3 (Energy_i * POST_t) + \beta_4 X_{bt} + \alpha_{ib} + \varepsilon_{ibt}$$

Here $y_{ibt}$ denotes credit conditions at the bank-firm level (loan-stock growth, new-loan amounts, interest rates and maturities); $POST_t$ equals 1 from the second quarter of 2022 onward; $Energy_i$ indicates energy-intensive sectors and is created as a dummy variable of value 1 if the firm belongs to an energy-intensive sector and 0 otherwise; $X_{bt}$ are bank-level controls; $\alpha_{ib}$ are bank-firm fixed effects, and standard errors ($\varepsilon_{ibt}$) are clustered at the bank-firm level. Further details of the variables and descriptive statistics are provided in the Annex 2.

**In the context of the energy-price shock following the Russian invasion, the marginal effects reveal sector-specific differences in the impact on firm loan growth.** Relative to the pre-invasion period (first quarter of 2021 to the fourth quarter of 2021), loan-stock growth declines after the invasion (second quarter of 2022 to the first quarter of 2023) for both non-energy firms and energy-intensive firms, with a smaller estimated fall for non-energy firms (down by about 1.0%) and a larger decline for energy-intensive firms (down by about 2.4%) **(Table A9)**. The findings are consistent with the greater exposure of energy-intensive producers to input-price volatility and operational risk.

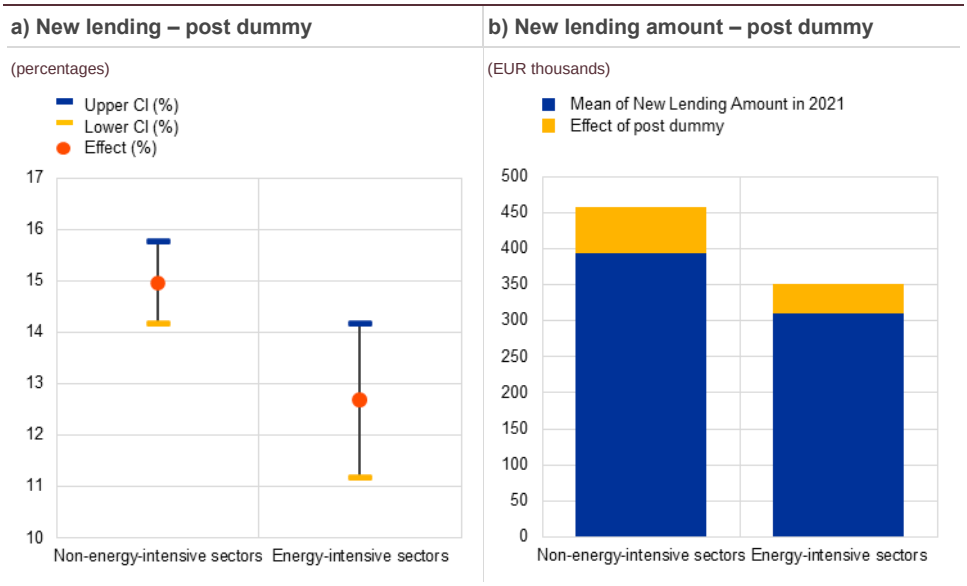
**New lending increases after the invasion for both groups relative to the pre-invasion baseline.** The marginal effect on new-loan amounts is positive for both non-energy firms (up by about 15.0%) and energy-intensive firms (up by about 12.7%) (**Chart 23** and **Table A10**). These patterns suggest that, despite elevated uncertainty, firms were able to obtain additional financing; this may, in part, reflect policy support (e.g. guarantee schemes under the EU Temporary Crisis Framework[40]) that reduced lenders' risk. Moreover, the apparent divergence between stocks and flows is economically coherent: stocks reflect net changes after amortisations, scheduled redemptions, early repayments, write-offs and possible reclassifications (e.g. non-performing loan (NPL) migration), whereas flows capture gross originations. In a stress episode, firms can increase gross borrowing to meet liquidity needs, while outstanding balances net out more quickly; this is particularly plausible for energy-exposed borrowers facing higher working-capital needs alongside tighter rollover policies.

[39] We define the period from the first quarter of 2021 to the fourth quarter of 2021 as the "pre-invasion" period and that from the second quarter of 2022 to the first quarter of 2023 as the "post-invasion" period.

[40] The EU Temporary Crisis Framework, adopted in March 2022, included several measures that indirectly reassured banks and encouraged them to continue granting credit to firms affected by the energy crisis and geopolitical uncertainty. These measures did not target banks directly but created conditions that reduced credit risk and improved borrower viability. Key measures included: public guarantees on loans, discounted interest rates on loans and liquidity support through direct grants, repayable advances and tax advantages.

**Chart 23**

Effect of post-period shock on the euro area new lending amount by sector grouping




Sources: AnaCredit and ECB calculations.
Note: CI stands for confidence interval. Panel a) shows the marginal effects of the post dummy on the new lending amount for each sector. Panel b) presents the impact of the same marginal effects in thousands of euro.

**Within the energy-intensive group, new-credit expansion is concentrated among stronger firms.** Applying specification formula (2) below and using a pre-invasion (2021) performance split within energy-intensive sectors, non-vulnerable firms[41] exhibit a statistically significant increase in new-loan amounts (up by about 16.3%), whereas vulnerable firms show a smaller and statistically insignificant estimate (up by about 1.0%) (**Table A11**). This pattern is consistent with risk-sensitive supply, with banks channelling new credit toward non-vulnerable firms.

Specification formula (2)

$$y_{ibt} = \beta_0 + \beta_1 POST_t + \beta_2 Vulnerable_i + \beta_3 (Vulnerable_i * POST_t) + \beta_4 X_{bt} + \alpha_{ib} + \varepsilon_{ibt}$$

**Interest rates rose on both outstanding and new loans, albeit with different sector patterns.** Relative to the pre-invasion period (first quarter of 2021 to fourth quarter of 2021), average rates on the stock of credit grew modestly,[42] up by 1 basis point for non-energy firms and up by 6 basis points for energy-intensive firms (**Table A12**). For new loans, pricing rose more visibly, up by 73 bps for non-energy firms and by 65 basis points for energy-intensive firms (**Table A14**). The broad upward move is consistent with the monetary policy tightening cycle. The slightly smaller increase in new loans to energy-intensive firms may reflect the composition and risk-mitigating factors (e.g. larger ticket sizes, higher collateralisation and the use of

41 The "Vulnerable" versus "Non-vulnerable" classification within energy-intensive sectors is based on a pre-invasion performance indicator (turnover-to-assets), with "Vulnerable" denoting firms below the energy-sector median in 2021.

42 These patterns are consistent with the ECB tightening cycle. Controlling for market benchmarks indicates a compression of loan spreads, particularly at better-capitalised banks.

public guarantees), in addition to banks' risk-adjusted pricing, given the sector's strategic importance.

**Once market rates are partialled out, the post-invasion effect on loan pricing turns slightly negative, evidence of a "spread squeeze."** When lagged ten-year sovereign yields are included as a proxy for banks' funding/benchmark rates, the post coefficient on loan pricing switches from positive to slightly negative for both sector groups, indicating that banks absorbed part of the market-rate surge rather than fully passing it on (**Table A15**).

**Within energy-intensive sectors, vulnerable firms tend to pay more for new loans.** The post-invasion increase in new-loan rates is up by about 85 basis points for vulnerable energy-intensive firms as compared with a rise of 70 basis points for non-vulnerable firms (Table A9). This pattern is consistent with lenders pricing in additional risk and complements the loan volume evidence that vulnerable firms captured less of the post-shock expansion in new credit.

**Table 5**

Impact of the Russian invasion of Ukraine on euro area bank lending to firms

| Marginal effects | Loan volume (stocks) in percentages | Loan volume (flows) in percentages | Interest rate (stocks) in basis points | Interest rate (flows) in basis points |
|---|---|---|---|---|
| **Post dummy** (non-energy sector) | -10.2*** | 16.1*** | 1.4*** | 73.8*** |
| **Post dummy** (energy sector) | -23.5*** | 13.5*** | 6.0*** | 64.6*** |

Notes: *** indicates a 1% confidence level.

**Energy-intensive firms experienced larger disruptions to loan growth, while new lending recorded a lower rate of expansion for this group.** Relative to pre-invasion trends, loan-stock growth fell for all firms and more for energy-intensive sectors, consistent with greater exposure to energy-cost uncertainty. At the same time, new lending amounts rose after the invasion for both groups, although the increase was smaller for energy firms, suggesting that precautionary borrowing and support measures helped to sustain financing despite the shock.

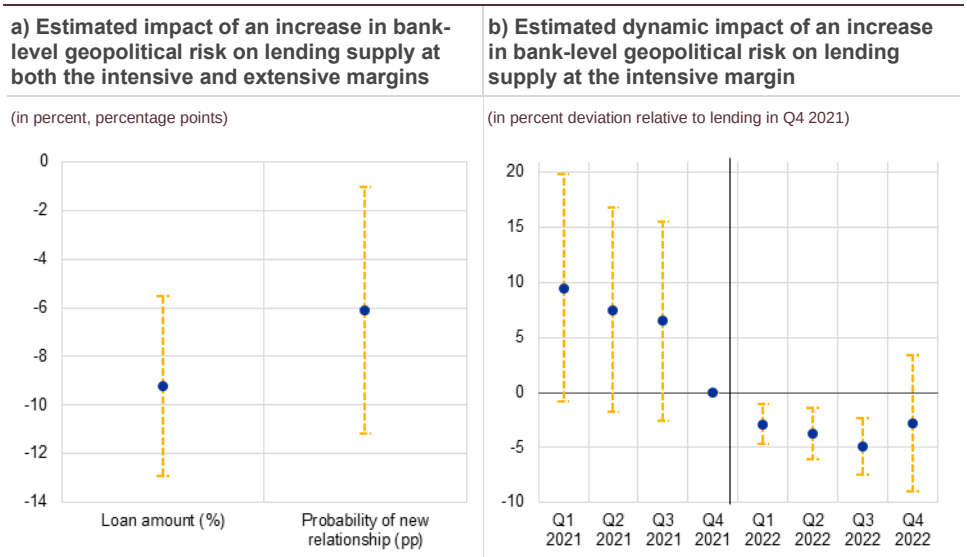
### 6.1.2 Exposure to geopolitical risk and bank lending after the Russian invasion of Ukraine

**This section empirically examines whether, and to what extent, the heterogeneity in banks' exposure to geopolitical risk explains differences in the bank lending supply to non-financial corporates after the onset of the Russian invasion of Ukraine.** To test these hypotheses, the analysis employs a difference-in-differences approach using AnaCredit and supervisory data covering the period between the first quarter of 2021 and the fourth quarter of 2022, thus

including the periods both before and after the invasion.[43] The key variable of interest in this analysis is the interaction between a bank-level geopolitical risk indicator (introduced in Dieckelmann et al., 2025) which captures the change in individual banks' exposure to geopolitical risk, and a dummy that takes value equal to 1 in the first quarter of 2022, i.e. at the onset of the invasion, and in the subsequent quarters.[44]

**Chart 24**

Estimated impact of increased bank geopolitical risk exposure following the invasion of Ukraine




Sources: Anacredit, ECB (supervisory data) and ECB calculations.
Notes: Panel a) shows the estimated response of bank-firm loan amounts to a one-standard-deviation increase in bank-level geopolitical risk exposure and the probability of new lending relationships being established following the Russian invasion of Ukraine. The regressions are estimated on a sample of 363 euro area banks, with quarterly data spanning from the first quarter of 2021 to the fourth quarter of 2022. The confidence intervals are set at the 90% level. Panel b) shows the estimated response of bank-firm loan amounts to a one-standard-deviation increase in bank-level geopolitical risk index following the Russian invasion of Ukraine at different time horizons. Confidence intervals are set at the 99% level.

**Euro area banks that were more exposed to the increase in geopolitical risk stemming from the Russian invasion of Ukraine significantly reduced lending supply to non-financial corporates compared with their peers.** Banks more exposed to geopolitical risk contracted both their lending volumes (intensive margin) and the probability of establishing new lending relationships (extensive margin) more than their peers (**Chart 24**, left panel). Importantly, before the invasion, there were no significant differences in lending behaviour between banks with varying levels of geopolitical risk exposure. However, the situation changed afterwards. The reduction

[43] This analysis is sourced from Avril et al. (2025) and relies on a dataset that merges the AnaCredit credit register data on euro area bank lending to non-financial corporates at loan level with bank-level balance sheet and profit and loss data from ECB Supervisory Statistics, and data on individual firms from Orbis. The analysis is based on a sample of 363 euro area banks. The granularity of the data makes it possible to control for credit demand.

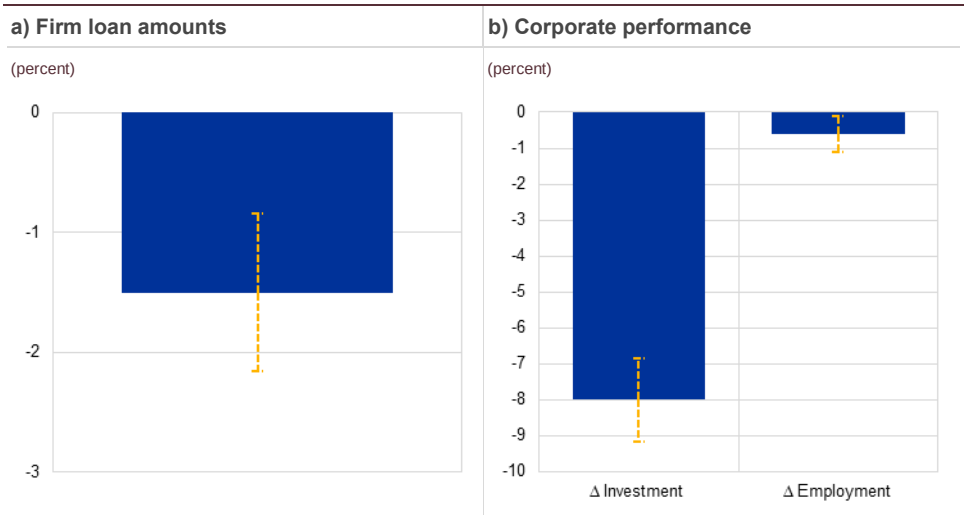
[44] This indicator is built by weighting the change in the standardised country-level geopolitical risk (CGPR) indices of Caldara and Iacoviello (2022) with bank-level asset-side exposures to the different countries in which banks operate, sourced from the ECB Supervisory statistics. Specifically, the geopolitical risk component is defined as the change in the country-level GPR z-score between the quarter of the invasion (first quarter of 2022) and the previous quarter (fourth quarter of 2021), capturing the spike caused by the invasion. This change is then weighted by the bank's average asset-side exposure shares in 2021. See Dieckelmann et al. (2025).

in lending volumes became statistically significant after the onset of the invasion, albeit the effect was not persistent and dissipated within three quarters as uncertainty about the potential impacts of the conflict declined **(Chart 29, right panel)**.[45] This short-lived but significant contraction underscores the sensitivity of lending supply to geopolitical risk.

**Firms heavily reliant on banks with high exposure to geopolitical risk were unable to fully substitute the reduction in credit by borrowing more from less-affected banks, with repercussions on their overall performance.** The analysis finds that firms which, before the conflict, had more than 50% of their credit originating from banks that were above the median of the geopolitical risk exposure distribution saw their borrowing fall (down by 1.5%) and were unable to offset the reduction in the bank lending they received, underscoring the impact that geopolitical risk can have on firms' ability to access credit **(Chart 25 panel a)**. The tighter financial constraints faced by these firms had a significant impact on their overall performance, resulting in notable declines across key indicators, such as investment and employment **(Chart 25 panel b)**.[46] These findings underscore the far-reaching effects of geopolitical risk, which can disrupt both the financial system and the broader real economy.

**Chart 25**

Impact of reduced lending following the Russian invasion of Ukraine on firms largely reliant on banks highly exposed to geopolitical risk




Sources: Anacredit, ECB (supervisory data) and ECB calculations.
Notes: Yellow dotted line indicates confidence interval. Panel a) shows the estimated responses following the Russian invasion of Ukraine of firm loan amounts to borrowing from banks with a high geopolitical risk exposure. Firms were classified as 'exposed' if at least 50% of their loans were sourced from banks in the top quartile of geopolitical risk exposure before the invasion. The regression is estimated using quarterly data spanning from the first quarter of 2021 to the fourth quarter of 2022. Confidence intervals are set at the 90% level. Panel b) shows the estimated responses of firm performance variables to being classified as 'exposed'. The dependent variables capture variations between 2021 and 2022. Confidence intervals are set at the 90% level.

[45] Specifically, for the average bank, a one-standard-deviation increase in the bank-level geopolitical risk indicator resulted in a decrease of about 9.2% in lending supply (with respect to peers) after the start of the invasion. Furthermore, a one-standard-deviation increase in the bank-level geopolitical risk indicator resulted in a 6.1 percentage point lower probability of the establishment of new bank-firm relationships following the onset of the invasion.

[46] Indeed, owing to the increase in geopolitical risk, these firms underperformed compared with their peers. In relative terms, investment fell by 8.0 percentage points and employment growth slowed by 0.6 percentage points.

### 6.1.3 The role of bank capital in the financing of euro area firms

**This section examines whether bank capital headroom shaped lending to energy-intensive firms.** Using AnaCredit data in combination with supervisory data from the first quarter of 2021 to the first quarter of 2023,[47] an estimation was undertaken of the role played by banks' lagged management buffers (capital above requirements and Pillar 2 guidance or P2G) for firm-level credit outcomes before and after the invasion. Our baseline specification formula is an interacted difference-in-differences with bank-firm fixed effects:

Specification formula (3)

$$y_{ibt} = \beta_0 + \beta_1 MB_{b,t-1} + \beta_2 Energy_i + \beta_3\left(MB_{b,t-1} * Energy_i\right) + \beta_4 POST_t + \beta_5\left(MB_{b,t-1} * post_t\right) + \beta_6(Energy_i * POST_t) + \beta_7\left(MB_{b,t-1} * Energy_i * POST_t\right) + \beta_8 X_{bt} + \alpha_{ib} + \varepsilon_{ibt}$$

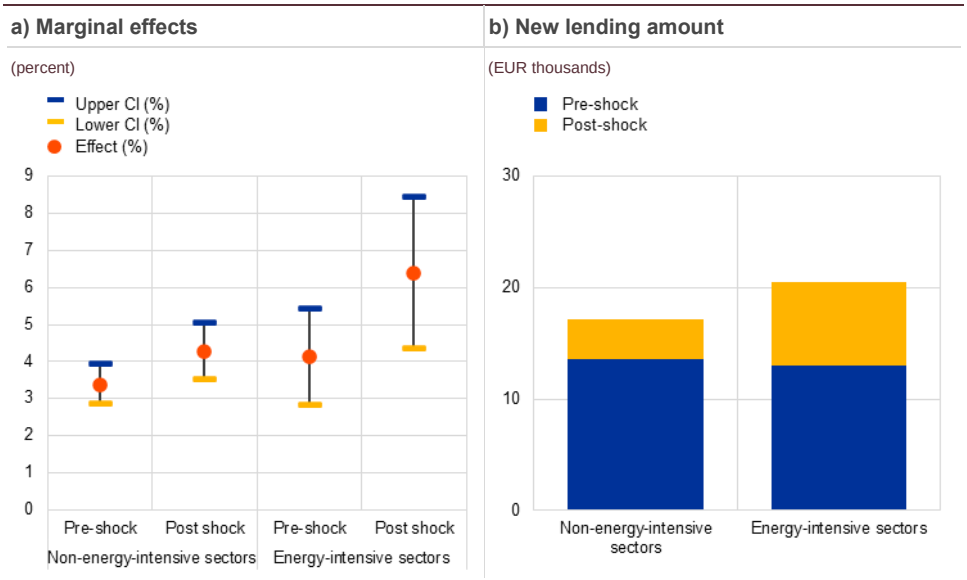
Here $y_{ibt}$ denotes credit conditions at the bank-firm level (loan-stock growth, new-loan amounts, interest rates and maturities); $MB_{b,t-1}$ is the lagged management buffer (lag of the level of capital above regulatory requirements and P2G); $Energy_i$ indicates energy-intensive sectors and is created as a dummy variable of value 1 if the firm belongs to an energy-intensive sector and 0 otherwise; $POST_t$ equals 1 from the second quarter of 2022 onwards; $X_{bt}$ are bank-level controls; $\alpha_{ib}$ are bank-firm fixed effects, and standard errors ($\varepsilon_{ibt}$) are clustered at the bank-firm level. Further details of the variables and descriptive statistics are provided in the Annex 2.

**Bank capital headroom is associated with higher lending, and the association is stronger for flows than for stocks.** A 1 percentage point increase in the lagged management buffer is linked to higher loan stocks for non-energy firms, up by about 1.5%, and for energy-intensive firms, up by 1.0% (**Table A18**), and is also linked to higher new-loan amounts for non-energy firms, up by about 4.3%, and for energy-intensive firms, up by 6.4% (**Chart 26**, **Table A19**). This also reflects the apparent divergence between stocks and flows outlined in Section 6.1.1.

[47] The period from the first quarter of 2021 to the fourth quarter of 2021 was defined as the "pre-invasion" period, and from the second quarter of 2022 to the first quarter of 2023 as the "post-invasion" period. The euro area baseline estimation is based on supervisory data for significant institutions (SIs). In addition to the euro-area baseline estimation set out in the Annex, we provide country-level analyses for Spain, Portugal and Slovenia using AnaCredit and Common Reporting (COREP)/ financial reporting (FINREP), including SIs and less-significant institutions or LSIs. Those analyses are presented in the Annex 2.

**Chart 26**

Marginal effect of euro area management buffers on the new-lending amount before and after the shock




Sources: AnaCredit and calculations by the ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.
Notes: CI stands for confidence interval. Panel b) depicts the incremental new lending relative to the 2021 mean in the pre- and post-shock periods, corresponding to a 1 percentage point increase in the management buffer.

**Banks with larger capital headroom price more softly, and, for new lending, the effect is economically meaningful.** A 1 percentage point increase in the lagged management buffer is associated not only with small reductions in stock rates – down by about 4 basis points for non-energy firms and by 3 basis points for energy-intensive firms (**Table A18**) – but also with materially larger reductions in new-loan rates – down by about 29 basis points for non-energy firms and by 33 basis points for energy-intensive firms (**Table A19**). By way of context, the mean of new-loan rates in 2021 was 191 basis points and 211 basis points for non-energy and energy-intensive firms respectively. In addition, higher buffers are linked to longer maturities on new lending for energy-intensive firms (**Table A23**), consistent with banks using capital headroom to offer more accommodating terms (price and maturity) when uncertainty is elevated, pointing to capital headroom playing a stabilising role in the immediate aftermath of the shock.[48]

The following table summarises the main findings of the analysis.

[48] Furthermore, although portfolio diversification could, in principle, weaken the marginal effect of capital headroom on lending to energy-intensive firms, our findings mainly reflect differences in banks' capital flexibility during the shock, so diversification is not expected to materially affect the stronger lending response observed among better-capitalised banks.

**Table 6**

Impact of bank management buffers on loan conditions for euro area firms

| Marginal effects | Loan volume (stocks) in percent | Loan volume (flows) in percent | Interest rate (stocks) in basis points | Interest rate (flows) in basis points |
|---|---|---|---|---|
| **Management buffer** (in post-period) Non-energy sector | 1.5*** | 4.3*** | -3.5*** | -29.0*** |
| **Management buffer** (in post-period) Energy sector | 1.0*** | 6.4*** | 2.7*** | -32.7*** |

Notes: *** indicates 1% confidence level.

The contrast between stocks and flows is economically meaningful and policy relevant. Stocks reflect pre-existing relationships that adjust slowly (through amortisation, repricing cycles or reclassification), whereas flows capture the margin at which banks meet liquidity and working-capital needs during stress. The evidence suggests that well-capitalised banks acted as shock absorbers on this margin, directing relatively more (and better-priced) new credit to energy-intensive sectors. This is consistent with targeted support and risk-based allocation rather than a blanket pullback.

**The findings above highlight the importance of bank-specific characteristics in withstanding geopolitical shocks and in supporting continued lending to the real economy.** Given that geopolitical shocks can propagate through multiple channels, banks need to properly identify and manage these risks in order to strengthen their resilience to external shocks.[49] In particular, banks must have strong governance and risk management frameworks in place to effectively monitor and address geopolitical risks. Furthermore, sound financial risk management, prudent capital planning and stress testing are key aspects in preventing excessive risk-taking and ensuring adequate capital planning. Operational resilience is a matter that also calls for close attention in a world of increasing cyber threats and risks of disruptions of service owing to high reliance on third parties.

### 6.1.4 EU bank funding adjustments to geopolitical shocks

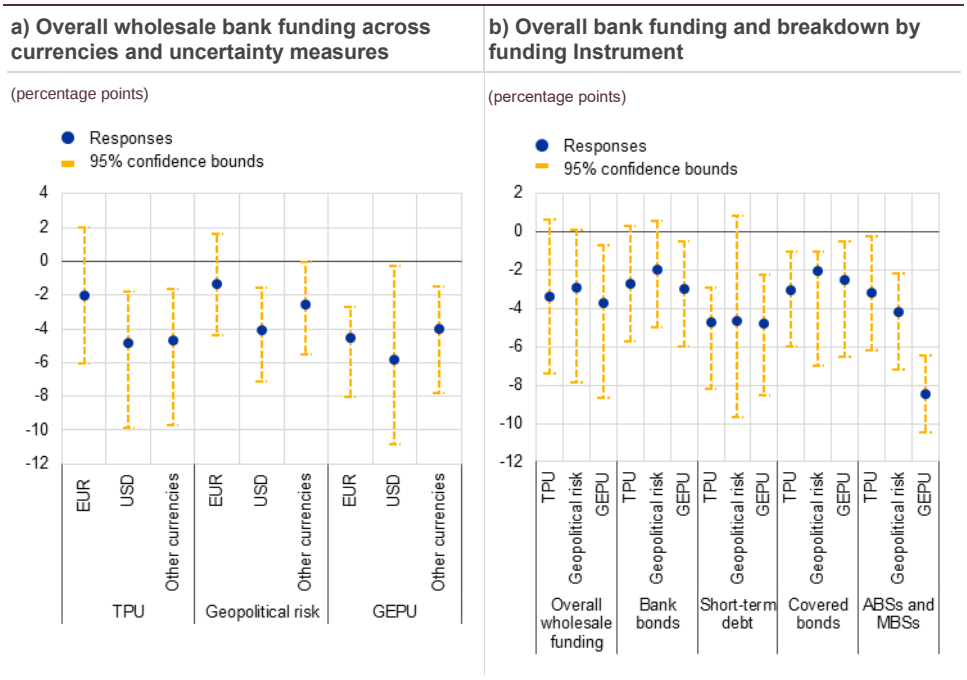
**A specific channel of adjustment to geopolitical shocks affecting financial stability is that relating to changes in bank funding and lending.** Using aggregated banking data on funding across four instruments – covered bonds, unsecured bonds, short-term debt and asset-backed securities (ABSs) – a structural VAR is used to study the effects of a shock to the TPU Index, EPU Index and GPR Index respectively on euro area bank market funding. The SVAR includes as endogenous variables a set of macro-financial variables, i.e. the euro area GDP year-on-year growth rate, the euro area HICP inflation, the euro area ten-year government bond yield and the USD/EUR exchange rate. The SVAR also includes as key variables of interest, measures of bank market funding (bank bonds, covered

[49] For further information on the incorporation of geopolitical risk into supervision, please see the article entitled “Addressing the impact of geopolitical risk” on the ECB website.

bonds, ABSs, mortgage-backed securities (MBS) and short-term debt), which are examined individually and further differentiated by currency of denomination.[50]

**Chart 27**

Maximum impulse response of EU bank funding in different currencies and of different funding instruments following shocks to trade and economic policy uncertainty and to geopolitical risk




Source: ECB calculations.
Notes: These charts show the country-level minimum/maximum impulse responses over a 12-quarter period of key macro-financial variables to a one-standard-deviation positive shock to the geopolitical indicators considered. The blue dots in the charts depict the percentage point maximum impact after a one-standard-deviation shock in the Trade Policy Uncertainty (TPU) Index, the Standard Geopolitical Risk (GPR) Index and the Economic Policy Uncertainty (GEPU) Index. 95% bootstrapped confidence bands are shown as yellow broken lines. The funding instruments considered were bank bonds, short-term debt, covered bonds, ABSs and MBSs.

An increase in trade or economic policy uncertainty and in geopolitical risk led to a marked retreat in bank wholesale funding issuance, accompanied by a relative shift towards issuance denominated in domestic currency. The pattern of wholesale funding reduction across currencies is broadly similar following a one-standard-deviation shock across the three indicators, the decline in the wholesale funding issuance denominated in foreign currency being larger and more immediate than for euro denominated funding.[51] More specifically, a trade policy uncertainty shock led to a significant reduction, of around 5 percentage points, in wholesale funding issuance denominated in USD and in other foreign currencies, but is not significant for funding denominated in euro (**Chart 27**, panel a). Similarly, in response to geopolitical risk and economic political uncertainty shocks, bank wholesale funding

[50] In the SVAR, a Cholesky identification approach is used. The geopolitical uncertainty variable is ordered first, followed by the macro-financial variables and lastly the funding variables, which were taken in logs. The dataset used is at quarterly frequency. The lag length was determined by Akaike and Schwarz information criterion. 95% confidence bounds were bootstrapped using the Efron & Hall bootstrap procedure (see Luetkepohl, 2006). The uncertainty variable is ordered first since it is assumed to be exogenous, and it is also assumed that bank funding shocks will not impact uncertainty measures within a quarter.

[51] The timing of maximum reduction is four to eight quarters after the shock for EUR currency funding and zero to two quarters for USD and other currency funding.

issuance in foreign currency is also reduced, by between 2 and 6 percentage points respectively. The limited impact for euro denominated funding may hint at a possible rebalancing from funding in foreign currency to domestic currency, given that funding costs increase owing to investors' higher risk aversion and to mitigate risks stemming from exchange rate volatility, especially if that exposure is not hedged. Furthermore, banks with high foreign currency exposure may face disrupted funding during periods of increased global risk aversion induced by uncertainty or geopolitical risks and this may constrain lending and increase bank fragility (Krogstrup and Tille, 2018). Consequently, banks facing higher funding uncertainty tend to turn towards more stable local currency funding sources in order to mitigate risks associated with counterparty concerns and liquidity shortages.[52]

Breaking down funding by instrument, the analysis shows that the issuance of bank bonds and covered bonds is relatively more stable following uncertainty shocks, while funding through ABS and MBS instruments, and short-term debt was more vulnerable. In particular, a one-standard-deviation uncertainty shock leads to a decline in the issuance of ABSs and MBSs and of short-term debt of some 3 and 8 percentage points respectively where the decline is significant. For bank bonds and covered bonds, the response is milder, with a fall of around 2 to 3 percentage points **(Chart 27, panel b)**. This divergence in responses across instruments may have been affected by a number factors. First, banks can time the issuance of funding instruments to benefit from favourable market conditions. For longer-term funding instruments, such as senior unsecured and covered bonds, smaller amounts can be rolled over to ensure smoother issuance over time, while larger amounts of shorter-term funding tend to lead to larger swings. Second, the timing choices made by banks are also affected by increased investor risk aversion in times of uncertainty and geopolitical risk, resulting in a need for higher risk premia and in a reduced supply of funds. As a result, riskier instruments are affected more than safer instruments, such as covered bonds. Looking ahead, a sustained period of uncertainty may test the limits of absorption of bank market wholesale funding, especially for instruments denominated in foreign currencies.

## 6.2 US economic policy uncertainty and euro area bank lending

**Beyond the effects of geopolitical risk in the context of the Russian invasion of Ukraine, US economic uncertainty has intensified, driven by a combination of heightened geopolitical tensions, shifting trade policies and increasing political fragmentation.** As with geopolitical risk, elevated economic policy uncertainty can constrain credit supply, given that banks may adopt more cautious lending strategies to protect their balance sheets from potential losses. The resultant tightening of credit supply conditions may amplify economic downturns by worsening the financial conditions for firms and by weighing on output and employment. Empirical evidence shows that spikes in domestic uncertainty – measured through

[52] Planning horizons for tapping the markets were also longer-term in EUR markets (three to ten years), compared with a shorter one to five year tapping horizon for the USD market.

indicators such as the EPU Index **(Chart 28, panel a)** – are associated with slower growth in domestic bank lending.[53] However, the spillover effects of increases in economic policy uncertainty lead to a contraction in lending in other countries are less well documented. This section examines whether US-driven increases in economic policy uncertainty spill over to euro area bank lending (Behn et al., forthcoming).

**Using loan-level bank-firm data and quarterly observations for the period from 2015 to 2025, the analysis estimates the impact of US-driven economic policy uncertainty on credit conditions in the euro area.** The following econometric specification is used.

Specification formula (5)

$$y_{b,f,t} = \alpha_{f,t} + \sigma_{b,f} + \beta BEPU_{b,t-1} + \gamma X_{b,t-1} + \epsilon_{b,f,t}$$

Here *b*, *f* and *t* denote bank, firm and quarter, respectively. Y identifies bank-firm level credit conditions (new-loan amount, interest rate and maturity). BEPU is the bank-level exposure to US-driven economic policy uncertainty – measured in terms of ex ante USD asset exposure.[54] X includes a large set of lagged bank-specific characteristics potentially affecting bank lending behaviour including: the logarithm of bank total assets, the Common Equity Tier 1 (CET1) ratio, the liquidity coverage ratio and the return on assets. The richness of loan-level data also makes it possible to isolate supply effects by controlling for firms' loan demand through borrower-by-quarter fixed effects ($\alpha_{f,t}$) and for bank-firm relationships through borrower-by-bank fixed effects ($\sigma_{b,f}$). Standard errors were clustered at the bank-by-quarter level.

**A surge in US-driven economic policy uncertainty leads euro area banks to reduce lending to non-financial corporations.** The econometric estimates show that banks with greater exposure to US-driven economic policy uncertainty tend to contract euro area credit supply to non-financial corporations more than their peers. The estimated effects are statistically significant at the 1% level and economically meaningful: a one-standard-deviation increase in bank exposure to US-driven economic policy uncertainty is associated, on average, with a decline of about 4.5% in total lending and 5.5% in term loans (**Chart 28**, panel b).[55]

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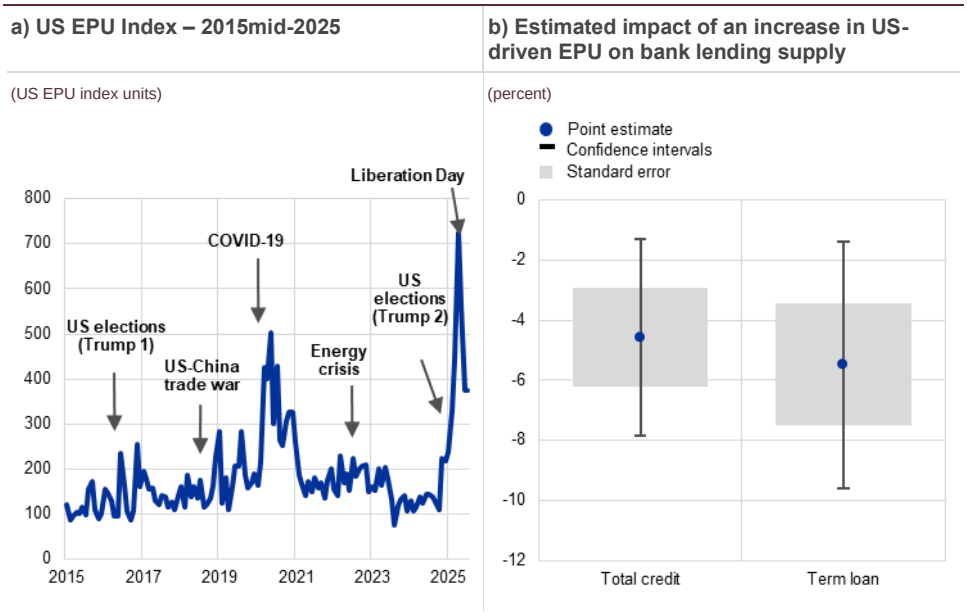
53 See Alessandri and Bottero (2016), Gissler et al. (2016), Valencia (2016) and Bordo et al. (2016).

54 Bank-level exposure to US economic policy uncertainty is measured as $\frac{1}{4}\left(\sum_{i=1}^{4} \frac{US\ Exposure_{b,t-i}}{Total\ Assets_{b,t-i}}\right) x\ US\ EPU_{t-1}$. US exposure included derivatives, equity instruments, cash balances at central bank and other demand deposits, debt securities, and loans and advances to the USA.

55 The standard deviation of the bank-level exposure to US-driven economic policy uncertainty was 7.41. The point estimates were calculated by multiplying the standard deviation with the estimated coefficient.

**Chart 28**

Economic Policy Uncertainty Index and estimated impact on loan volumes

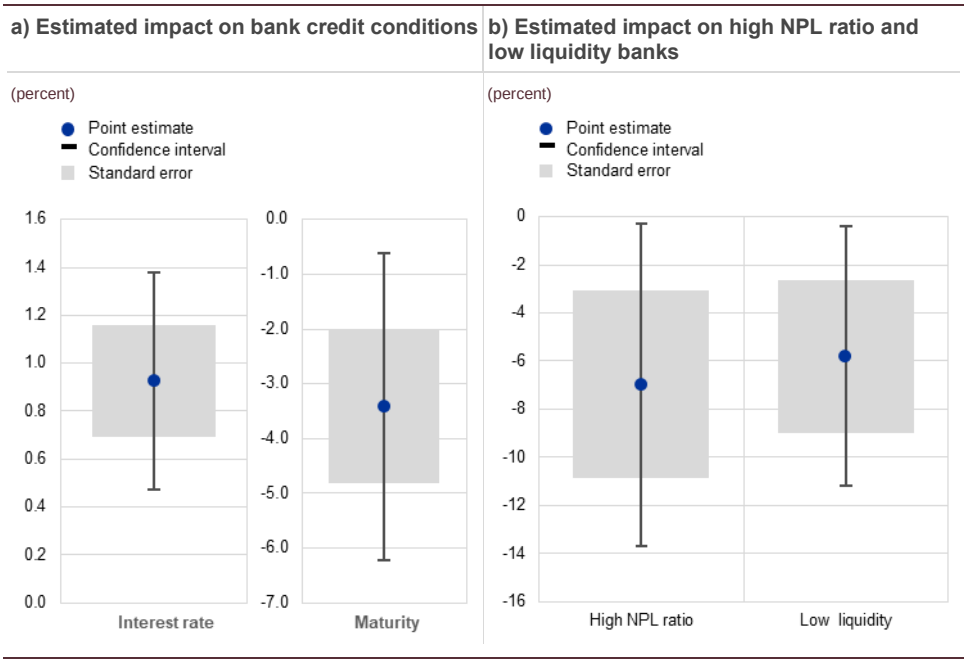



Sources: Baker et al. (2016), ECB (AnaCredit), ECB supervisory reporting and ECB calculations.
Notes: Panel a) shows the changes in the US Economic Policy Uncertainty (EPU) Index over the period from 2015 to mid-2025. Panel b) shows the estimated response of the bank-firm logarithm of new total lending and new term loans following a one-standard-deviation increase in US-driven EPU.

**Exposure to heightened economic policy uncertainty affects not only the volume of credit but also credit conditions, with the overall impact on lending supply depending on banks' balance sheet characteristics.** Looking at interest rates and loan maturities, the econometric evidence shows that banks more exposed to US-driven economic policy uncertainty respond by raising lending rates and shortening loan terms to non-financial corporations. Specifically, a one-standard-deviation increase in exposure to US-driven economic policy uncertainty is associated, on average, with an increase of about 90 basis points in lending rates and a 3% reduction in loan maturity (**Chart 29**, panel b). Such higher borrowing costs and shorter maturities expose firms to greater refinancing risk (Harford et al., 2014), which may discourage firms from making long-term investments and lead to them facing refinancing challenges and to adopting suboptimal investment strategies (Almeida et al., 2012). The analysis shows, however, that the effects are heterogeneous across banks. For example, in response to a one-standard-deviation increase in US-driven EPU, banks with a high level of NPLs (above the last quartile of the NPL ratio distribution, i.e. over 2%) contract their lending by about 7% more than those of their peers with stronger asset quality. Similarly, banks with low liquidity (below the first quartile of the excess reserves distribution, under 5.5%) reduce their lending by 5.8% more than more liquid banks (**Chart 29**, panel b).

**Chart 29**

Estimated impact of an increase in US-driven EPU on interest rates and maturities




Sources: ECB (AnaCredit), ECB supervisory reporting and ECB calculations.
Notes: Panel a) shows the estimated impact on bank-firm interest rates and the logarithm of loan maturity following a one-standard-deviation increase in US-driven EPU. Panel b) shows the estimated differential impact on the bank-firm logarithm of new total credit for high non-performing loan (NPL) and low liquidity banks.

**Overall, the evidence shows that rising US-driven economic policy uncertainty spills over to the euro area through a tightening of credit supply.** Banks with greater exposure not only to geopolitical risk or policy uncertainty in their domestic country, but also to a foreign country, such as the USA, respond more strongly, cutting back lending volumes, raising interest rates and shortening loan maturities. These effects are economically significant and driven by banks with weaker balance sheets.

## 6.3 Geopolitical shocks and euro area sectoral portfolio reallocation

**Russia's invasion of Ukraine not only affected loans by the banking sector but also impacted the securities holdings of the euro area's financial sector.** Based on granular security-by-holder data from the ECB Securities Holdings Statistics by Sector (SHSS) dataset, this section assesses the impact of the full-scale invasion on portfolio reallocation across countries, by investment location and by holding sector. Cross-sectoral adjustments may have important implications for the functioning of the euro area capital market (Longaric et al., 2025), given that sectoral distribution plays a central role in the transmission of shocks across borders and affects the degree of financial integration within the monetary union. The extent of portfolio reallocation in response to Russia's full-scale invasion is measured through changes in security holdings across sectors between the fourth quarter of 2021 and the

second quarter of 2022.[56] The holdings of each sector reflect changes in the quantity of securities held, valued at current amounts outstanding.[57]

**The Sankey diagram set out below shows the reallocation of securities holdings across euro area countries following Russia's full-scale invasion of Ukraine in the first quarter of 2022 (Figure 5, panel a).** The data reveal a broad-based reduction in holdings, with a decrease in domestic holdings (down by 6.8%), which is notably smaller than the decline in intra-euro area holdings (down by 13.3%), and even more so compared with the reduction in holdings directed toward the rest of the world (down by 16.7%). These shifts reflect a substantial reduction in cross-border investment activity, driven by heightened geopolitical uncertainty and increased risk aversion among investors, and ultimately the trimming of risks from external developments. The holdings of securities issued directly in Russia or Ukraine have no impact on the results, as their share in euro area sector portfolios is negligible. Moreover, the retrenchment patterns exhibit a notable degree of persistence, as the initial trends remain observable after a one-year horizon (up to the second quarter of 2023): rest of the world holdings show the largest declines, while domestic holdings have partially rebounded. A country-level breakdown reveals that the most pronounced declines in holdings occurred in Ireland and Luxembourg, reflecting the significant role of investment funds domiciled in these countries. Spain, France and Italy experienced more moderate contractions. The largest reductions in intra-euro area holdings were observed in Ireland, Luxembourg and the Netherlands, while Spain and France saw the smallest reductions. Ireland, Luxembourg and the Netherlands, also recorded the most significant declines in both domestic and rest of the world holdings.

**A more detailed look at sector level reveals that the most substantial holding reductions were observed among investment funds, insurance corporations and pension funds, and households (Figure 5, panel b).** Banks stood out as having seen a relatively modest decline in holdings and having even increased their intra-euro area exposures, thereby playing a stabilising role during the period of heightened market uncertainty. Sector-specific responses may reflect differences in regulatory environments, risk tolerance and investment mandates, which can amplify or mitigate systemic vulnerabilities.

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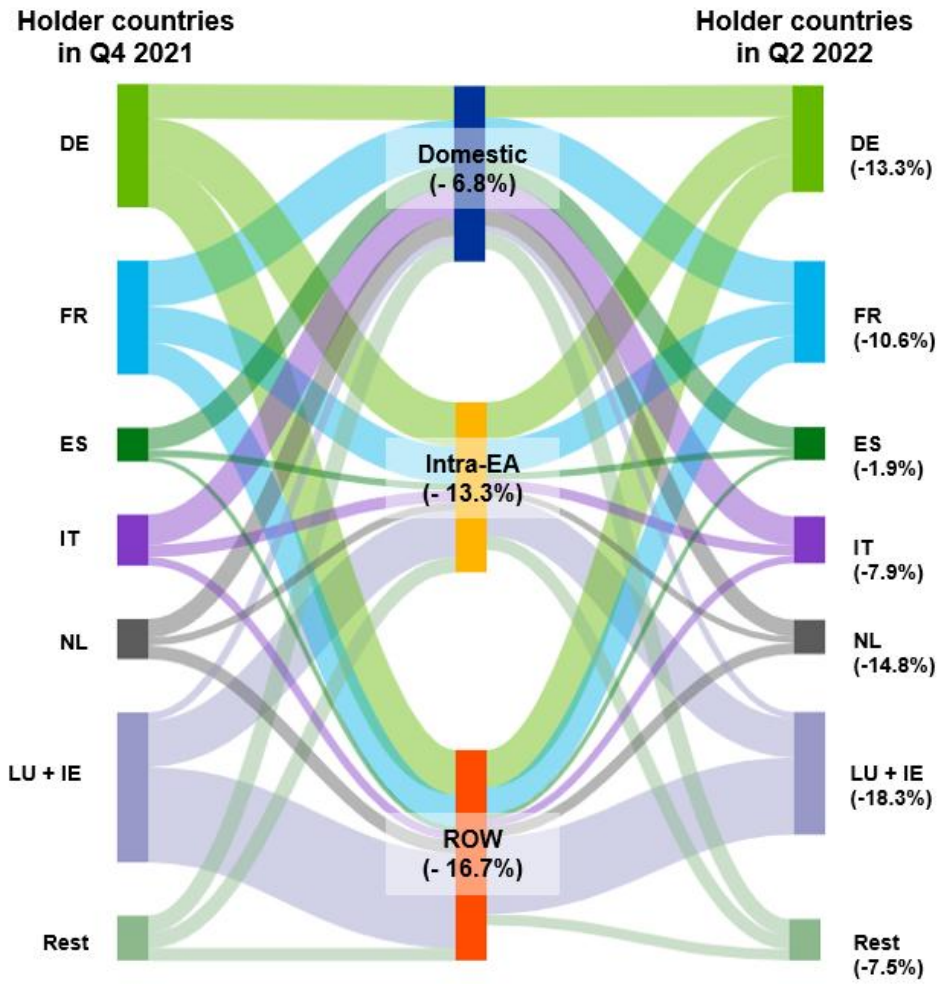
56 Using SHSS data, the analysis tracks the securities held by the following five euro area financial sectors, looking at possible changes in security prices: investment funds (IFs), insurance corporations and pension funds (ICPFs), money market funds (MMFs), banks, and other financial institutions (predominantly central counterparties or CCPs). In addition, the analysis included holdings by the corporate and household sectors. At the country level, our analysis focused on Germany, France, Spain, Italy and the Netherlands, as well as a group combining Ireland and Luxembourg – given their significant roles as domiciles for investment and money market funds. The SHSS report the institutional holder, and not the ultimate owner of the securities.

57 The securities held in each period are derived by dividing the aggregate value held by each sector or country (A) by the amount outstanding for each security (B), yielding Share of securities held$_0$ = $A_0$ / $B_0$ and Share of securities held$_1$ = $A_1$ / $B_1$ for periods 0 and 1, respectively. The net transaction in the share of securities is calculated as the difference between the two periods C= Share of securities held$_1$- Share of securities held$_0$. To express this change in monetary terms, the transaction is multiplied by the amount outstanding for each security in the latter period, $T_1$ = C × $B_1$. The holdings in the Sankey charts are $A_0$ for the fourth quarter of 2021 and $A_0$ + $T_1$ for the second quarter of 2022, reflecting the euro-equivalent value of reallocation at current prices. This analysis is restricted to securities for which the amount outstanding is available in both quarters in order to ensure consistency and comparability across time.

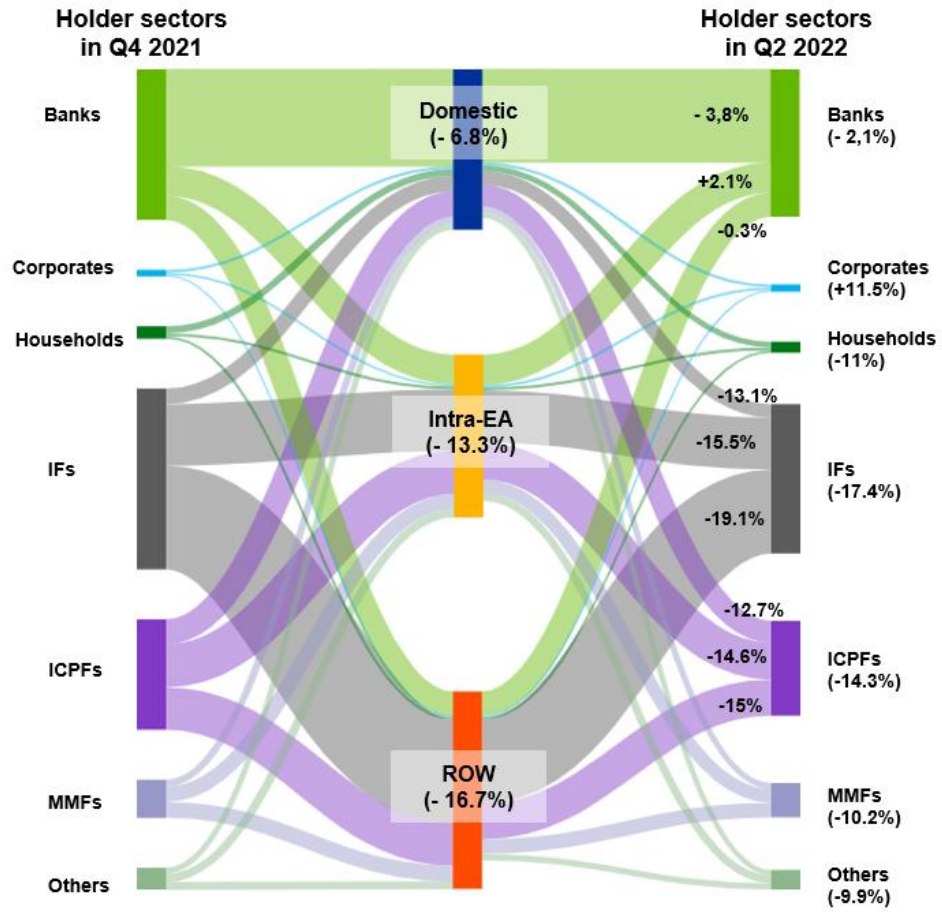
**Figure 5**

Securities holdings in the euro area between the fourth quarter of 2021 and the second quarter of 2022

**a) Securities holdings by country**



b) Securities holdings by sector




Source: Securities Holdings Statistics.
Notes: EA stands for euro area. Total changes in holdings are shown between parentheses.

**Next, the potential impact of the Russian invasion of Ukraine on financial dynamics within the euro area is formally assessed using a panel regression at the security level, providing evidence of changes in home bias.** This approach aims to identify signs of increased preference for domestic assets following a geopolitical shock – a development that could indicate a shift away from cross-border investment and suggest a weakening in financial integration. The estimated equation takes the following form.

Estimated equation formula

$$\Delta \frac{Holding_{isct}}{Outs_{value_{it}}} = \alpha + \beta \boldsymbol{NonDomesticHolder}_{isct} + ISIN_{FE} + Quarter_{FE} + HolderCountry_{FE} + (HolderCountry \times Holdersector)_{FE} + \varepsilon$$

Here, the dependent variable is the quarterly change in the share of security i held by sector s in country c at time t, relative to the total outstanding amount of the security. The key explanatory variable, NonDomesticHolder, is a binary indicator equal to 1 if the holder's country differs from the issuer's country within the euro area, and 0 otherwise. The regression includes fixed effects at the International Securities Identification Number (ISIN) level, quarter level, holder-country level and a

country-by-sector interaction in order to control for time-invariant and sector-specific heterogeneity.

**The findings indicate that in the aftermath of the invasion, euro area investors reduced their holdings of non-domestic euro area securities more than domestic securities.** The coefficient of interest, β, captures the differential change in relative holdings between cross-border and domestic euro area investors following the geopolitical shock. A significantly negative β indicated that non-domestic investors reduced their positions more aggressively than domestic counterparts, consistent with cross-border retrenchment. Reflecting this marked increase in home bias, non-domestic holders decreased their holding share by 3.3 percentage points relative to that of domestic holders. This was primarily driven by bond holdings, which fell by 7.4 percentage points more for non-domestic holders, whereas stocks declined only by 2.5 percentage points more. The result holds across different time windows and robustness checks, providing strong evidence that the full-scale attack acted as a fragmentation-inducing shock within the euro area financial system, reflecting a decline in cross-border risk tolerance.

**Table 7**

Estimates of the impact of the Russian invasion of Ukraine on securities holdings by euro area sectors across domestic and non-domestic holders

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Change in holding share | Change in holding share | Change in holding share | Change in holding share | Change in holding share |
| | All | Bonds | Stocks | Bonds | Stocks |
| Non-domestic holder | -0.033*** | -0.074*** | -0.025*** | -0.106*** | -0.033*** |
| | [0.003] | [0.001] | [0.003] | [0.002] | [0.003] |
| Constant | 0.041*** | 0.041*** | 0.014*** | 0.047*** | 0.020*** |
| | [0.003] | [0.001] | [0.003] | [0.001] | [0.002] |
| N | 514819 | 443743 | 71076 | 287424 | 70976 |
| R-sq | 0.04 | 0.01 | 0.00 | 0.28 | 0.11 |
| Security FE | | | | X | X |
| Sector x Country FE | | | | X | X |
| Country FE | | | | X | X |

Source: ECB/ESRB workstream on financial stability risks from geoeconomic fragmentation.

Understanding the sectoral and cross-border investment dynamics is essential for designing targeted policy measures that support resilience and preserve financial integration in the face of future shocks. The analysis shows that Russia's invasion of Ukraine triggered a marked retrenchment in cross-border securities holdings, with non-domestic investors reducing their exposures more sharply than domestic investors – particularly in bond markets. This stronger domestic orientation reflects an increased home bias, in view of the external risks, and a decline in intra-euro area risk-sharing.

## Box 3
# The UCITS sector in Luxembourg in the face of the Russian invasion of Ukraine

This box assesses the resilience of Luxembourg Undertakings for Collective Investment in Transferable Securities (UCITS) during Russia's invasion of Ukraine in February 2022.[58] While around 11% of Luxembourg UCITS (in terms of units) had some exposure to either the Ukraine or Russia at the beginning of 2022, this exposure was very limited in value, amounting to around 0.4% of assets. With the start of the conflict at the end of February 2022, the price correction was fast and radical. Fair value adjustments were applied with haircuts of up to 100% (depending on the affected asset), mainly reflecting the freezing tradability of Russia-issued securities and international sanctions.[59] At such valuations there were therefore no incentives for investors to redeem (at no benefit, but rather at the cost of losing the equivalent of an option on any proceeds from potential sales of Russian assets). Looking at the monthly capital flows, no specific pattern is observable around February 2022 (irrespective whether funds were or were not exposed to Russia or Ukraine). Instead, there are small monthly net outflows of a stable magnitude from January to October 2022 for all Luxembourg UCITS. It is likely that these net outflows relate more to the high, and increasing, inflation and broad-based monetary tightening prevailing at that time. Based on the Commission de Surveillance du Secteur Financier (CSSF)'s proprietary national UCITS Risk Reporting data, the months that saw the largest daily redemptions are also identifiable at fund level. For funds exposed to Russia and the Ukraine, no peak in the months surrounding the start of the war can be found **(Chart A)**, again confirming that the shock did not cause any specific capital flow pattern. The effects were clearly different for those few UCITS with material exposures to those countries, most of those UCITS deciding to either suspend or liquidate their funds.

Liquidity profile and the use of derivative instruments (leverage) can both contribute to amplifying funds' responses in stress episodes. To test this hypothesis, a cross-sectional regression was conducted of net flows (i.e. the difference between subscriptions and redemptions) in the first half of 2022 based on a set of variables observed shortly before the invasion, in December 2021, namely leverage (measured as the sum of derivative notionals[60]), liquidity profile (measured as the percentage of assets that fund managers see as sellable within 7 days) and a set of controls (total net assets, past quarterly performance and investment strategy dummies). Interaction terms are added to capture the potential specificity of UCITS using a vector autoregression (VAR) approach with a leverage exceeding 200%. The estimation is carried out on the full reporting sample of Luxembourg UCITS and on those exposed to Russia and/or Ukraine. The results show that the chosen

58 The event coincided with monetary tightening in the EU and the US, after a long period of large securities purchases and extremely high and increasing inflation rates, eroding global investors' real returns and thereby likely affecting their behaviour.

59 In addition, the Russian rouble depreciated against the euro by around 50% shortly after the outbreak of the conflict (ECB Exchange Rate Statistics).

60 See Committee of European Securities Regulators (2010), CESR's Guidelines on Risk Measurement and the Calculation of Global Exposure and Counterparty Risk for UCITS – CESR/10-788, 28 July.

independent variables have very weak explanatory power. Nevertheless, it was observed that liquidity profile contributes to funds' resilience after the crisis (more liquidity is associated with higher net flows). This echoes the observation that cash ratios materially increased with the outbreak of the conflict relative to total assets and in absolute terms **(Chart A, panel b)**. Leverage is not statistically significant, presumably because the derivative notionals method is not particularly effective in capturing economic leverage, given that it treats all derivatives equally, regardless of their purpose (hedging or investing).

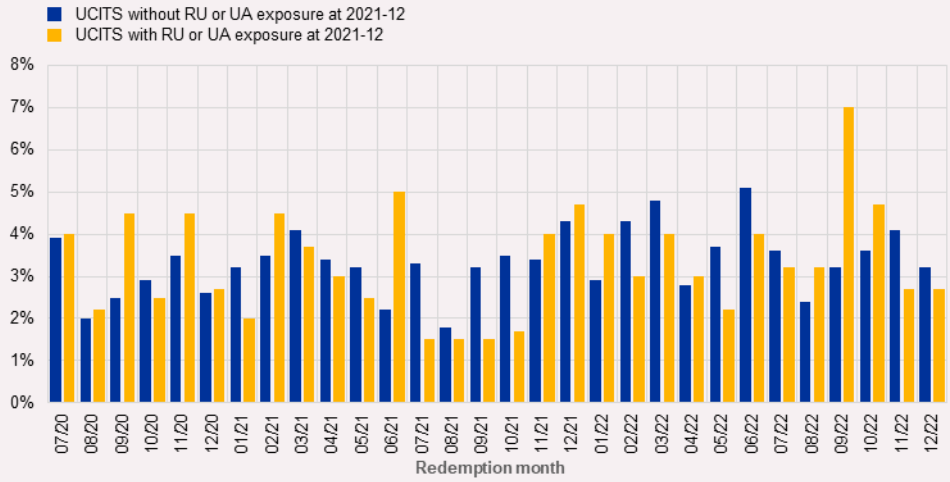
The overall resilience of Luxembourg UCITS to the Russia-Ukraine conflict can also be explained by factors other than portfolio liquidity. First, the haircuts of up to 100% that were applied reduced incentives for capital outflows. Second, those funds most exposed to Russia and/or the Ukraine suspended redemptions and avoided any unfair treatment of investors arising from valuation uncertainties. In addition, the CSSF promptly issued guidance to assist fund managers in managing any illiquidity of affected assets in the best interest of investors.[61] The option of segregating (into side pockets) assets that were illiquid/non-tradable was subsequently chosen by 15 funds (i.e. 29% of the funds that opted for suspension), allowing them to reopen while ensuring fair treatment of investors. This confirms the importance of a broad set of liquidity management tools, including quantity and price-based ones (Böhl and Goergen, 2025).

**Chart A**

Share of Luxembourg funds with and without exposure to Russia or the Ukraine whose highest redemption falls in the respective month

**a) Share of euro area funds with and without exposure to Russia or the Ukraine in December 2021**

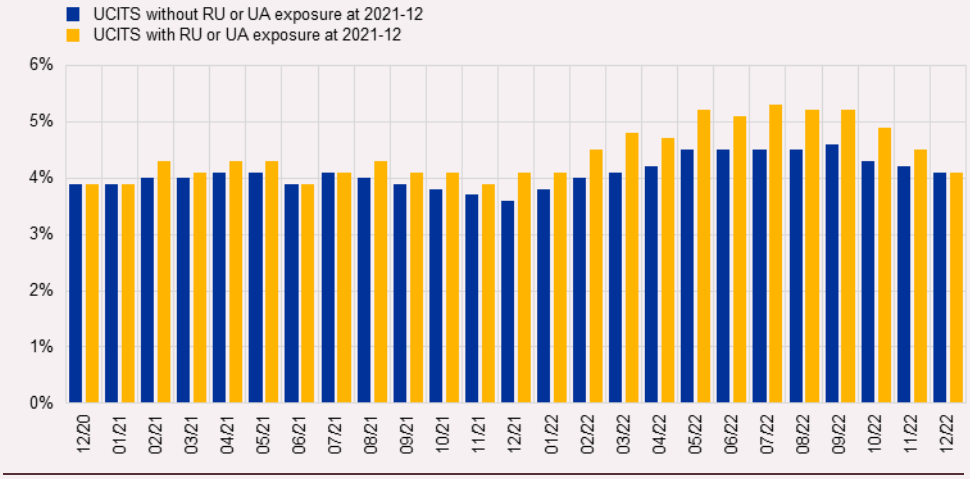
(percentages)




[61] See the article entitled "Ukraine crisis: FAQ on the application of Liquidity Management Tools by investment funds" published on the website of the Commission de surveillance du Secteur Financier on 31 March 2022.

**b) Cash as a percentage of total assets, excluding money market funds, in December 2021**

(percentages)




Source: Commission de Surveillance du Secteur Financier (CSSF) investment funds supervisory reporting.

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# Annex

See more.

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For specific terminology please refer to the ESRB glossary (available in English only).

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