

SPEECH

Europe and the world economy

Keynote speech by Philip R. Lane, Member of the Executive Board of the ECB, at the Asian Monetary Policy Forum

Singapore, 22 May 2026

Introduction

It is an honour to be invited to contribute to the Asian Monetary Policy Forum. My topic today is to examine the role of Europe in the world economy.^[1] International trade, international finance, international technological diffusion, global commodity markets and global value chains generate many types of inward and outward linkages between Europe and the rest of the world.^[2]

In relation to the linkages between Asia and Europe, developments in Asia are an important driver of the euro area outlook. Along one dimension, shocks to the Asian economy have global reverberations. Along another, the transmission of global shocks is highly intermediated through the centrality of Asia in global supply chains.

My speech today has three parts. I will first review how the euro area economy has evolved over recent decades and how its relationship with the global economy has changed. In the second part, I will introduce some of the ECB modelling tools that we use to analyse how global forces operate on the euro area. Last, I will discuss the role of global forces in shaping the ECB monetary policy stance.

The role of international factors in the euro area

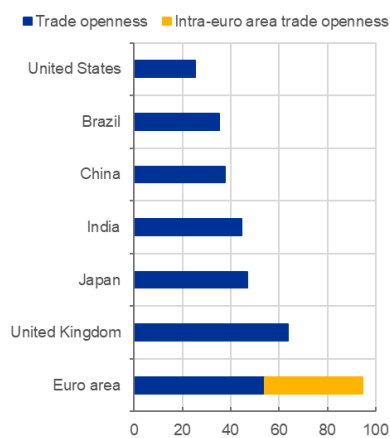
Adjusting for its size, the euro area is a highly-open economy. Trade openness – measured as the sum of exports and imports relative to GDP – is high by international standards. The participation of firms in the euro area in regional and global value chains has doubled over the last three decades (Chart 1). In global production chains, exports often include imported intermediate goods and services, so the full value of an exported product is not necessarily generated in the country that ships it. Euro area output is absorbed across many regions of the world, as illustrated by the left bar of panel c) in Chart 1, with Asia representing a more important final destination than the United States.^[3] The right bar of panel c) in Chart 1 shows that foreign value added (with a prominent role for Asia) accounts for a sizeable share of total euro area absorption. All in all, the profile in Chart 1 suggests that the euro area economy is highly sensitive to both positive and negative global shocks.^[4]

Chart 1

Indicators of trade openness and trade integration

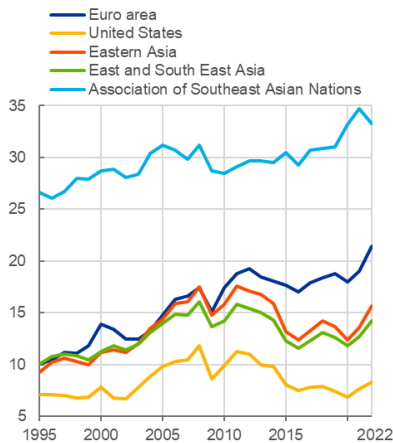
Trade openness in 2024

(percentage of GDP)



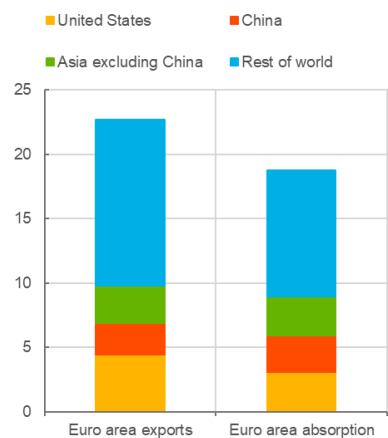
Participation in global value chains

(percentage of gross export)



Value added originated and absorbed in the euro area

(percentage of total value added)



Sources: left panel: IMF World Economic Outlook, Eurostat and ECB calculations; middle panel – OECD TiVA (2023); right panel: ADB MRIO 2025 tables and ICIO (Belotti, F., Borin, A., and Mancini, M. (2021), “icio: Economic analysis with intercountry input–output tables”, *Stata Journal*, Vol. 21, No 3, pp. 708-755).

Notes: Left panel – trade openness is the sum of gross exports and gross imports as a percentage of GDP; middle panel – Association of Southeast Asian Nations (ASEAN) includes Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste and Vietnam. The latest observations are for 2022; right panel – based on 2024 data. Euro area exports shows the percentage contribution of foreign value added in total euro area exports, euro area absorption shows the percentage contribution of foreign value added in total euro area absorption.

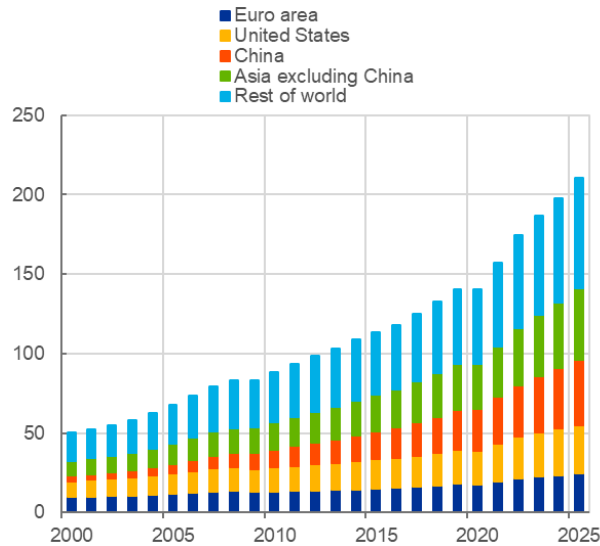
When the euro area was formed in 1999, the purchasing power of Asia was similar to that of the euro area. Today, China alone commands nearly twice the purchasing power of the euro area (1.8 times euro area GDP at purchasing power parity), while the rest of Asia matches that of China (1.9 times euro area GDP at purchasing power parity) (Chart 2).

Chart 2

Share of the euro area and other regions in world output and trade

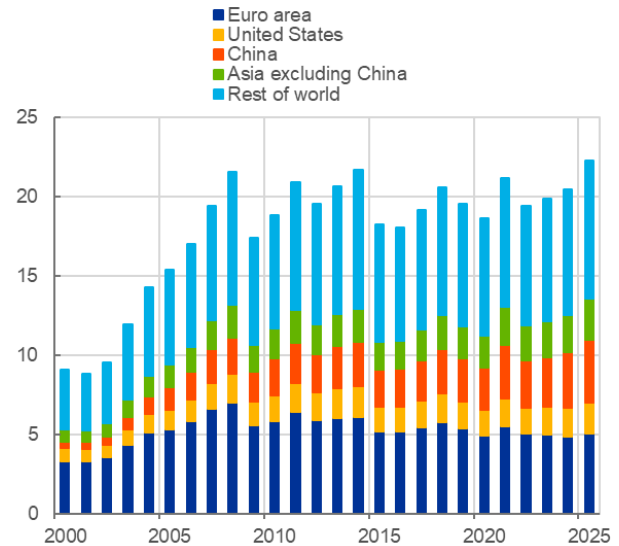
Gross domestic product at purchasing power parity

(trillions of US dollars)



Exports

(trillions of US dollars, volumes)



Sources: IMF World Economic Outlook , CPB Netherlands Bureau for Economic Policy Analysis and ECB.

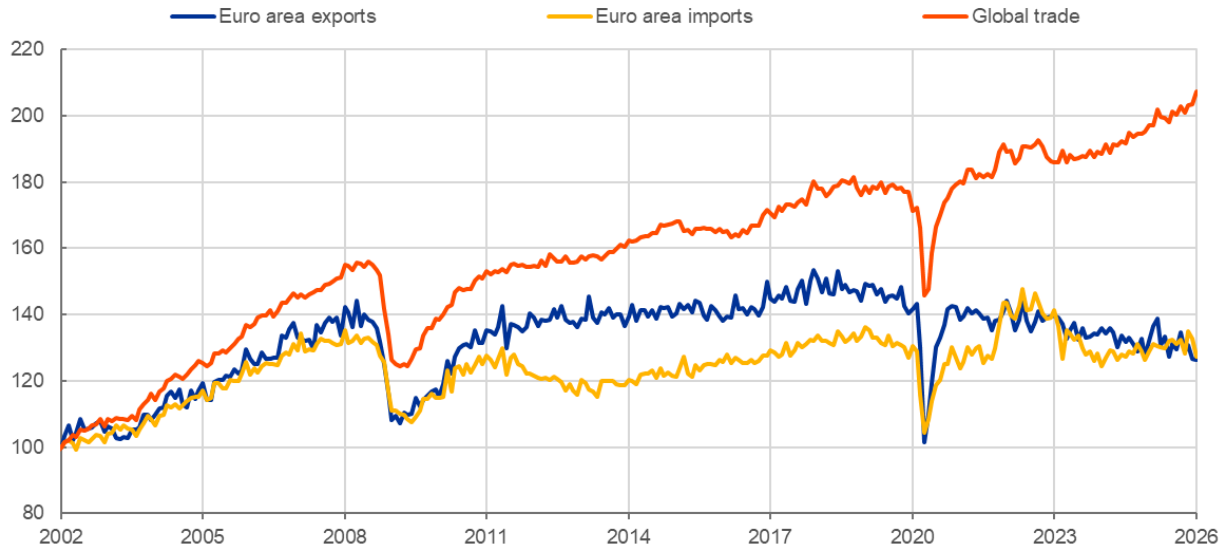
Notes: Left panel – IMF GDP projections are used when historical values are not yet available. The earliest observations are for 1999 and the latest observations are for 2025. Euro area is the sum of intra-euro area and extra-euro area exports. The earliest observations are for 2000 and the latest observations are for 2025. Right panel – volumes obtained as values evaluated at constant prices in 2021.

This transformation has reshaped global trade dynamics. The traditional profile of the euro area as an export powerhouse has come under pressure as emerging economies, particularly in Asia, have enhanced their industrial capabilities (Chart 2). Asia, with China at its core, has become the driving force behind global trade growth, rivalling the euro area and the United States in industrial output and trade momentum. In the first two decades following the creation of the euro area, its exports and imports consistently grew more slowly than global trade. In more recent years, this gap has turned into a clear decoupling, with euro area exports declining while global trade recovered from the pandemic slump and resumed expanding at its previous pace (Chart 3).

Chart 3

Euro area and global trade

(volumes, January 2002=100)



Sources: Eurostat and CPB Netherlands Bureau for Economic Policy Analysis.

Notes: Euro area exports and imports refer to extra euro area trade. The latest observations are for January 2026.

The trade relationship between the euro area and Asia has been a stabilising factor during turbulent times. After the 2008 financial crisis, Asia's rapid recovery helped cushion the blow for the euro area. This trade relationship successfully endured the financial turbulence in China in 2015-2016; although euro area exports to China softened somewhat, the link proved to be resilient. China remained a crucial market for European producers and a vital supplier of goods during the pandemic when lockdowns and disruptions were hitting trade between the euro area and the rest of the world (Chart 4).

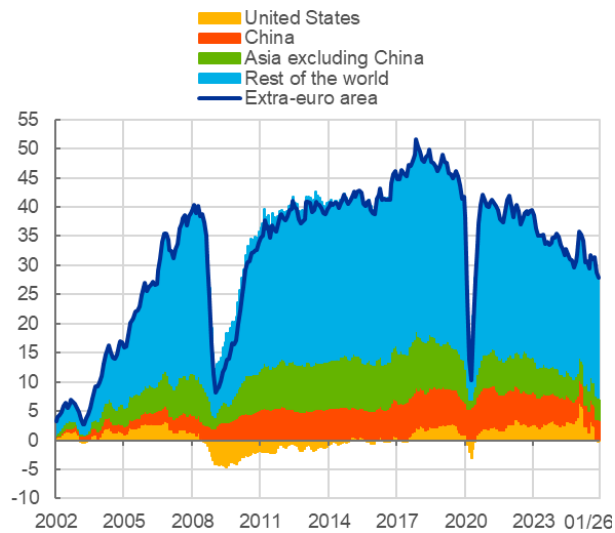
But this resilience comes with a more challenging counterpart: the growing competitiveness of Asian economies – and China in particular. Euro area exports remain relatively diversified across destinations, but their momentum has gradually weakened. Imports, by contrast, have become more concentrated, with Asia emerging as the most competitive supplier to the euro area. Yet the growing concentration of imports has increased the exposure of the euro area to supply disruptions, geopolitical tensions and price shocks.

Chart 4

Euro area export and import growth across regions

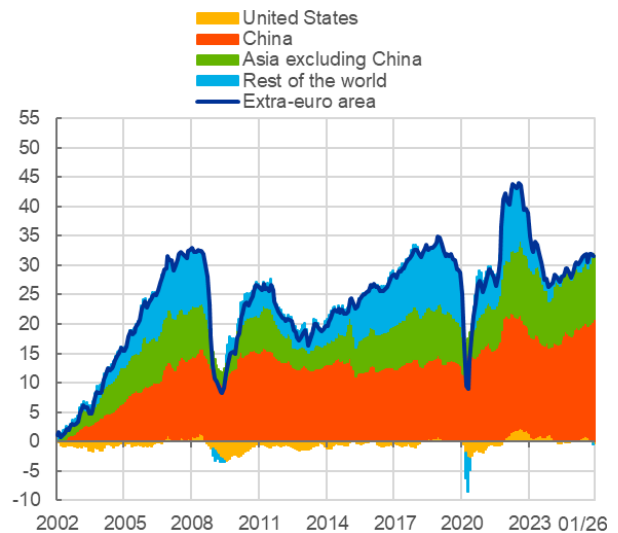
Extra-euro area goods exports

(volumes, three-month moving averages, contributions)



Extra-euro area goods imports

(volumes, three-month moving averages, contributions)



Sources: Eurostat and ECB calculations.

Notes: Seasonally adjusted time series. Volume index January 2002 = 0. Contribution weights are based on export and import values respectively. The latest observations are for January 2026.

There are two distinct phases in the decline of the export market shares of the euro area, which broadly correspond to what the literature describes as the first and second China shocks.

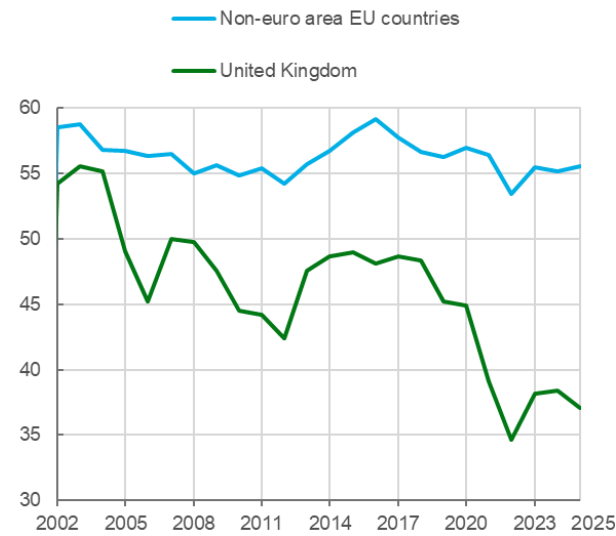
The first phase saw advanced economies, including the euro area, lose export market share as emerging Asian economies, led by China, became a hub for low-cost manufacturing and production assembly. Yet, this phase also brought opportunities, as China became a fast-growing market and a critical node in Europe-Asia value chains. The second phase reflects more complex challenges.^[5] Europe is losing market share across major destination markets (Chart 5), while the import intensity of Chinese growth has markedly declined (Chart 6).

Chart 5

Euro area export market shares across trade partners

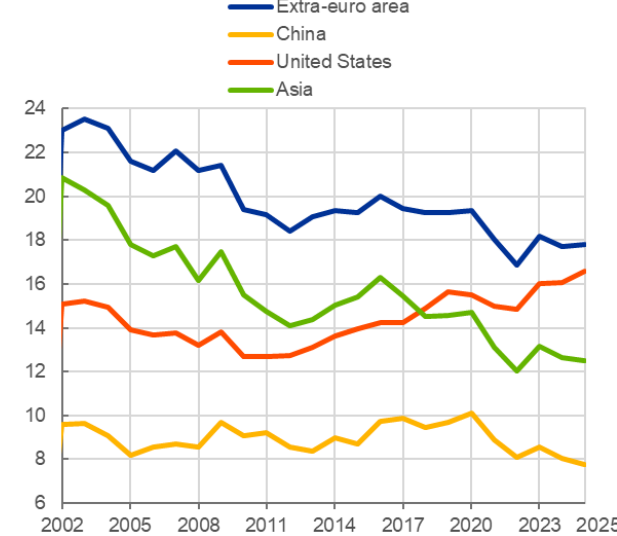
Euro area export market shares

(percentages)



Euro area export market shares

(percentages)



Sources: Eurostat and CPB Netherlands Bureau for Economic Policy Analysis.

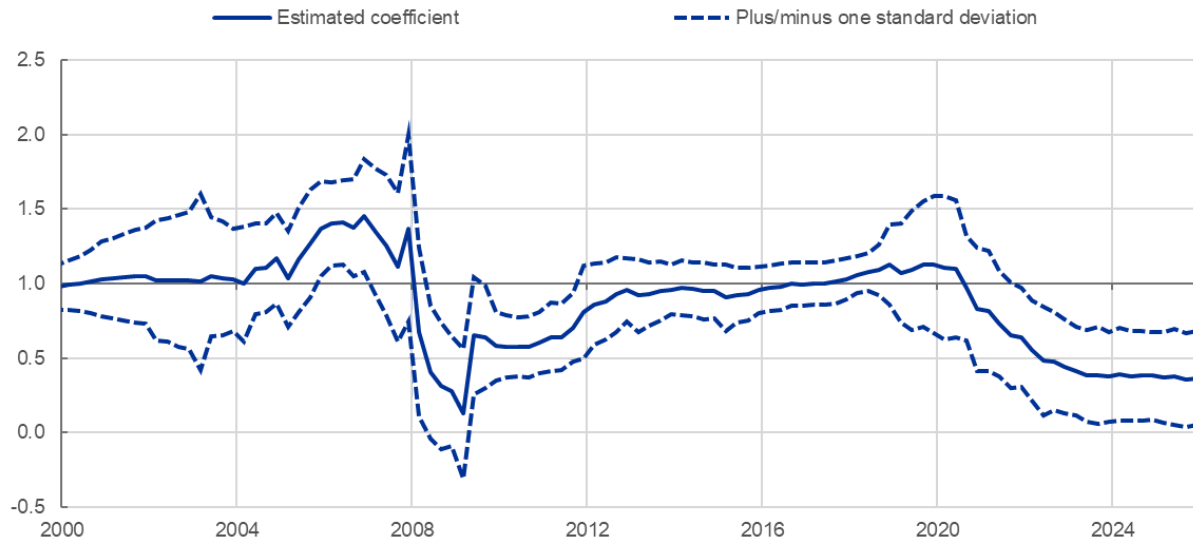
Notes: Nominal values for export market shares. The latest observations are for 2025.

Chart 6

Import intensity of China's economic activity

Long-run elasticity of imports to GDP – rolling window estimate over 40 quarters

(coefficient estimates)



Sources: Haver Analytics and ECB staff calculations (see Al-Haschimi, A., et al. (2025), "[China's growing trade surplus: why exports are surging as imports stall](#)", *Economic Bulletin*, Issue 7, ECB).

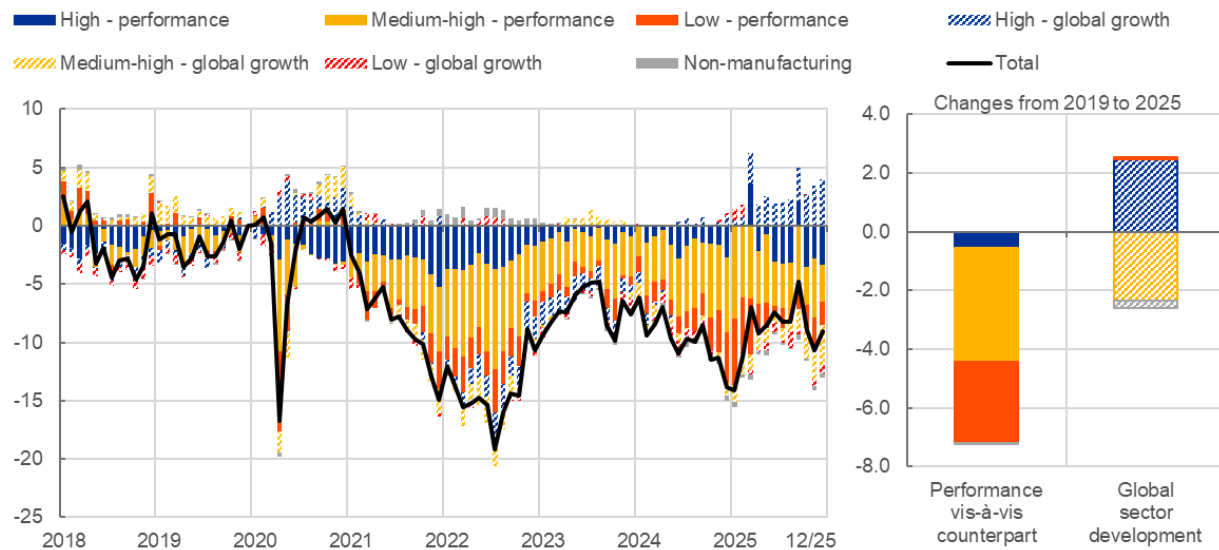
Notes: Estimates, based on a rolling window over 40 quarters, of the long-run coefficient of an error correction model containing an index of domestic demand. The point estimate reported at date t corresponds to an estimation over the period from $t-40$ to t . The latest observations are for the third quarter of 2025.

The losses in euro area export market share are concentrated in industries where the euro area has historically excelled. This is increasingly visible if we decompose export market share changes into two parts: (a) a performance effect which identifies whether euro area exports are growing faster or slower than global demand in each technology segment; and (b) a global demand effect which identifies whether the share of that segment in world trade is expanding or shrinking (Chart 7). The euro area is not only suffering losses in export market share because global demand is shifting away from its export basket. It is also losing ground within key medium-high technology segments – the traditional backbone of euro area export strength.^[6]

Chart 7

Extra-euro area export market shares by technological complexity

(index, December 2019=0; percentage point contributions)



Sources: Trade Data Monitor, CPB Netherlands Bureau for Economic Policy Analysis, Eurostat and [Banin, M. et al. \(2025a\), "Have euro area exports missed the tech train?"](#) Economic Bulletin, Issue 2/2025, ECB.

Notes: Decomposition of developments in aggregate export market shares by tech content in a “performance” component, which measures changes in the market share of an economy by segment (the ratio of the export growth of the economy to global import growth in the segment); and a “global development” component, which measures the global growth of each segment (measured as the ratio of global imports in the segment to total global imports). The latest observations are for December 2025.

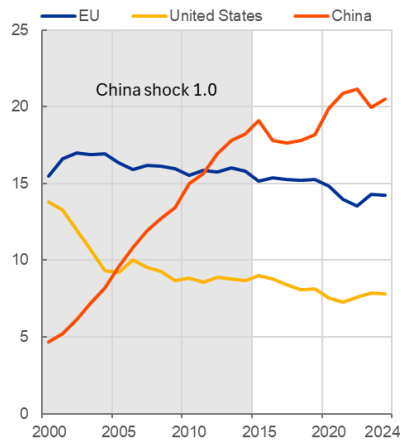
With a production base now comparable in size to Europe and the United States combined, China is increasingly producing the type of complex goods in which Europe has specialised. Moreover, in comparing the goods China exports with those exported by other major economies, the overlap with Europe stands out. More than any other major economy, the export basket of China is becoming increasingly similar to that of Europe (Chart 8).

Chart 8

Comparison of export market shares, economic complexity, and export similarity

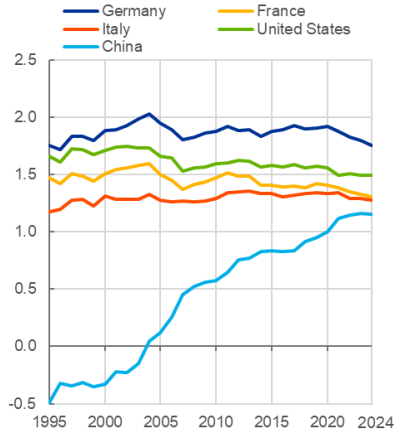
Global manufacturing export shares

(percentages)



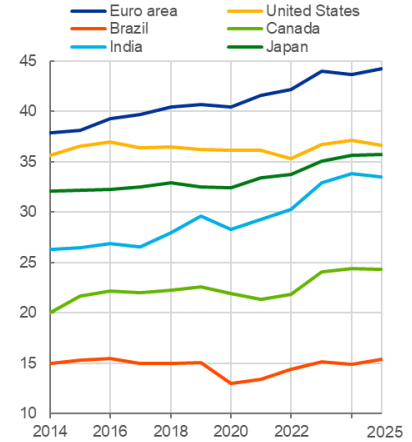
Economic Complexity Index

(index)



Export similarity with China

(index)



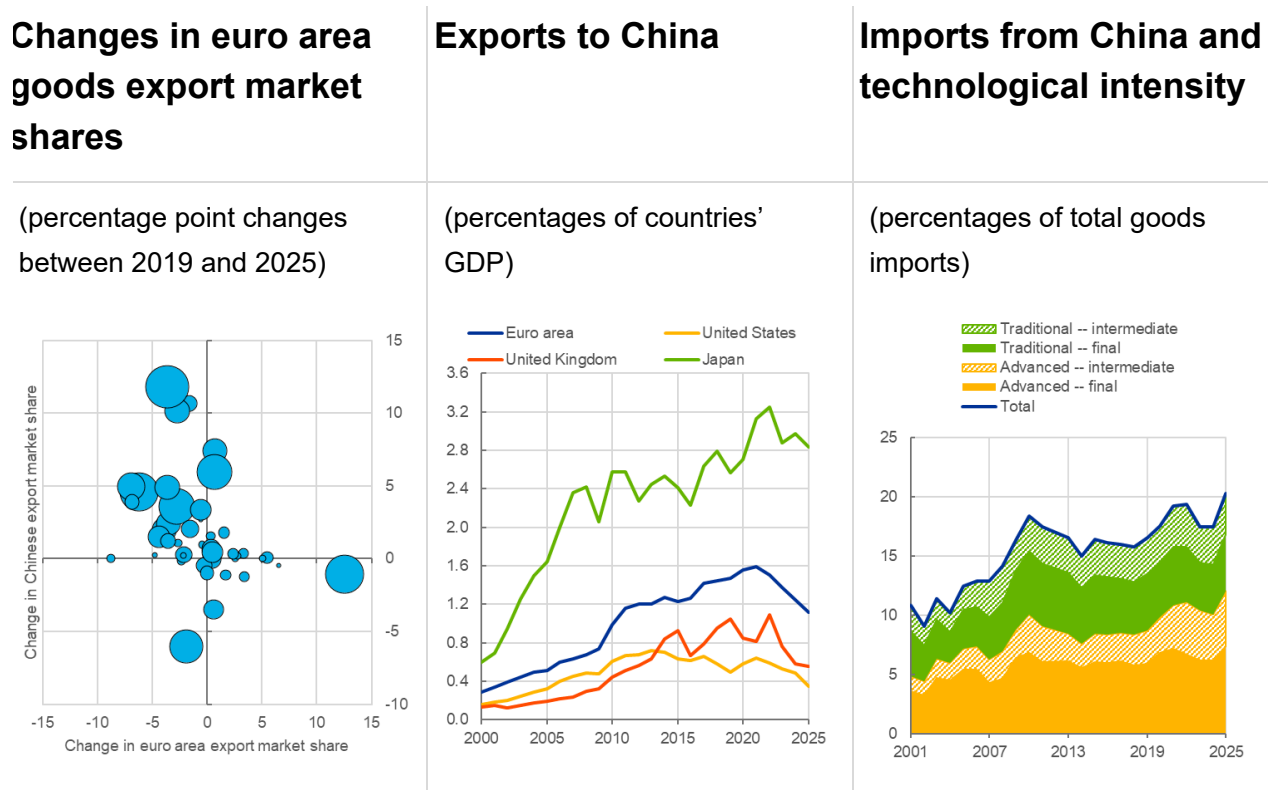
Sources: Left panel – World Trade Organization and ECB staff calculations; middle panel: Harvard Growth Lab Atlas of Economic Complexity; right panel – Trade Data Monitor and ECB staff calculations.

Notes: Left panel – the EU aggregate refers to EU exports excluding intra-EU trade. The latest observations are for 2024; middle panel – the Economic Complexity Index measures the knowledge intensity of an economy based on the diversity and global reach of its exports. Higher values indicate a more complex and diversified production structure. The latest observations are for 2024; right panel: based on Finger, J. M., and Kreinin, M.E. (1979), "A Measure of 'Export Similarity' and Its Possible Uses", *The Economic Journal*, Vol. 89, No 356, 905-912, and de Soyres, F. et al. (2025), "[The sectoral evolution of China's trade](#)", FEDS Notes, Board of Governors of the Federal Reserve System, 28 February. The latest observations are for 2025.

The EU is increasingly competing with China in industries that were traditionally its own core areas of industrial strength. This is affecting Europe on three fronts – in third markets; in China; and inside the European market itself. In third markets, the euro area is losing market share while China continues to expand its presence. In China, euro area exports are on a declining path and have lost market share, while in the euro area market Chinese firms are gaining ground in higher-tech products (Chart 9).^[7]

Chart 9

Indicators of competition between euro area and China – globally, in China, and in the euro area



Sources: Left panel – Trade Data Monitor and ECB staff calculations; middle panel – IMF and ECB staff calculations; right panel – Trade Data Monitor and ECB staff calculations.

Notes: Left panel – each bubble refers to a sector. Size of the bubbles represents the share in extra-euro area exports; middle panel – the latest observations are for 2025; right panel – import values excluding all non-identified technological categories. The latest observations are for November 2025.

Price competitiveness and the influence of China on global commodity markets

Over the past decade, the euro exchange rate has appreciated in real terms against the Chinese renminbi, primarily reflecting a widening in the cumulative inflation gap between China and the euro area (Chart 10). There is a clear pattern: where Chinese producer prices have declined – or increased less than euro area prices – China has gained export market share relative to the euro area (Chart 10).

Amongst other factors, shifts in the relative price of energy have contributed to the shift in production and trade patterns. Industries such as manufacturing and chemical production – traditional key pillars of the euro area economy – have been disproportionately affected by rising energy costs following the European

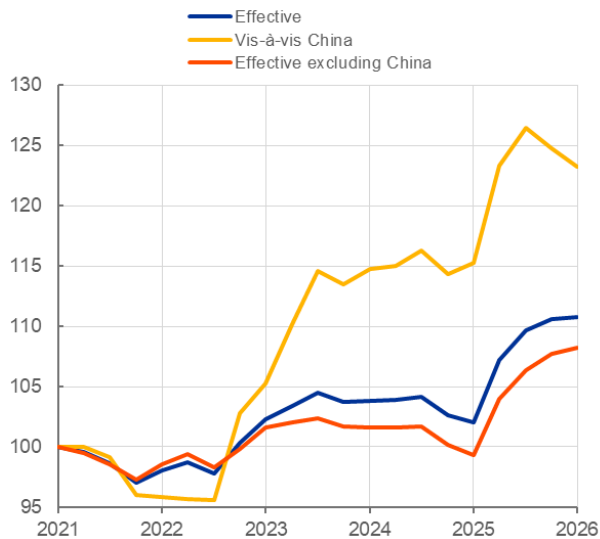
gas crisis and by supply disruptions.^[6] The data suggest persistent scarring effects on the competitiveness of energy-intensive industries, limiting their ability to expand production and exports (Chart 11).

Chart 10

Euro area real exchange rate; euro area and Chinese relative prices and export market shares

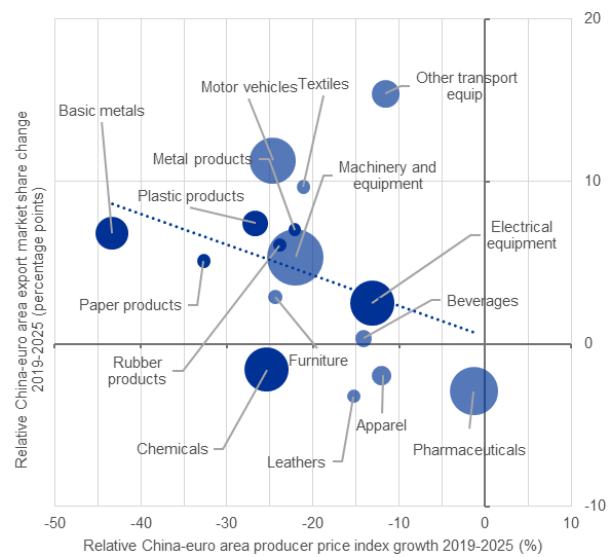
Euro area real exchange rates

(index, first quarter of 2021 = 100, increase = worsening price competitiveness)



Euro area versus China: relative prices and export market shares

(y-axis: percentage points, x-axis: percentages)



Sources: Left panel. Al-Haschimi, A. et al. (2024), “[Why competition with China is getting tougher than ever](#)”, The ECB Blog, ECB, 3 September; right panel – Haver Analytics, Trade Data Monitor and ECB staff calculations.

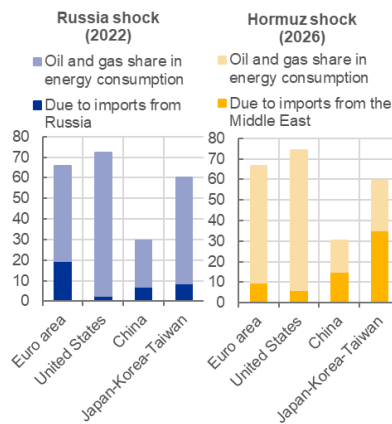
Notes: Left panel – share of China in manufacturing trade is used as a weight to exclude China from the real effective exchange rate. The latest observations are for the first quarter of 2026; right panel – nominal export market shares. The food and wood sectors are excluded from the scatterplot. Size of bubbles based on share of each sector in total extra-euro area exports in 2025.

Chart 11

Comparison of energy shocks and their effects on euro area production and exports

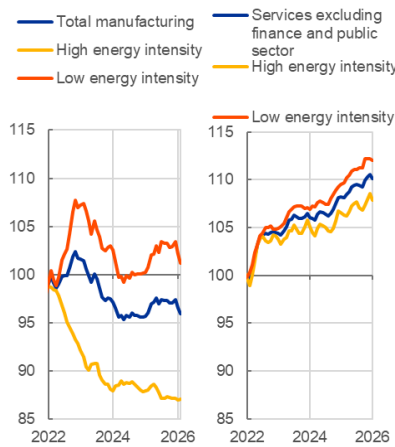
Exposure to oil and gas shocks

(percentages, percentage points)



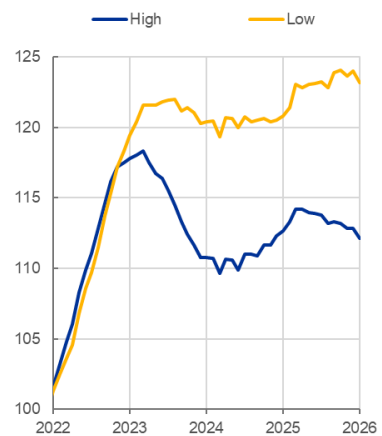
Industrial and services production by energy intensity

(three month moving average, December 2021=100)



Extra-euro area exports by energy intensity

(values, index December 2021 = 100)



Sources: Trade Data Monitor, Energy Institute, and ECB staff calculations.

Notes: Left panel – the shares of imports of oil and gas (HS codes 27.09, 27.10 and 27.11) are from Russia in 2021 (yellow series) and Middle East countries (Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates) in 2025 (blue series); the series are scaled by the share of oil and gas in total energy consumption in 2021 and 2024, respectively; middle panel – the classification is based on the amount of energy used in production. The latest observations are for February 2026 for industry, and January 2026 for services; right panel – high energy intensive exports include manufacture of food, beverages and tobacco products, wood and cork products, except furniture, chemical products, rubber and plastic products, non-metallic mineral products, and basic metals. The latest observations are for January 2026.

At the same time, relatively subdued import prices from China have helped to contain inflation in the euro area, an effect that has strengthened in recent years. This influence is not only direct, through the prices of goods imported from China, but also indirect across the broader basket of imported goods from other economies. By offering competitively priced exports, China has exerted downward pressure on producers in other countries, encouraging them to keep their own export prices competitive in order to maintain market share in the euro area. As a result, lower Chinese import prices have contributed to moderating overall imported inflation and have helped ease price pressures faced by euro-area firms (Chart 12).

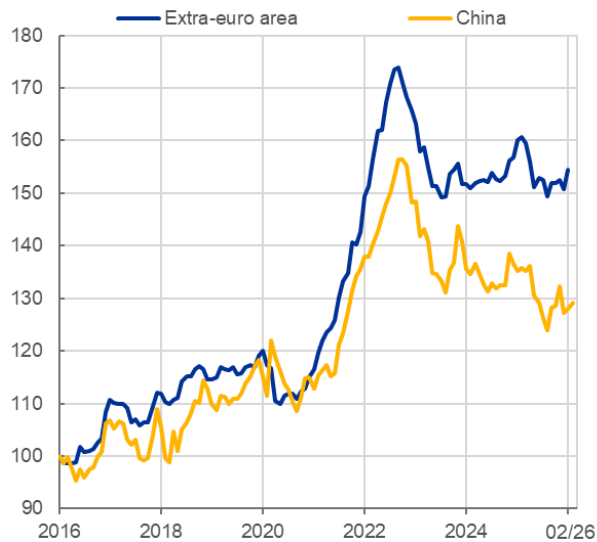
Moreover, the estimates reported in Chart 12 provide only a partial picture of the influence that developments in Asia may have on euro area inflation, as they do not account for how the evolving role of Asia in the global economy affects global commodity prices, or consumption, investment and export dynamics of the euro area.

Chart 12

Prices of euro area imports and non-energy industrial goods (NEIG) inflation in the euro area

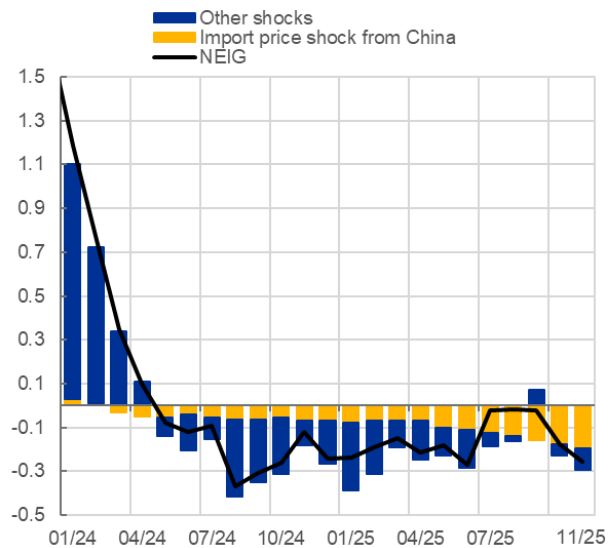
Euro area import prices

(index, January 2016 = 100)



Historical decomposition of NEIG inflation

(percentage points and percentage points contribution)



Sources: Left panel – Eurostat and ECB staff calculations; right panel – ECB staff calculations based on a granular Bayesian vector autoregression (BVARs) for NEIG components.

Notes: Left panel – the latest observations are for December 2025 for China and November 2025 for extra-euro area imports; right panel – this chart shows the historical decomposition of NEIG inflation based on a granular assessment as the deviation of NEIG from its historical mean (black line). The latest observations are for November 2025. See Anaya Longaric, P. et al. (forthcoming), [“What is keeping goods inflation low? The role of the import exposure to China”](#), *Economic Bulletin*, ECB.

In relation to the commodity channel, research by ECB staff highlights how macroeconomic risk shocks in China can lead to notable shifts in the prices of oil, metals, and other strategic inputs, such as copper (which is vital for the energy transition) (Chart 13).^[9] In turn, global commodity prices pass through to

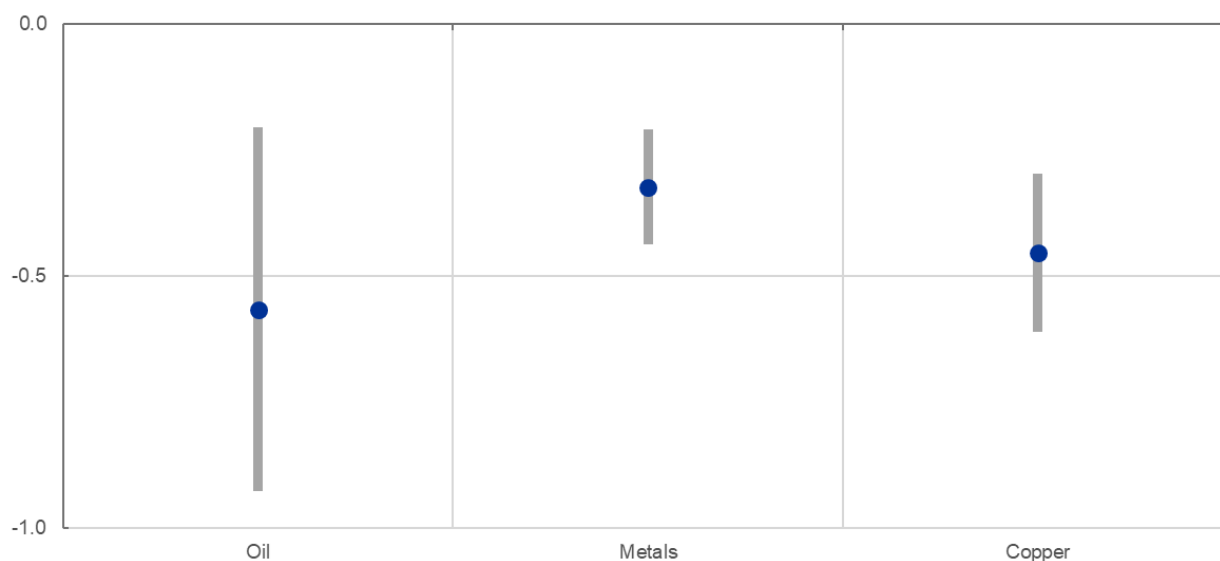
consumer price inflation, both directly via the energy and food components in the price index and indirectly through the role of commodities as inputs into production chains in many sectors.^[10]

Chart 13

Chinese demand and commodity prices

Impact of macroeconomic-risk shocks in China on commodity prices

(percentage changes)



Sources: Bloomberg, ECB and ECB staff calculations.

Notes: The chart shows the (same day) response of global financial market variables to structural shocks. The responses are scaled to represent the impact of shocks in China that would generate a 1% drop in Chinese equity prices. The range refers to the 95 percent confidence intervals based on Driscoll-Kraay corrected standard errors.

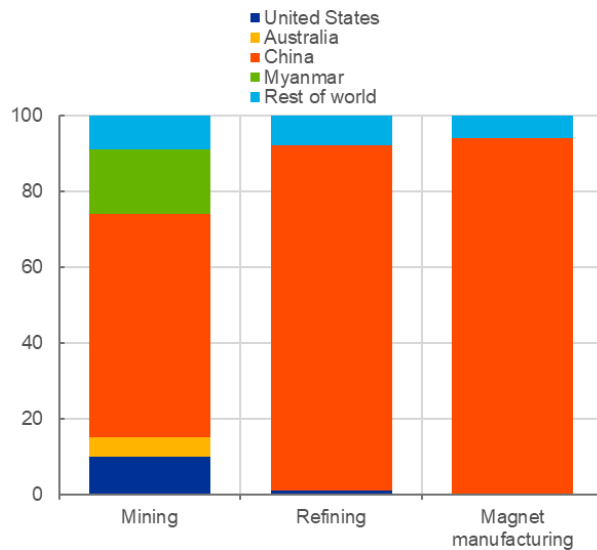
In addition to the price channel, any disruption of Asian exports of critical raw materials and other inputs would damage euro area production. The dominance of China is especially pronounced in critical raw materials.^{[11][12]} It produces 95 per cent of the global supply of rare earth elements and is a key player in refining materials like lithium and cobalt. Approximately 70 per cent of rare earth imports to the euro area come directly from China, with additional exposure via third-party suppliers, such as US firms. The automotive and renewable energy sectors are among those that are particularly exposed. The car industry, for example, relies heavily on permanent magnets made from rare earths, while wind turbines depend on neodymium magnets (Chart 14).

Chart 14

Chinese dominance in rare earths and euro area dependence on imports of critical raw materials

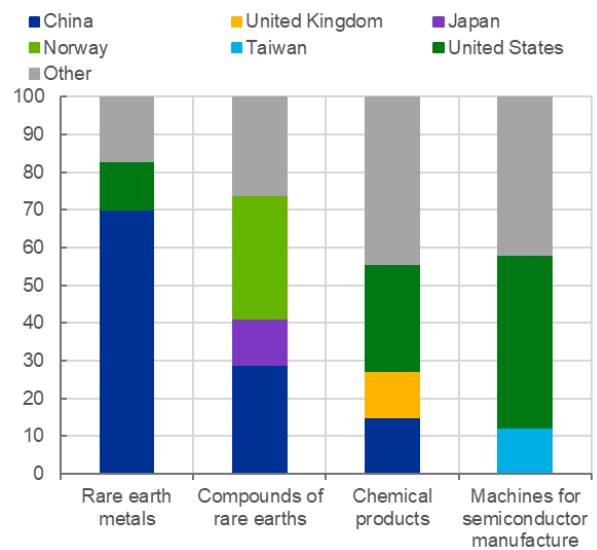
Global rare earth elements production

(percentage changes)



Euro area imports by commodity and source country

(percentages)



Sources: Left panel – International Energy Agency (2025b), BACI database and authors. See Aguilar, P. et al. (2026), “[Global implications of export controls on rare earths: a model-based assessment](#)”, Occasional Paper Series, No 384; right panel – Trade Data Monitor and Banin, M. et al. (2025), op. cit.

Note: Right panel – the latest observations are for 2024.

Exchange rate developments

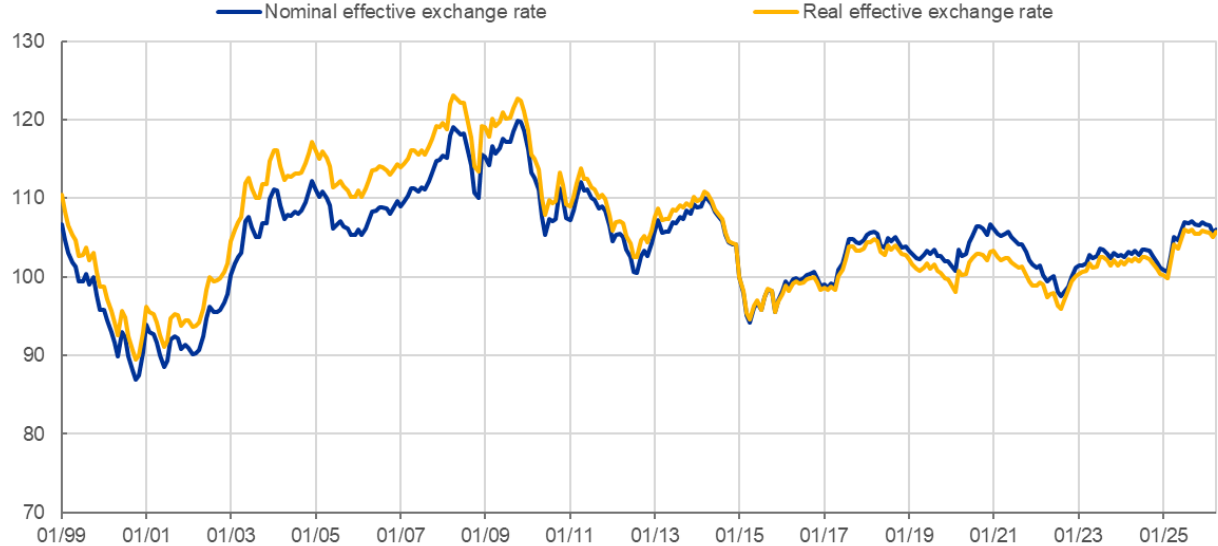
I have shown that the price competitiveness of the euro area has deteriorated mainly because producer prices there have moved unfavourably relative to those of key trading partners – especially in Asia, and in China in particular. The legacy of the 2021-22 energy shock has been central to this shift in relative producer prices.^[13] But exchange rates also matter.

The longer-term evidence on the nominal and real effective exchange rates of the euro puts recent developments into perspective (Chart 15). It shows prolonged and substantial currency swings over the lifetime of the euro but no clear overall trend with currency shifts that tend to unwind over time.^[14] However, the euro exchange rate against the Chinese renminbi and a basket of selected Asian currencies – including

those of Japan, South Korea, India, Indonesia, Malaysia, the Philippines, Taiwan and Thailand – shows a marked appreciation both in nominal and real terms since the start of the monetary policy tightening cycle implemented by the ECB in the summer of 2022 (Chart 16).

Chart 15
Euro nominal and real effective exchange rates for 17 currencies

(index: January 2015 = 100)



Sources: ECB and ECB staff calculations.

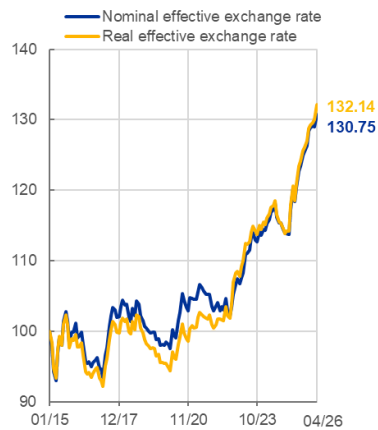
Notes: Nominal effective exchange rate and real consumer price index (CPI)-deflated effective exchange rate, denominated in euro, for 17 trading partners. The latest observations are for April 2026.

Chart 16

Euro exchange rate developments and Chinese renminbi exchange rate indicators

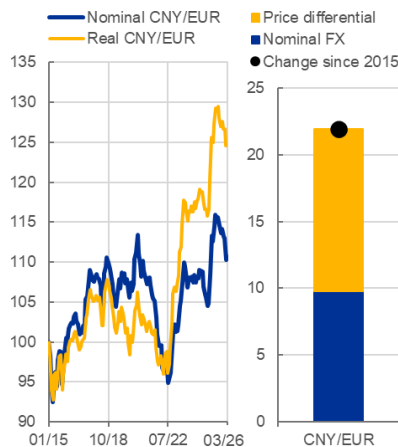
Effective exchange rates for the euro against selected Asian currencies

(index: January 2015 = 100)



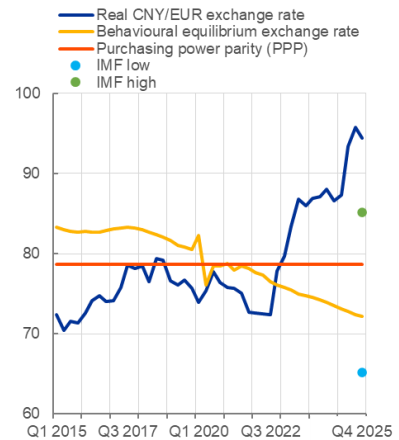
Real renminbi exchange rate against the euro and the US dollar

(index: January 2015 = 100)



Renminbi exchange rate compared to equilibrium estimates

(index: Q1 1999 = 100)



Sources: Bloomberg, Haver Analytics, IMF and ECB staff calculations.

Notes: Nominal effective exchange rate and real (CPI-deflated) effective exchange rate, denominated in euro, for selected Asian trading partners (Japan, South Korea, Indonesia, India, Malaysia, Philippines, Taiwan and Thailand). Corresponding trade weights are normalised to one. Nominal exchange rates are deflated by the CPI price index. The chart presents a range of measures of CNY misalignment against the euro. Bilateral behavioural equilibrium exchange rate estimates are derived using dynamic ordinary least squares estimated from 1999 onwards following Philip R. Lane & Gian Maria Milesi-Ferretti, 2004. "The Transfer Problem Revisited: Net Foreign Assets and Real Exchange Rates," *The Review of Economics and Statistics*, MIT Press, vol. 86(4), pages 841-857. The real exchange rate is standardised to be 100 in the first quarter of 1999. Purchasing power parity is computed as average of the real exchange rate index from 2015. In addition, the chart includes IMF-consistent bilateral misalignment estimates obtained by distributing the IMF's real effective exchange rate gap across trading partners using China's trade weights. The latest observations are for April 2026 for the left panel. The latest observations are for March 2026 for the middle panel. The latest observations are for the fourth quarter of 2025 for the right panel.

As previously discussed, the appreciation of the euro in real terms vis-à-vis the renminbi primarily reflects the much larger cumulative inflation in the euro area relative to China during this period, yet the bilateral nominal exchange rates have contributed as well. Standard metrics for exchange rate misalignment such as purchasing power parity, the level estimated with a behavioural equilibrium exchange rate model and the

range of bilateral exchange rates consistent with IMF misalignments, indicate that the renminbi nominal exchange rate is currently undervalued against the euro (Chart 16, panel c).

The euro area external position and global imbalances

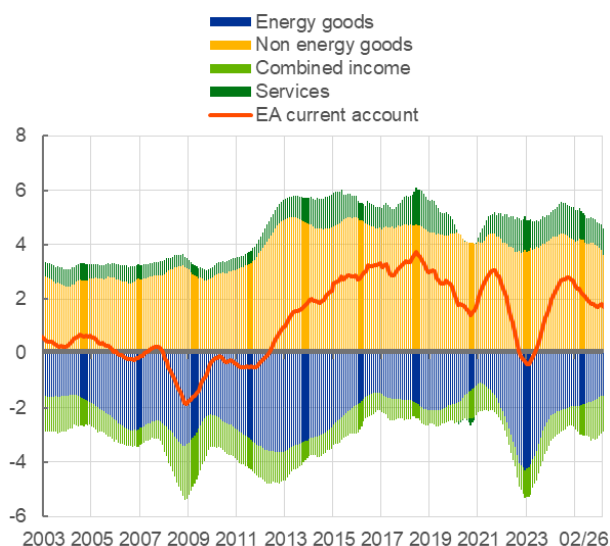
The euro area current account has been in surplus for much of the past decade and the euro has built up a large positive net international investment position (Chart 17).^[15] Chart 18 shows the pattern in bilateral imbalances, which can be important in understanding the source of trade tensions. The persistence of the euro area current account surplus reflects a combination of weak domestic investment and high savings. I will return to the topic of global imbalances later in this speech.

Chart 17

Euro area current account and net international investment position

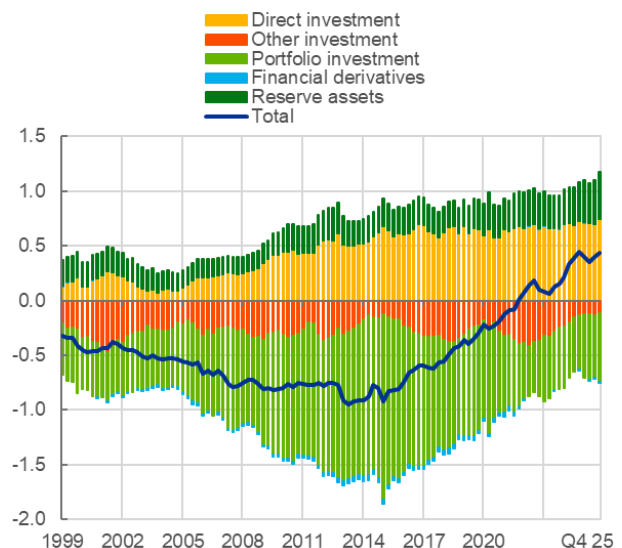
Euro area current account

(percentages of GDP, 12-month moving sum)



Net international investment position

(percentages of GDP)



Sources: ECB and Eurostat.

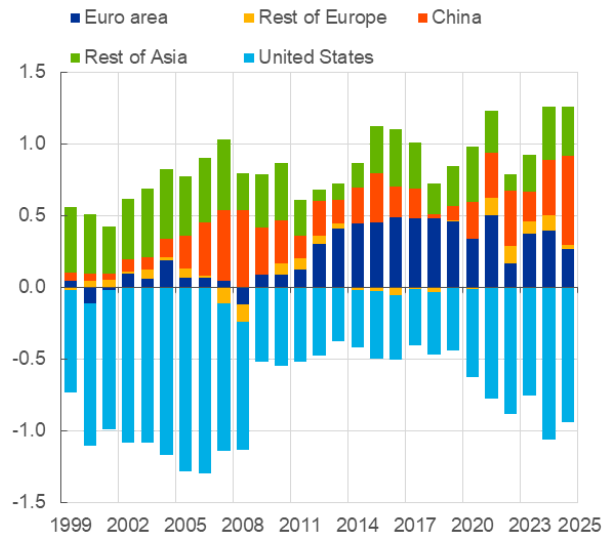
Notes: Left panel – the latest observations are for February 2026. The denominator in the observations for January and February 2026 includes euro area GDP estimates for the first quarter of 2026, released on 13 May 2026; right panel – financial derivatives include employee stock options. The latest observations are for the fourth quarter of 2025.

Chart 18

Euro area current account balance in context

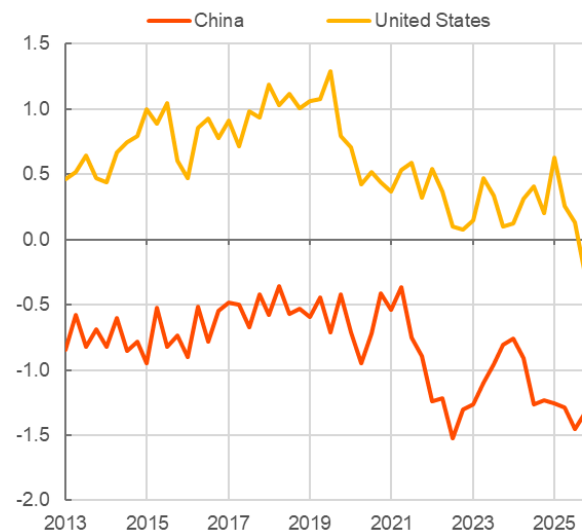
Current account by country group

(percentages of global GDP)



Bilateral euro area trade balances

(percentages of euro area GDP)



Sources: Left panel – External Wealth of Nations Database; right panel – ECB and Eurostat

Note: Left panel – “Rest of Europe” includes Bulgaria, Czech Republic, Denmark, Hungary, Poland, Romania, Sweden, Albania, Bosnia and Herzegovina, Iceland, Kosovo, Moldova, Montenegro, North Macedonia, Norway, Serbia, Switzerland, and the United Kingdom. “Rest of Asia” includes Hong Kong, Japan, Mongolia, Korea, Brunei Darussalam, Cambodia, Indonesia, Lao, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, Vietnam, Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka, Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan. The latest observations are for 2025.

Global models at the ECB

This section examines the analytical infrastructure that the ECB uses to assess how developments in the global economy affect the euro area. Understanding the evolving trade linkages and structural shifts described above is essential, but it is equally important to develop the quantitative tools needed to assess their macroeconomic implications and to explore how different policy scenarios might play out.

The ECB maintains a suite of global macroeconomic models precisely for this purpose. In a world of elevated uncertainty, with shifting trade policies, geopolitical tensions and energy market disruptions, the capacity to simulate alternative scenarios and quantify transmission channels across regions has become a central element of the ECB’s analytical toolkit.^[16]

A suite-of-models approach

Why does the ECB operate a suite of models rather than relying on a single framework? By design, any individual model is an abstraction of a complex reality. To be useful for policymakers, a model needs to be interpretable and tractable, yet comprehensive enough to capture the mechanisms that matter. This creates an inherent trade-off: no single model simultaneously incorporates all of the relevant dimensions, from macroeconomic dynamics and financial channels to the granular structure of global value chains and the nonlinear effects of large policy changes. By maintaining a set of complementary models, each with distinct strengths, results can be cross-checked and a richer, more robust understanding of how global shocks transmit to the euro area can be obtained.

These models serve two broad functions. First, they are integral to the Eurosystem/ECB's regular macroeconomic projection process. In each projection round, the impact of changes in the international environment is assessed and scenarios are modelled, primarily using the ECB-Global and ECB-BASE models to examine the macroeconomic impact, cross-checked with satellite models. Second, beyond the projection and scenario exercises, the satellite models allow for deeper analytical work, exploring specific transmission channels in greater detail, such as quantifying granular sectoral effects, or assessing the implications of structural shifts that require dedicated modelling frameworks.

The macroeconomic projection workflow

The Eurosystem/ECB staff macroeconomic projections, produced four times a year, rely on a structured modelling workflow in which the ECB-Global model is used to assess spillovers from the international environment. These global inputs then feed into the euro area projection models, principally the ECB-BASE model. Scenarios accompanying the projections are also modelled using this framework, with the ECB-Global model providing the global macroeconomic impact and satellite models such as multi-country, multi-sector dynamic models and the Baqaee-Farhi static model cross-checking along specific dimensions such as sectoral propagation through trade linkages and production networks or nonlinear effects of very large tariffs.^[17]

ECB-Global

ECB-Global is a multi-region semi-structural model calibrated to reproduce realistic dynamics of the broad macroeconomic aggregates across eight world regions. The model incorporates trade and financial linkages, energy markets, and regional heterogeneity. It also allows for region-specific monetary policy frameworks, such as China's managed exchange rate. This has made it a useful tool for a wide range of policy questions: assessing global imbalances under alternative reform scenarios; tracing the propagation of energy price shocks, quantifying cross-border spillovers; and evaluating the macroeconomic impact of tariff escalations. Its semi-structural design gives it a flexibility that fully structural models often lack, such that it can be adapted to allow staff to address rapidly-evolving policy questions.^[18]

ECB-Global can be used to study how the structure of international spillovers has evolved over time. By recalibrating the trade parameters of the model to different periods, staff have quantified the changing global footprint of major economies.^[19] Chart 19, panel a), shows that outward spillovers from China (that is, the impact of a Chinese growth shock on the rest of the world) have roughly doubled since the early 2000s, reflecting the dramatic expansion of trade linkages between China and the rest of the world.

At the same time, however, China has become considerably less exposed to foreign demand shocks. As Chart 19, panel b), illustrates, the sensitivity of China to inward spillovers has declined markedly, consistent with a falling export-to-GDP ratio that makes the Chinese economy less reliant on external demand as a source of growth.

The euro area has moved in the opposite direction, with its rising openness translating into a greater sensitivity to foreign shocks as well as a slightly diminishing role in terms of outward spillovers. Chart 19, panel c), presents a complementary empirical decomposition of industrial production volatility that confirms this picture: foreign shocks account for a much larger share of business cycle fluctuations in the euro area than in China.

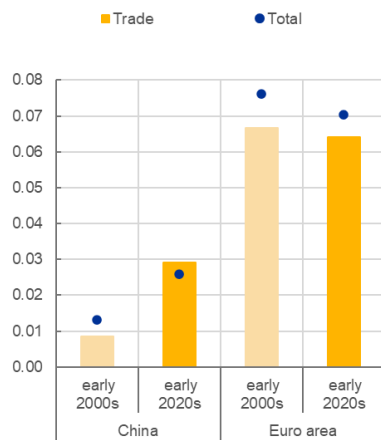
Importantly, China's spillovers to the global economy operate primarily through trade and commodity demand rather than through financial channels, as a consequence of its relatively closed capital account. This distinction matters for the assessment of the transmission of Chinese shocks to the euro area and is one of the reasons why a multi-channel model such as ECB-Global is well suited for this type of analysis.

Chart 19

Global spillovers over time and business cycle drivers

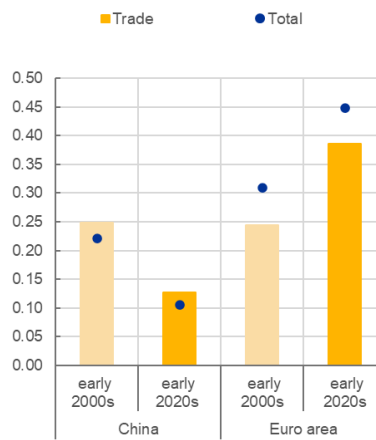
a) Domestic-to-foreign spillovers

(multiplier)



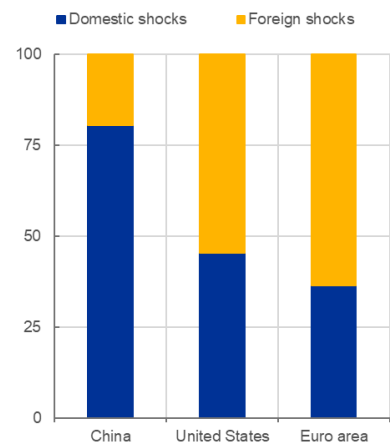
b) Foreign-to-domestic spillovers

(multiplier)



c) Drivers of business cycles

(percentage of industrial output volatility)



Sources: ECB-Global simulations and ECB staff calculations.

Notes: To be comparable across countries, the outward spillover measures the net present value of additional GDP growth in the world excluding Country X divided by the NPV of GDP of additional GDP in country X and then multiplied by the share of GDP in country X relative to world GDP. This is done for China for the periods 2000-04 and 2019-22 to account for structural shifts in spillovers in the global economy. Inward spillovers measure the increase in GDP (in NPV terms) in country X given a growth shock in the world excluding country X economy increasing the NPV of GDP by 1%. The volatility of industrial production is decomposed into domestic and foreign shocks, taking into account propagation through production and investment networks. Foreign shocks include both global shocks and foreign country and sector shocks that propagate through production networks. Based on Boeckelmann, L., Imbs, J., and Pauwels L. (2026), "Accounting for Propagation", forthcoming.

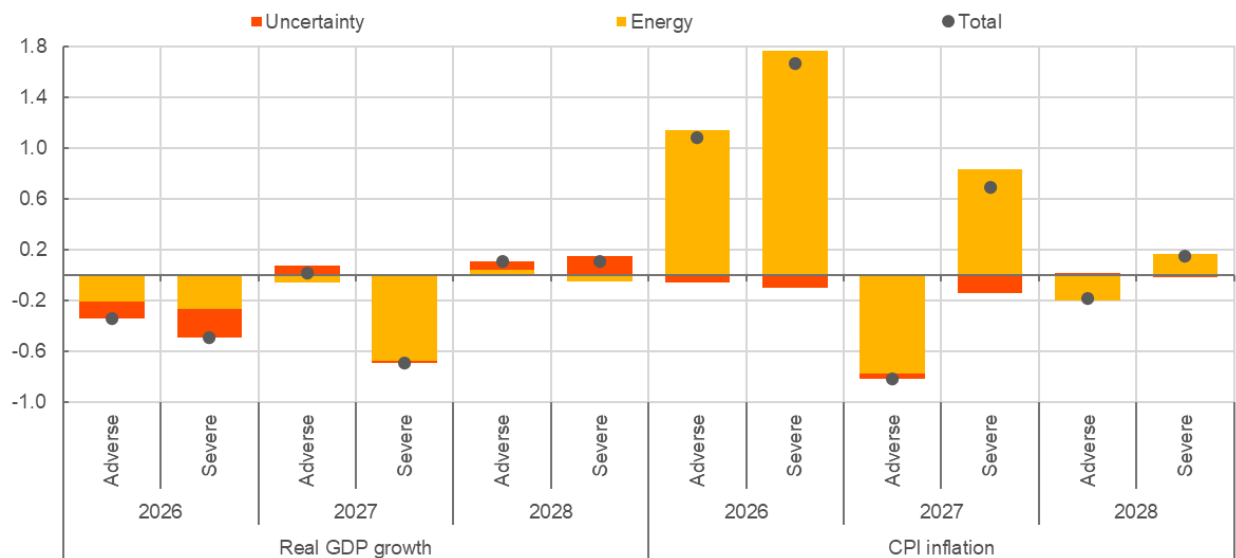
In terms of scenario analysis, a recent application concerns the Middle East conflict. When the war in the Middle East erupted in early 2026, disruptions to shipping through the Strait of Hormuz, a route accounting for around 20 per cent of global oil supply, led to a sharp spike in oil and gas prices and an increase in uncertainty. The ECB needed to rapidly assess how these energy price shocks would propagate through the global economy and affect the euro area outlook. ECB-Global was used to construct adverse and severe scenarios, differentiated by the intensity of the energy supply disruption and the persistence of the price shock.

In the adverse scenario, oil prices were assumed to peak at USD 119 per barrel and gas prices at EUR 87 per MWh; in the severe scenario, oil prices were assumed to reached USD 145 per barrel and gas prices EUR 106 per MWh, with a much slower normalisation. Chart 20 shows the global spillovers from these scenarios. The oil block and multi-region structure of the model made it possible to trace the transmission from the initial supply disruption through commodity markets to output and inflation across all major economies, and to quantify the resulting drag on euro area foreign demand. The global inputs from ECB-Global were then run through ECB-BASE to compute the impact on the euro area.

Chart 20

Impact on global economic activity (excluding the euro area) across energy price and uncertainty scenarios

(percentage point deviations from baseline annual growth rate)



Sources: ECB staff calculations based on ECB-Global model.

Notes: Endogenous monetary policy and a managed exchange rate for China. The adverse scenario assumes a temporary spike in energy prices and global uncertainty that fades relatively quickly. The severe scenario assumes larger and more persistent energy price increases and prolonged heightened uncertainty.

Another application that illustrates the value of the multi-region structure of the ECB-Global model is the analysis of global external imbalances. ECB staff have used the model to compare two illustrative scenarios. In the baseline, which is a “more of the same” scenario, current trends are projected forwards. Specifically, this entails: an AI-led productivity surge and continued demand support in the United States,

weaker productivity growth in the euro area; and ongoing Chinese competitiveness gains that further lower its export prices. Chart 21 shows that, under this scenario, global trade imbalances widen further.

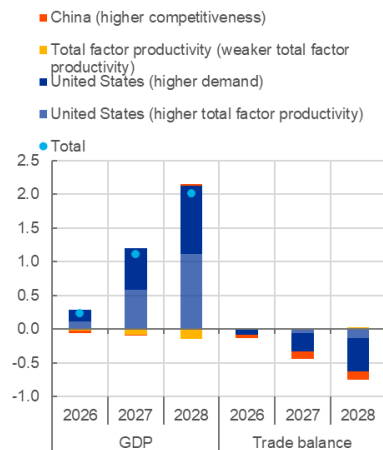
The alternative scenario envisages simultaneous rebalancing through a coordinated set of reforms: the United States retrenches domestic demand, the euro area undertakes structural reforms and capital market integration, and China shifts toward higher productivity, stronger domestic demand and currency appreciation. Chart 22 shows that under this reform scenario, imbalances narrow. While the overall GDP effects are broadly similar across the two scenarios, there is a rebalancing in net trade. The key insight is that the reform mix and the degree of global coordination matter greatly for cushioning the costs of adjustment.

Chart 21

ECB-Global simulations - Baseline scenario

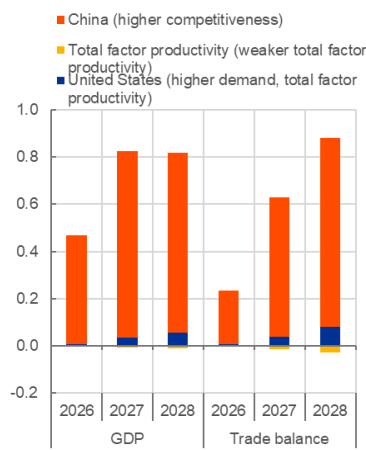
a) United States

(GDP in percentage deviations from level; trade balance in percentage point deviations)



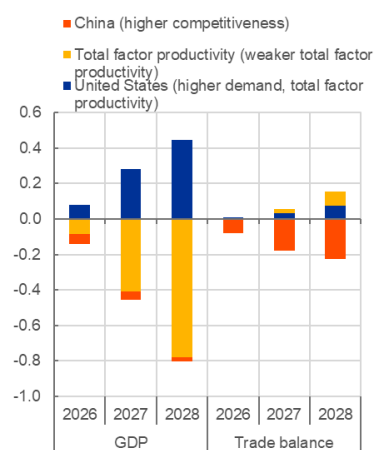
b) China

(GDP in percentage deviations from level; trade balance in percentage point deviations)



c) Euro Area

(GDP in percentage deviations from level; trade balance in percentage point deviations)



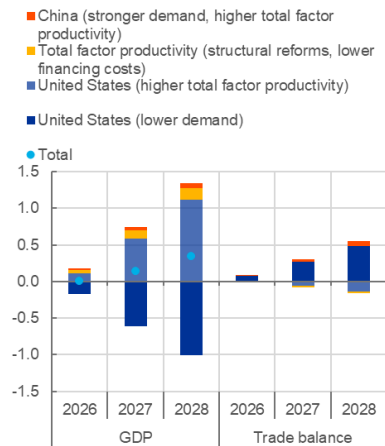
Source: ECB-Global simulations.

Chart 22

ECB-Global simulations - Reform scenario

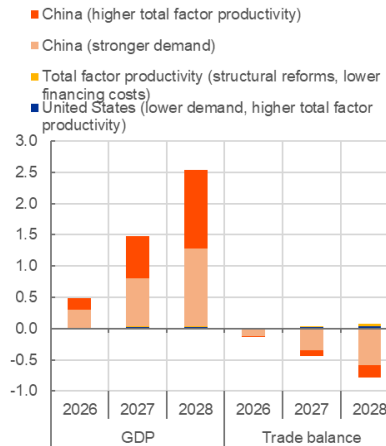
a) United States

(GDP in percentage deviations from level; trade balance in percentage point deviations)



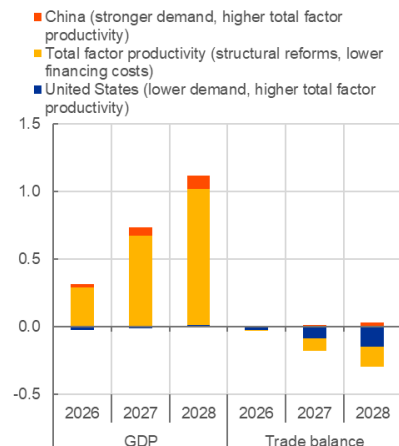
b) China

(GDP in percentage deviations from level; trade balance in percentage point deviations)



c) Euro Area

(GDP in percentage deviations from level; trade balance in percentage point deviations)



Source: ECB-Global simulations.

From aggregate to granular: new ECB models for trade and production linkages

Rising geopolitical tensions and economic fragmentation have underscored the need for new quantitative tools to adequately assess the impact of external shocks on the euro area. In this regard, it is important to account for the multi-region dimension of the global economy, the fact that trade largely involves goods rather than services, and, above all, the role of regional and global value chains. Two recently developed models address these challenges from complementary perspectives. First, a large-scale calibrated dynamic stochastic general equilibrium (DSGE) model, recently developed by ECB staff, aims to address these needs by explicitly accounting for the multi-sector dimension and input-output linkages both within and across multiple regions. Second, the MCMS-ONKIO (Multi-Country, Multi-Sector Open-economy New Keynesian Input-Output model) model complements this framework at a higher level of sectoral granularity, while putting less focus on investment and real rigidities.^[20]

Turning first to the large scale DSGE model, this comprises four regions (the EU, the United States, China, and the rest of the world) and ten sectors, specified according to the NACE Rev. 2 classification and

interconnected through input-output linkages.^[21] Across the four regions, there is international trade in consumption goods, investment goods and intermediate goods, which creates a global production network. The model also includes a rich set of nominal and real rigidities – such as sticky prices and wages, investment adjustment costs, and imperfect labour and capital mobility across sectors – making it suitable for quantitative analysis grounded in a general-equilibrium approach.

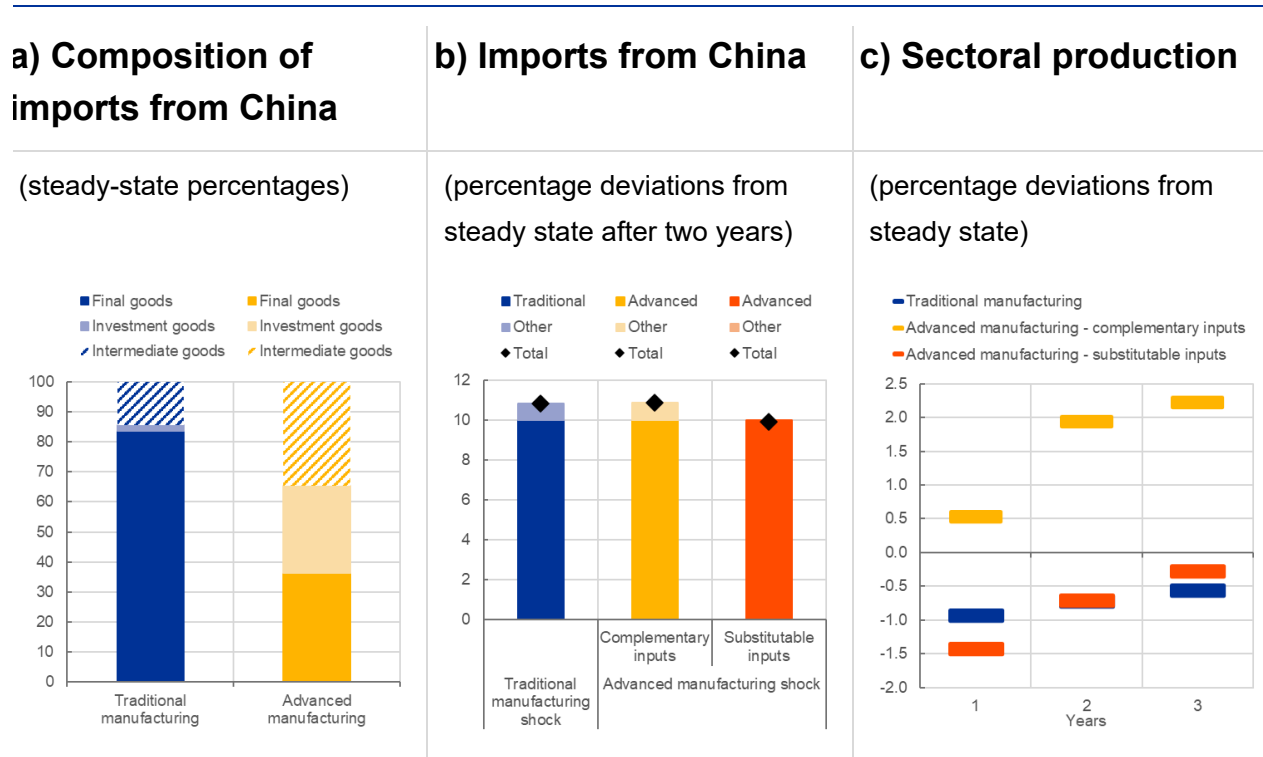
A recent application of the model has been to analyse the short-run impact on the EU of China's industrial rise through the lens of sectoral productivity shocks occurring in China, distinguishing between a shock to traditional Chinese manufacturing and a shock to advanced manufacturing.^[22] These shocks help to isolate the key transmission channels from a European perspective – namely, reductions in Chinese marginal costs and export prices. An important caveat applies: given the inherently short-run nature of a DSGE model, the analysis cannot capture potential longer-term scarring effects on the EU, such as the permanent erosion of domestic productive capacity.^[23]

In the model, a salient feature of EU imports from China is that traditional manufacturing goods are used mainly for final consumption by EU households, while advanced manufacturing goods are used more intensively as inputs in production and for capital accumulation (Chart 23, panel a). These different end-uses are key for the transmission of productivity shocks originating in either of the two sectors. Indeed, final goods typically exhibit a large elasticity of substitution between domestic and foreign alternatives. Clothing is a case in point: households can quickly switch to a cheaper Chinese alternative. By contrast, foreign intermediate and investment goods are typically complementary inputs in production and capital accumulation, reflecting the specialisation of global value chains. Computers and solar panels are examples: since there is little production of these in the EU, cheaper Chinese computers and solar panels are broadly good news for EU producers.

To compare the effect of a productivity shock to traditional Chinese manufacturing with that of a productivity shock to advanced Chinese manufacturing, the impact of the two shocks is scaled to imply a ten percentage point increase in sectoral import penetration in the EU in both cases (Chart 23, panel b). The different substitutability of final as opposed to intermediate imported goods shapes the impact of the two shocks on production in the corresponding EU sector (Chart 23, panel c). As consumers switch more readily to cheaper Chinese traditional manufacturing products, EU production in the sector declines as domestic producers are displaced by Chinese competitors. By contrast, when EU producers can source cheaper inputs from Chinese advanced manufacturing, EU production in the sector increases — provided that Chinese inputs act as complements in production. If Chinese inputs instead displace competing European products, EU production in the sector declines.

Chart 23

Productivity shocks in China: effects on EU imports and production



Source: Amicucci, A. et al. (2026), op. cit.

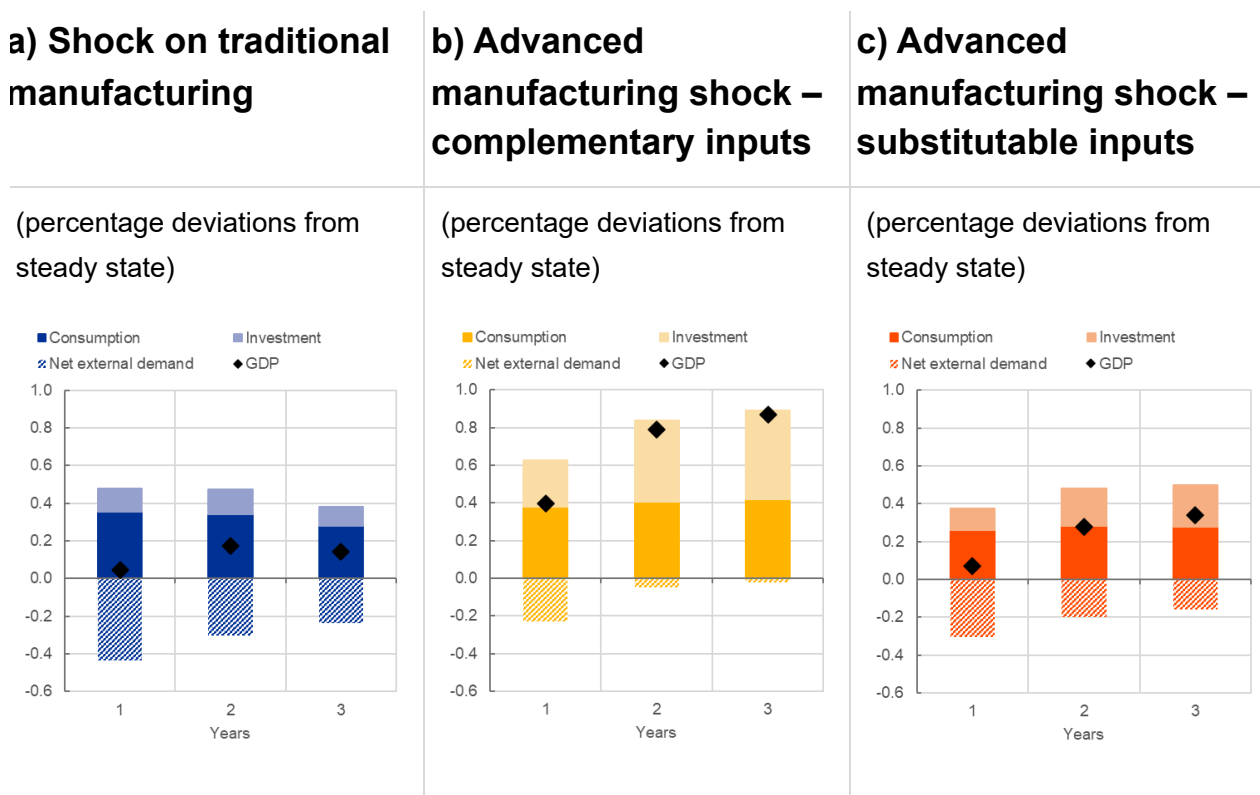
Notes: Simulations based on a multi-country DSGE model with production networks and trade linkages. The chart shows the responses to productivity shocks in Chinese traditional or advanced manufacturing. For comparison, the two shocks are scaled to both imply a 10 percentage points rise in Chinese import penetration in the EU after two years, which corresponds to a 20% increase in Chinese traditional manufacturing productivity or a 40% increase in Chinese advanced manufacturing productivity.

Turning to the aggregate effects of the shocks, both have a positive impact on EU GDP (Chart 24). A first channel operates through income effects, as households can enjoy cheaper Chinese goods and, hence, increased purchasing power overall – despite some income lost to displaced domestic production in the case of a shock to traditional manufacturing (Chart 24, panel a). In the case of advanced manufacturing, the impact is even more positive, as not only do income effects apply but EU production can also benefit from cheaper imported inputs when these act as complements in production (Chart 24, panel b).

Moreover, while conventional wisdom tends to focus on more direct effects, indirect effects can overturn a seemingly gloomy picture. A shock in Chinese traditional manufacturing poses a challenge to European exports, as domestic production is displaced; as a consequence, net external demand deteriorates, weighing on GDP. Still, the positive income effects prevail, pushing domestic demand up and yielding a positive impact on GDP overall (Chart 24, panel a). When the shock occurs in Chinese advanced

manufacturing and these products act as complementary inputs in European production, the deterioration in net external demand is very mild, and GDP on net increases thanks to the boost to domestic demand, particularly from investment (Chart 24, panel b). When the shock occurs in Chinese advanced manufacturing but these products act as substitutes for competing European products on the input side as well, the deterioration in net external demand is larger. Nevertheless, GDP still increases overall, owing to the support from domestic demand (Chart 24, panel c).

Chart 24
Productivity shocks in China: effects on EU GDP



Source: Amicucci, A. et al. (2026), op. cit.

Notes: Simulations based on a multi-country DSGE model with production networks and trade linkages. The chart shows responses to productivity shocks in Chinese traditional or advanced manufacturing. For comparison, the two shocks are scaled to both imply a 10 percentage point rise in Chinese import penetration in the EU after two years, which corresponds to a 20% increase in Chinese traditional manufacturing productivity or a 40% increase in Chinese advanced manufacturing productivity.

Importantly, as indicated earlier, the positive impact on EU GDP in this model-based analysis reflects short-run channels but does not account for longer-run risks, such as potential scarring effects from permanent production displacement and the consequent strategic vulnerabilities that might arise.^[24]

The analysis above highlights how sectoral productivity shocks in China transmit to the EU through production networks and trade linkages. Recent supply-side disruptions, from energy price shocks to trade restrictions on critical inputs, have underscored the fact that sector-specific disturbances can generate economically significant spillovers well beyond the directly exposed industries. Another model developed by ECB and Banco de España staff to analyse these questions is the MCMS-ONKIO model, the Multi-Country, Multi-Sector Open-economy New Keynesian Input-Output model, which maps these transmission channels across a highly disaggregated sectoral and regional structure.^[25]

The MCMS-ONKIO model covers four regions: the EU, the United States, China and the rest of the world. It disaggregates production into 44 sectors linked through detailed input-output tables. What makes this model particularly valuable is the way it captures the feedback between prices and production costs across sectors: when an upstream shock raises input costs, these higher costs feed through to downstream sectors, which in turn raise their own prices, amplifying the original shock through the entire production network. The model can also be reconfigured to distinguish individual euro area economies, enabling analysis of how the same external shock can have very different effects across countries depending on their production structure and trade linkages.

A recent application of the model concerns Chinese export controls on rare earth elements.^[26] Rare earth elements occupy an upstream position in many global value chains and are difficult to substitute. China dominates critical stages of the supply chain, particularly refining and permanent magnet production, making export controls a natural application for the MCMS-ONKIO framework. Although the quantities involved are small, the strategic upstream position of rare earths in the value chain means that disruptions at the mining and refining stage can potentially generate disproportionate effects downstream. The short-lived imposition of export controls introduced by China in April and October 2025 illustrated how such upstream disruptions can propagate through production networks.

To assess the potential macroeconomic consequences, ECB staff simulated a scenario of stringent but partial Chinese export restrictions lasting for 18 months, a period long enough to exhaust Western inventories but sufficiently limited to avoid permanent substitution away from Chinese supply. Chart 25, panel a), shows the sharp declines in Chinese rare earth exports observed during the April-May 2025 episode, with geopolitically distant countries, notably the United States, experiencing the largest reductions. The restrictions in the scenario are calibrated to match these patterns. The MCMS-ONKIO model is particularly well-suited to this exercise because the shock originates in a specific upstream input and propagates through global production networks.

Because the MCMS-ONKIO model aggregates economies into four broad regions, it is complemented by a static partial equilibrium framework based on a single CES production function to assess cross-country vulnerabilities at a finer level of granularity.^[27] Chart 25, panel b), shows the estimated output losses across countries from this static framework. The impacts are heterogeneous, reflecting differences in geopolitical alignment with China, sectoral exposure and import reliance. Taiwan faces the largest losses owing to its concentration in exposed industries such as electronics, while the United States is more

vulnerable than Japan, which has reduced its dependence on China for its supplies of rare earth elements since the 2010 episode.^[28]

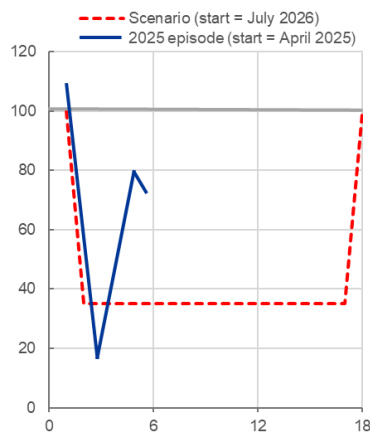
Chart 25, panel c), presents the macroeconomic impact from the MCMS-ONKIO model for the United States and the euro area. The export restrictions act primarily as an adverse supply shock: as rare-earth inputs feed into a broad range of downstream industries and are difficult to substitute in the short-run, downstream production becomes constrained and inflationary pressures arise as higher input costs and shortages propagate through global value chains. The results are sensitive to the assumed degree of substitutability: when substitution is constrained across inputs and suppliers, reflecting the dominant position of China in the supply chain, the impact on GDP and inflation roughly doubles relative to the scenario where only input substitution is limited.

Chart 25

Chinese partial export restrictions on rare earths

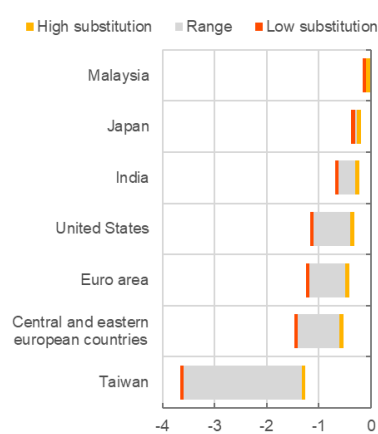
a) Chinese rare earth elements exports to United States

(x-axis: months after shock; y-axis: nominal flows, relative to 2024 average)



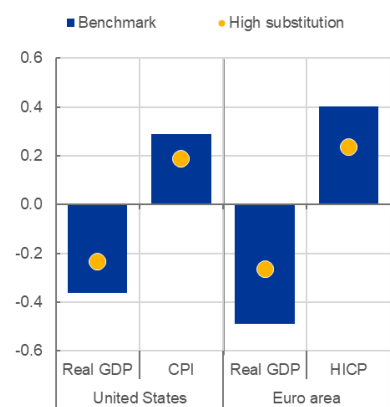
b) Output losses

(percentage deviations from initial steady state)



c) Impact on the euro area and United States

(percentage deviations from baseline, impact by end-2027)



Sources: Trade Data Monitor, Aguilar, P. et al. (2026), [“Global implications of export controls on rare earths: a model-based assessment”](#), ECB Occasional Paper Series, No 384, ECB and ECB staff calculations.

Notes: Left panel – this chart is based on Chinese customs exports data – reported declines in US customs data for imports are smaller (e.g. -37% in US imports versus -69% in Chinese exports data); middle panel – this chart is based on a partial equilibrium model with a single production function. The ranges are obtained by varying substitution elasticities around estimates made in Shojaeddini et al. (2025), [“Understanding market sensitivity: estimation of supply and demand elasticities for non-fuel minerals”](#), *Mineral Economics*, No 38, pp. 985-996; right panel – based on MCMS-ONKIO. “Benchmark” constrains substitution across inputs and across countries – as is most likely given the dominance of China in the supply chain of rare-earth elements. “High substitution” only constrains substitution across inputs.

While ECB-Global can capture the broad macroeconomic contours of a trade disruption, it cannot trace how a shock to a single upstream input cascades through 44 sectors and across four regions via production networks. The MCMS-ONKIO model shows how seemingly small disruptions in the supply of rare earths – affecting a market worth only USD 5 billion – can generate macroeconomically significant effects by hitting critical nodes in global value chains.

The same production-network structure that propagates rare earth disruptions also plays a central role in the transmission of energy price shocks, a question of direct relevance given the energy market turbulence

of recent years. Using the MCMS-ONKIO framework, recent work at the Banco de España shows that input-output linkages significantly amplify the inflationary impact of an international energy price shock and, critically, make it far more persistent than a model without production networks would predict.^[29]

The mechanism is intuitive. When international energy prices rise, the immediate effect is a spike in headline inflation driven by the higher cost of energy consumed by households. But the story does not end there. Through the production network, higher energy costs raise the input costs of energy-intensive upstream sectors, which in turn raise the prices of their output, feeding into the costs of downstream sectors, which raise their own prices, and so on. This feedback loop between selling prices and production costs amplifies and prolongs the inflationary episode well beyond the initial shock. Chart 26 illustrates this point: if national and international input-output linkages are switched off, the cumulative headline inflation response is only around 60 per cent of the baseline. Put differently, the full production-network structure accounts for roughly 40 per cent of the cumulative inflation response, even when energy is still kept as an intermediate input.

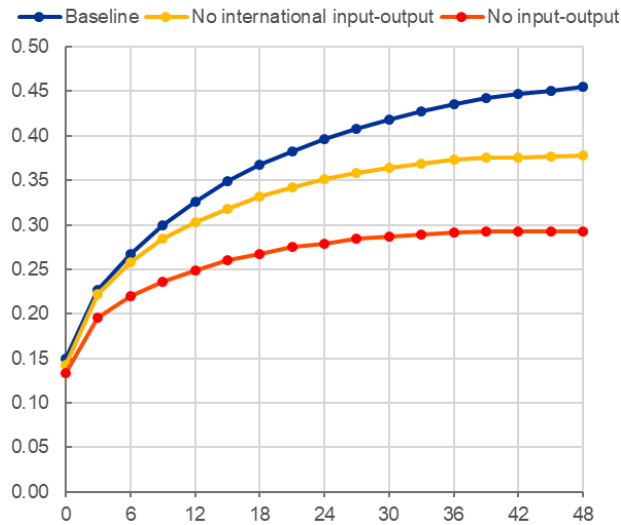
The interaction between national and international production networks matters: inflationary pressures spill across borders as higher domestic prices translate into higher export prices, which raise import costs for trading partners, feeding back into domestic inflation. The combined effect of national and international networks is larger than the sum of each considered in isolation, precisely because these cross-border feedback loops only operate when both dimensions are active simultaneously. These mechanisms are directly relevant to the current conjuncture: the Middle East conflict has driven energy prices higher for all regions, but the impact on competitiveness is asymmetric. China's faster pivot toward cheaper energy sources, including continued access to discounted Russian supply and rapid deployment of renewables, means that the energy cost shock is amplifying pre-existing competitive divergences through the same production-network channels, raising input costs for European producers relative to their Chinese competitors.

Chart 26

Production networks as spillover amplifiers of energy shocks

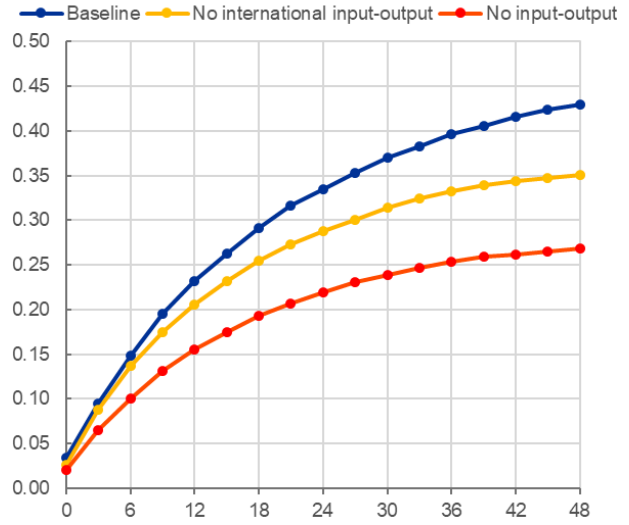
a) Cumulative impulse response function of headline Inflation

(percentage points)



b) Cumulative impulse response function of core Inflation

(percentage points)



Source: Aguilar et al. (2025).

Notes: This chart shows the cumulative impulse response function of headline (left panel) and core (right panel) inflation for the baseline and turning off the full, international, or national input-output structure. When turning off the input-output structure, the use of energy is always kept as an intermediate input.

DREAM: assessing global structural transitions and spillovers

The global economy is increasingly shaped by strong and persistent structural forces, including productivity shifts, the diffusion of AI technologies, demographic ageing, climate transition policies, and rising public debt levels. These developments are not temporary business cycle disturbances, but shocks capable of permanently altering production structures, relative prices, trade patterns, and equilibrium interest rates. From a policy perspective, analysing such structural changes requires models that can trace transitions between steady states, rather than frameworks focused solely on local fluctuations around a fixed equilibrium. This is particularly relevant in a highly interconnected global economy, where persistent shocks in large economies such as China can generate substantial and long-lasting spillovers to the euro area.

In this context, the DREAM model provides a useful framework for analysing nonlinear adjustment dynamics, structural policy changes, and global spillovers in a coherent general equilibrium setting.^[30]

DREAM is a multi-country DSGE framework that complements the existing modelling toolkit for macroeconomic scenario analysis and risk assessment. It can be configured either as a euro area-centric model with multiple member countries or as a disaggregated global model. The framework incorporates rich cross-country linkages, including trade in final and intermediate goods, financial integration through cross-holdings of long-term government bonds, a detailed energy block distinguishing clean and dirty energy sources, and a comprehensive fiscal structure with non-Ricardian households and a broad range of policy instruments.

A key advantage of DREAM is its ability to analyse permanent shocks in a fully nonlinear multi-country environment, which is difficult to capture in standard linearised models approximated around a single steady state. Instead, DREAM allows for endogenous transitions across steady states, making it particularly suitable for studying structural changes such as long-lasting energy price shocks, decarbonisation policies or persistent productivity shifts.

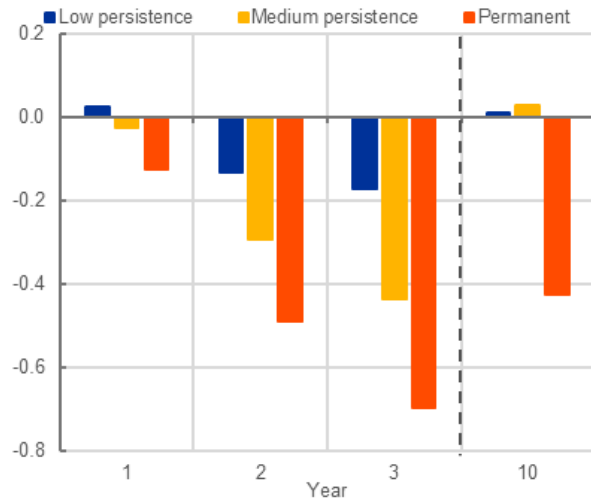
Chart 27 illustrates the impact of increases in global oil prices with different degrees of persistence: low, medium, and permanent, each calibrated to generate a peak increase of 10 per cent in the global oil price. Oil price increases operate as classic cost-push shocks: higher energy costs raise the marginal costs of firms, increasing inflation while depressing economic activity. The more persistent the shock, the more prolonged the inflationary pressures and the decline in GDP, as households and firms adjust consumption, wage-setting, investment and pricing decisions in response to weaker expected future income and profitability.

Chart 27

The effects on the euro area of oil price increases of different persistence

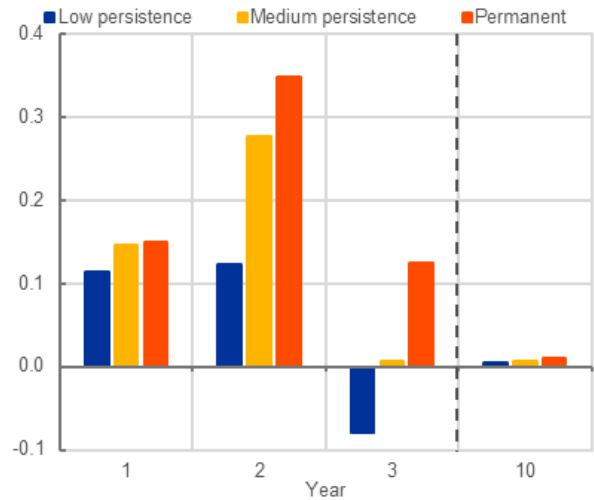
Real GDP

(annual average, percentage deviations from steady state)



HICP inflation

(annual average, percentage points)



Sources: ECB simulations using DREAM; Darracq Pariès, M., et al. (2026), op. cit.

Notes: Simulations are based on a three-country version of DREAM comprised of Germany, the rest of the euro area, and a rest-of-the-world aggregate. The responses illustrate the effects on the euro area of an increase in global oil prices with different persistence each calibrated to generate a peak increase in global oil prices by 10 per cent. Low persistence model has the first-order autoregressive term of 0.8; the medium persistence model has a first-order autoregressive term of 0.95. X-axis are years. Monetary policy follows the model-specific interest rate rule.

In all cases, inflation eventually returns to target, although after a permanent oil price shock the economy converges to a permanently higher price level. Temporary shocks generate transitory output losses, with GDP recovering as energy costs normalise and real incomes stabilise. By contrast, a permanent increase in oil prices implies a lasting deterioration in the terms of trade and real income, leading to a persistent decline in output. The exercise therefore highlights the importance of accounting for shock persistence and steady-state transitions when assessing the macroeconomic consequences of structural global disturbances.

Climate transition policies are another structural force which are likely to have important global macroeconomic implications. From a policy perspective, an important question is whether global decarbonisation is driven primarily by technological improvements or by carbon pricing policies, as the two approaches can generate very different domestic adjustment paths and international spillovers. Given the

central role of China in the global economy, and its roughly 30 per cent share in global emissions, persistent climate-policy changes in China can have sizeable and long-lasting effects on the euro area economy.

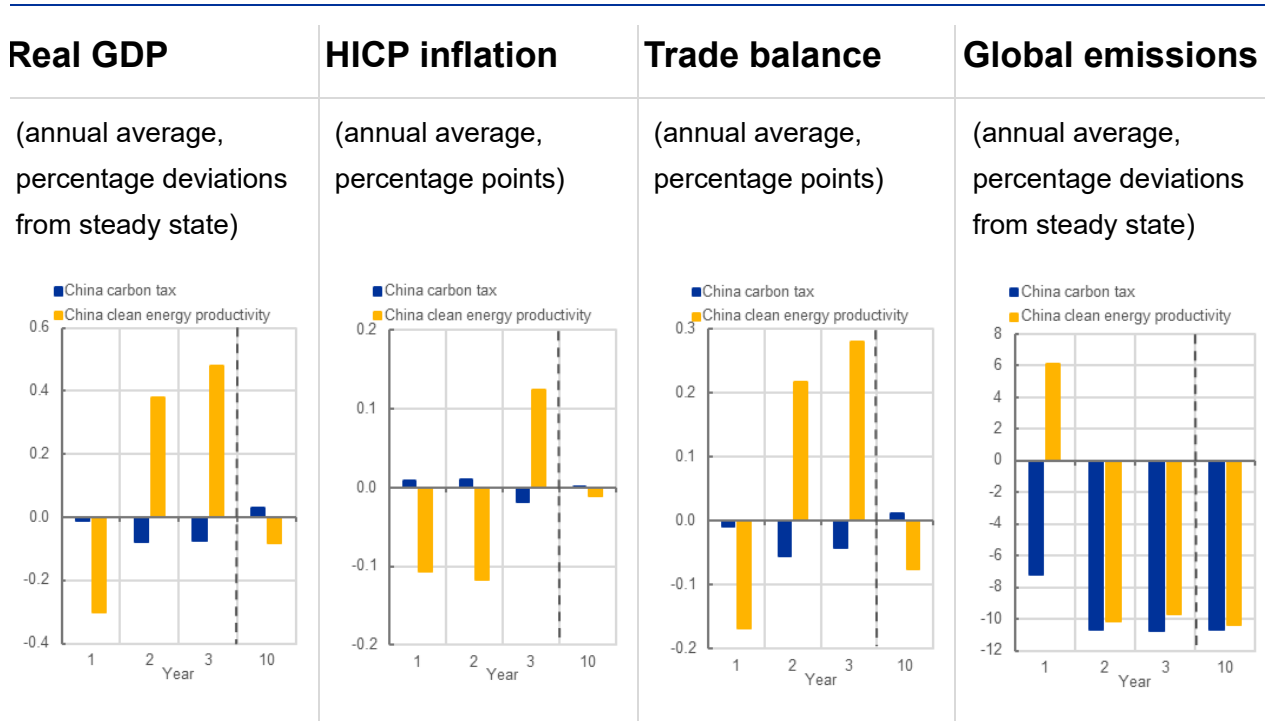
Chart 28 considers two alternative permanent decarbonisation shocks in China: (i) a positive shock to clean energy productivity; and (ii) an increase in the carbon tax on dirty energy. Both shocks are calibrated to deliver a 10 per cent reduction in global emissions in the long run. The key distinction lies in the transmission mechanism: the productivity shock lowers the relative cost of clean energy and improves supply conditions, whereas the carbon tax raises production costs and induces a contractionary cost-push adjustment.

A permanent clean energy productivity shock raises efficiency in China, increasing output, consumption, and investment while reducing marginal costs and inflation. Lower relative prices imply a real depreciation and stronger Chinese export competitiveness. For the euro area, spillovers operate through two opposing channels. On the one hand, lower import prices from China raise euro area real income and reduce inflationary pressures. On the other hand, cheaper Chinese goods trigger expenditure switching away from euro area products, weakening euro area net exports and GDP in the short run. While stronger Chinese demand later supports euro area exports, persistently lower Chinese prices ultimately generate a structural competitiveness loss for the euro area, reflected in higher import penetration and a gradual reallocation of global demand toward China.

A permanent carbon tax on dirty energy instead raises production costs in China and induces substitution toward clean energy. Given imperfect substitutability between clean and dirty energy, marginal costs and inflation increase, while output declines due to lower permanent income and profitability. Spillovers to the euro area again reflect opposing forces. On the one hand, more expensive Chinese goods improve euro area competitiveness and reduce imports from China. On the other hand, weaker Chinese domestic demand dampens euro area exports. Euro area inflation rises modestly due to higher import prices, although this is partly offset by weaker global demand. In the long run, the deterioration in Chinese competitiveness generates a durable expenditure-switching effect toward euro area producers, delivering a small positive effect on euro area GDP.

Chart 28

Euro area spillovers from decarbonisation in China: carbon taxes vs. increase in clean energy productivity



Sources: ECB simulations using DREAM; Darracq Pariès, M. et al. (2026) op. cit.

Notes: Simulations are based on a four-country version of DREAM comprised of the euro area, China, the United States, and a rest-of-the-world aggregate. The responses illustrate the spillovers on the euro area from an increase in carbon taxes (blue) and an increase in clean energy productivity (yellow) in China, each calibrated to generate a 10% decline in global emissions in the long-run. X-axis are years. The results are in deviations from steady state. Monetary policy follows the model-specific interest rate rule.

The impact of global macro shocks on euro area monetary policy

Global factors shape euro area macroeconomic outcomes and therefore the environment in which monetary policy operates. Yet their implications cannot be read mechanically. What matters is understanding the drivers of global developments: the same observed movement in the exchange rate, for instance, can carry very different implications depending on the underlying shock that generated it. Identifying that shock is therefore central to calibrating the appropriate policy response.

One approach in understanding the impact of global shocks on the euro area is to proxy them with US shocks. The dominant role of the US dollar in international trade invoicing means that US conditions propagate globally through trade channels even in the absence of large bilateral trade flows.^[31] US monetary policy is also the primary driver of the global financial cycles, transmitted through capital flows,

asset prices and risk appetite across countries and regions regardless of the exchange rate regimes maintained in different economies.^[32] Together, these two channels make the United States a natural anchor for identifying global shocks.

At the same time, the rapid growth of Asian economies over recent decades has made them an increasingly important part of the global transmission mechanism. Asian economies now account for a substantial and growing share of world output and trade, and any account of how global shocks propagate must incorporate this channel. Indeed, ECB staff analysis shows that spillovers from Asia have a strong impact on the euro area.^[33]

ECB staff analysis quantifies these spillovers using a time series model that identifies shocks that are external to the euro area. The model is a trend-cycle Bayesian VAR in which several global shocks are identified, including US demand, US supply, US monetary policy, global demand and Asian macroeconomic shocks.^[34] Augmenting the model with Asian GDP, to control for its growing role in the global economy, ensures the appropriate accounting for the estimated US shock transmission to the euro area.

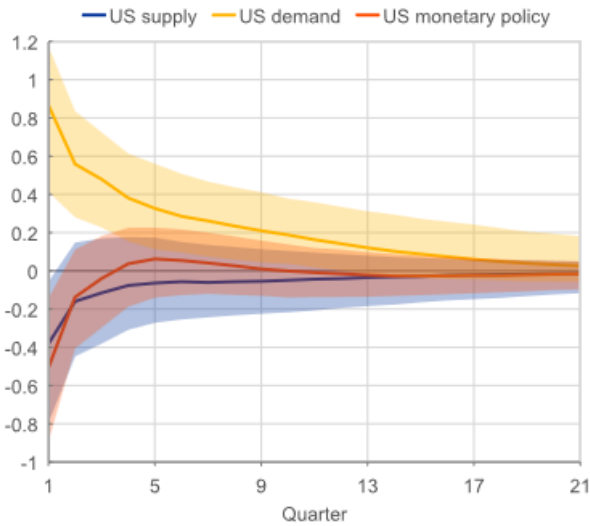
Identifying the sign and magnitude of global shocks for the euro area is not as straightforward as identifying the impact of domestic shocks since the exchange rate channel and international financial channels complicate transmission. For instance, a foreign demand shock tends to spill over positively to euro area activity (Chart 29, yellow). When foreign demand increases, euro area exports and broader activity are affected positively. Part of the impact is via Asia, which also receives a boost from global demand, amplifying the impact on the euro area. The euro exchange rate tends to depreciate in real effective terms, which helps boost exports in the euro area further. The end result is that the increase in euro area output is larger than the initial impact on US (global) GDP. At the same time, the increase in demand leads to upward pressure on prices that is further accelerated by the depreciation of the euro due to the increase in import prices. This combination of stronger output and higher inflation implies that euro area monetary policy needs to tighten.

Chart 29

Euro area responses to US shocks

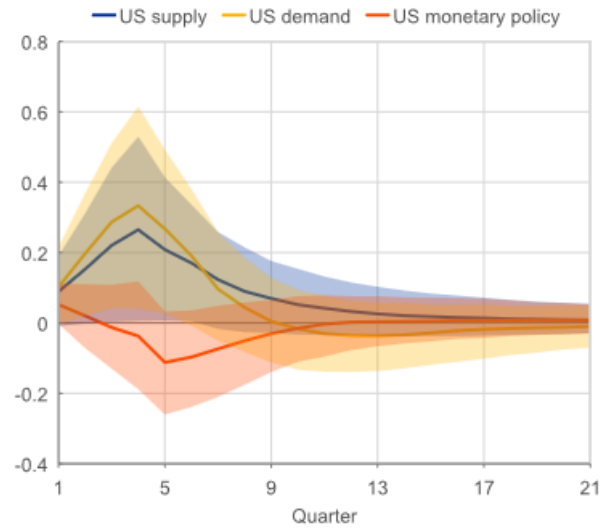
Euro area real GDP

(percentage deviations from long-run trend)



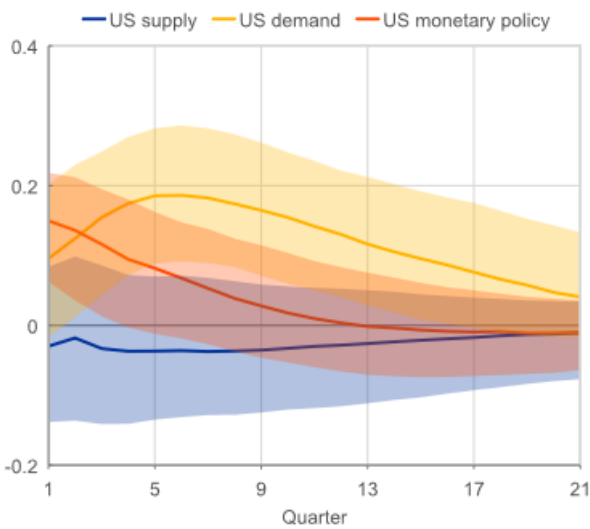
Euro area inflation

(year-on-year percentage points)



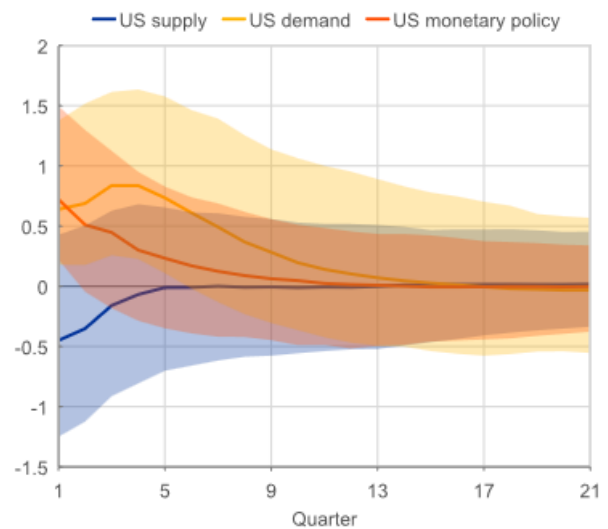
Euro area nominal two-year interest rate

(percentages per annum)



Real exchange rate

(percentage deviation from long-run trend)



Source: ECB calculations.

Notes: The charts show the impact of a US aggregate supply shock, a US demand shock and a US monetary policy on the variables for the euro area. The shaded areas correspond to 70% confidence intervals. The real exchange rate is the USDEUR exchange rate.

A global supply shock that raises foreign inflation while reducing foreign output typically leads to higher euro area inflation and lower GDP, as indicated by the median responses (blue lines) in Chart 29. However, these responses are subject to considerable uncertainty, as reflected in the wide confidence bands around inflation and GDP. Consequently, the monetary policy response is not well identified (Chart 29, bottom left panel). A more granular identification strategy is therefore needed to determine the appropriate monetary policy response, distinguishing, for example between cases in which inflation declines or output rises following a supply shock. A tariff shock provides one such example. ECB staff analysis of euro area-specific US tariff-related trade surprises suggests that these shocks can weaken euro area activity sufficiently to offset the direct price effects of tariffs, thereby leading to lower inflation.^[35] This illustrates the broader point that supply shocks must be carefully identified before drawing conclusions about the appropriate monetary policy response.

The impact of foreign monetary policy shocks on the euro area is also a priori not clear. The empirical evidence shows that when US monetary policy tightens unexpectedly, the euro exchange rate depreciates and thereby leads to an initial increase in inflation (Chart 29, top right panel, red).^[36] To counter that, euro area monetary policy also tightens, albeit less than US policy (bottom left panel). Eventually, via lower demand from the United States, but also via trading partners in Asia and elsewhere that are also affected by the shock, demand falls leading to lower output (top left panel) and inflation (top right panel) in the euro area.^[37]

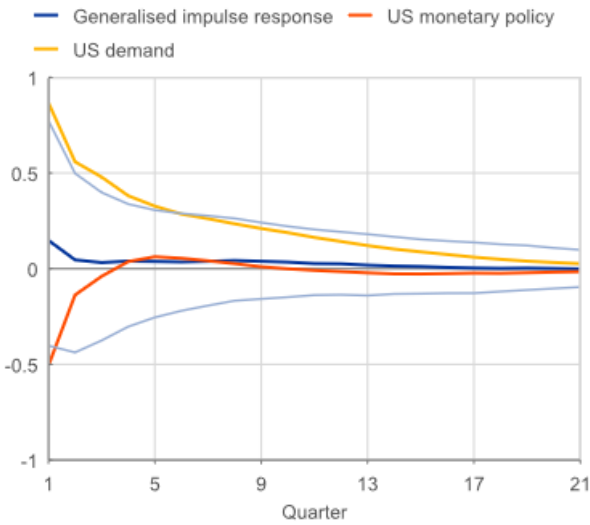
Given the wildly different impacts of various global shocks on the euro area, there is no unconditional interpretation of the impact of movements in exchange rates. This is illustrated in an exercise that computes the impact of an increase in the US-euro area interest rate differential of 10 basis points, with the restriction that the euro exchange rate depreciates. If one looks only at “generalised impulse responses” that are agnostic about the underlying shock, the effects on euro area GDP and inflation are inconclusive. These responses are more akin to elasticities than structural interpretations. They show that, without identifying the shock, one cannot say with confidence whether the observed change in the interest rate differential and exchange rate is associated with a change in expectations for euro area monetary policy – proxied by the reaction of the 2-year yield – as seen by the confidence bands that include positive, negative and zero values (Chart 30, blue).

Chart 30

Generalised impulse responses

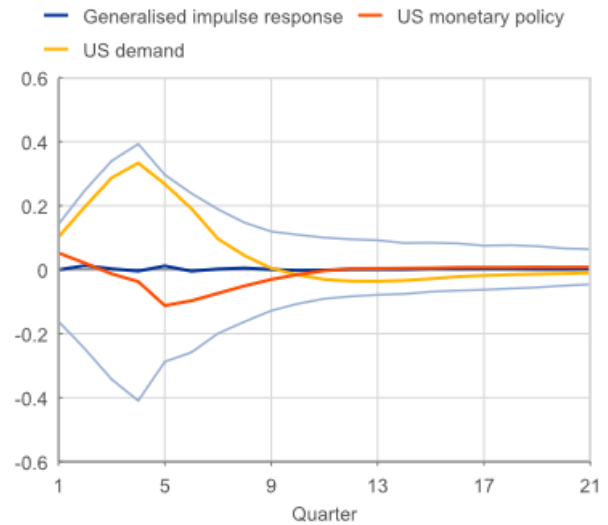
Euro area real GDP

(percentage deviations from long-run trend)



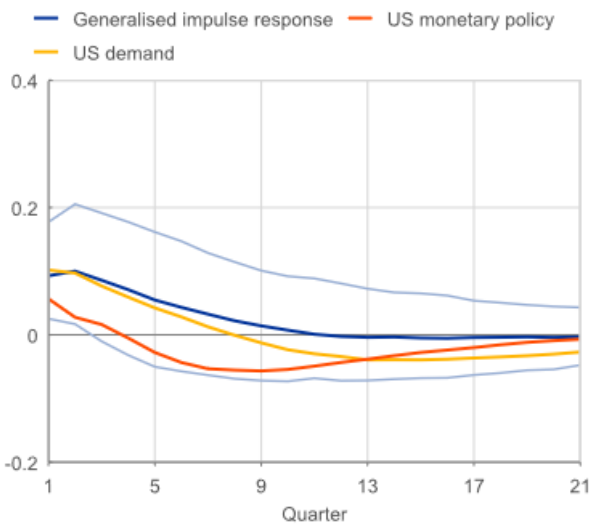
Euro area inflation

(year-on-year percentage points)



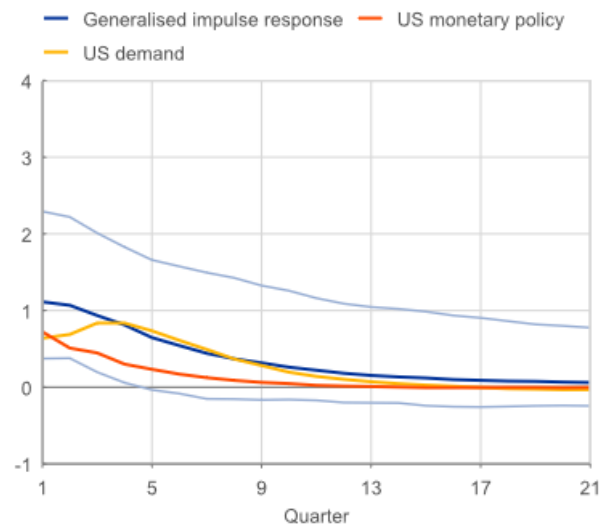
Nominal two-year interest rate gap US-euro area

(percentages per annum)



Real exchange rate

(percentage deviations from long-run trend)



Source: ECB calculations.

Notes: The charts show an exercise where the gap in the nominal interest rate between United States and the euro area increases and the real exchange rate in the euro area depreciates. Generalised impulse response functions that are agnostic about the specific shock hitting the economy and more akin to an elasticity lead to inconclusive impact on euro area inflation and output. Hence, the impact on monetary policy is ambiguous also. Instead, when the underlying shock is identified, the impact is clearer. A US demand shock pushes euro area inflation and GDP up, while a US monetary policy shock leads to a decline in both variables for the same exchange rate responses. The monetary policy implications vary in each case. The real exchange rate is the USDEUR exchange rate. The light blue lines correspond to 70% confidence intervals around the generalised impulse response functions.

Once the underlying shock is identified, however, the results become much clearer. Both a foreign demand shock (Chart 30, yellow) and a monetary policy shock (Chart 30, red) that lead to a 10 basis point increase in the US-EA interest rate differential on impact together with a euro depreciation imply very different macroeconomic outcomes. Euro area output increases in response to an increase in foreign demand, while it declines in response to a tightening of foreign monetary policy. Euro area inflation initially increases in both cases, and the increase is sustained as a result of a demand shock, whereas it eventually fizzles out and turns negative in the case of a monetary policy shock. Subsequently, the medium-term interest rate differential remains positive in response to the demand shock but turns negative as euro area needs to loosen policy relative to the United States to support the economy. This implies that monetary policy cannot respond to exchange rates or foreign interest rates as such; it must respond to their implications for the domestic inflation outlook, which depend on the nature of the shock driving them.^[38]

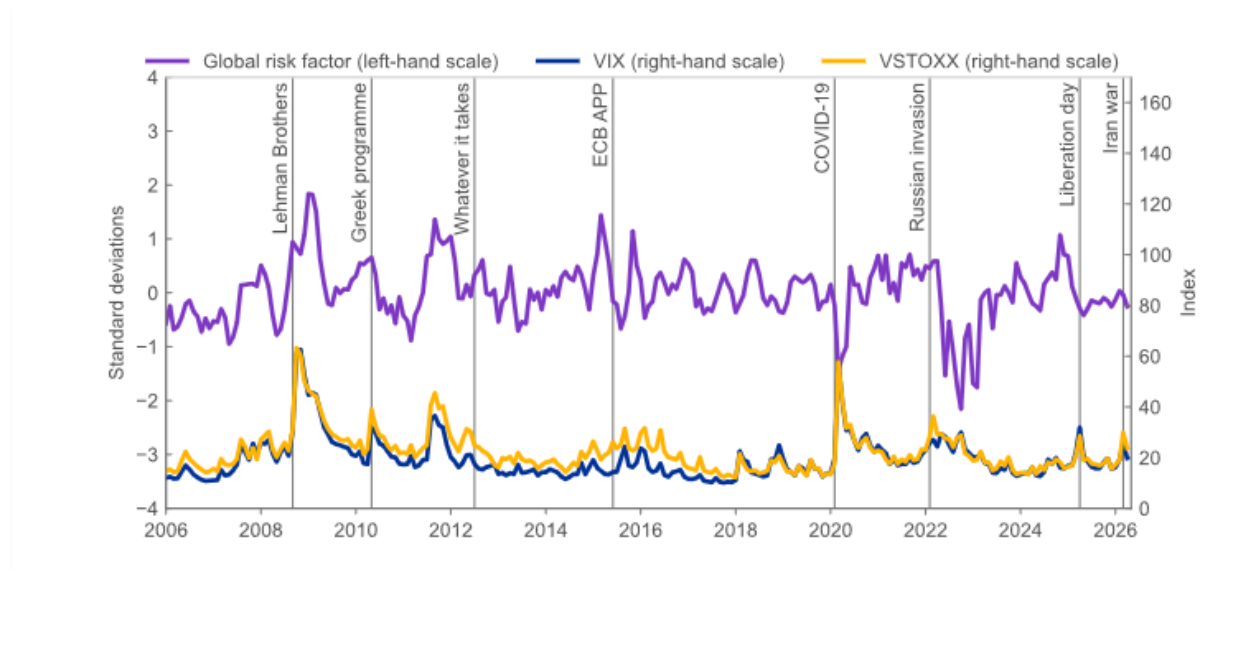
Role of global financial shocks

Global financial shocks can have strong spillover effects globally. One way to identify those shocks is via a BVAR estimated in daily frequency with an identified global risk shock.^[39] The shock is especially prominent in periods of market stress, such as during the global financial crisis, around the euro area debt crisis, and Covid for example as shown in Chart 31 in purple, increasing in sync with other global financial volatility measures.

Chart 31

Comparison of the global risk factor with alternative risk indicators

(standard deviations; Index)



Source: ECB calculations.

Notes: The purple line shows the global risk factor as estimated from the two-country daily BVAR of Brandt, L., Saint Guilhem, A., Schroder, M. and Van Robays, I. (2021), op. cit. To align the volatility of our global risk measure to that of other measures for easier visual comparison, the global risk factor is the three-months moving average of the standardised posterior mean global risk shock from the daily BVAR, while financial market indicators are shown as monthly averages. NB: the measures are not fully comparable, because by construction the global risk shock takes positive and negative values (capturing risk-on and risk-off episodes) whereas financial market indicators measure volatility and only take positive values – hence the two distinct scales.

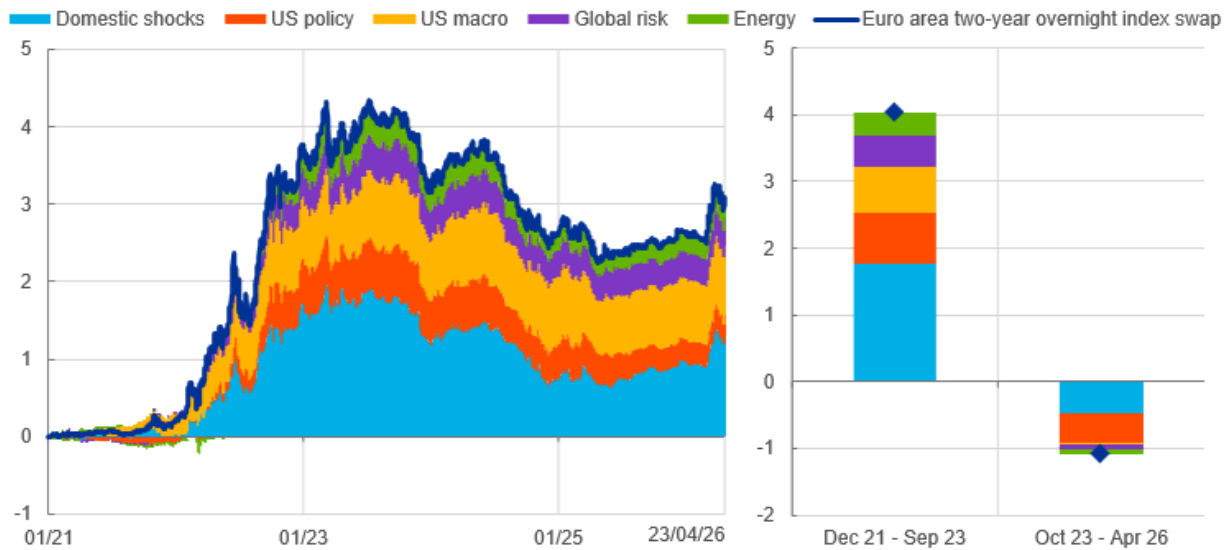
Outside those periods of severe global financial market stress, the global risk factor accounts for only a relatively small share of movements in the euro area two-year interest rate (Chart 32, purple). This notwithstanding, global shocks taken together explain a large share of euro area interest rate movements. The global risk shock (purple), energy shocks (green), and US policy (red) and macro (yellow) shocks together have accounted for more than half of the movements in the euro area interest rates in the last couple of years.

Chart 32

Decomposition of euro area interest rate

Drivers of the euro area two-year nominal Overnight Index Swap

(cumulated changes since 1 January 2021, percentage points)



Source: ECB calculations.

Notes: The model is a two-country BVAR including two-year euro area overnight index swap (OIS), euro area stock prices, EUR/USD exchange rate, two-year euro area OIS rate – US Treasury spread, US stock prices, euro area two-year inflation linked swap, and energy price index. It is estimated using daily data from the period 2007-2026. The latest observations are for 23 April 2026.

The asymmetry of global monetary spillovers is also worth noting: US monetary policy has a particularly strong impact on euro area financial markets, while the reverse effect is much weaker.^[40] This asymmetry reflects the central role of the United States in the international monetary and financial system. It means that US policy decisions can influence financing conditions elsewhere in the world even when domestic fundamentals remain unchanged.

At the same time, the transmission of global financial shocks may have changed in the past year. While historically financial shocks typically led to safe-haven flows to the United States, this pattern did not hold in the second quarter of 2025. The increase in uncertainty due to the US tariff announcements was associated with dollar depreciation rather than dollar appreciation, with the dollar-euro rate moving from 1.08 to 1.18 in that quarter.^[41] Looking ahead, if the US dollar were to become a less reliable as a safe haven currency (at least vis-à-vis some types of shocks), the international monetary system might be more

resilient if non-dollar liquidity were more available during high-stress episodes. The ECB has recently announced an enhanced repo (EUREP) facility for central banks that provides a standing euro liquidity backstop to eligible non-euro area central banks against high-quality collateral.^[42]

Conclusion

Let me finish with some main conclusions. First, Asia matters substantially more for the euro area now than it did a decade ago. Asian macroeconomic shocks have sizeable spillovers, and their effect on euro area GDP is close to that of US shocks. This reflects Asia's growing role in global demand, production networks and trade transmission.

Second, US shocks also remain a powerful driver of the euro area economy, affecting the euro area both directly and indirectly through their impact on the broader global economy.

Third, the monetary policy implications of global shocks depend critically on the nature of the shock. Foreign demand shocks, supply shocks, monetary policy shocks and risk shocks can generate very different combinations of output, inflation and exchange rate responses, leading to varying implications for euro area monetary policy.

This underscores the value of structural global models. Such models help central banks move beyond reduced-form correlations and simulate alternative scenarios. They allow policymakers to ask not only what happens when the exchange rate depreciates or when foreign interest rates rise, but also why these movements occur and how they are likely to affect domestic inflation and activity. Understanding the underlying drivers is essential for calibrating the appropriate monetary policy response to the shocks. This is why careful shock identification, supported by global models, are indispensable elements of the analytical framework underlying monetary policy in an interconnected world.

1.

The views expressed in this speech are my own and should not be interpreted as reflecting the collective view of the Governing Council of the ECB. I am grateful to Paolo Bonomolo, Leonardo Carrai, Virginia Di Nino, Luca Fosso, Nicolò Gnoco, Thore Kockeroles, Gerrit Koester, Peter McQuade, Romanos Priftis and Annukka Ristiniemi for their contributions to this speech.

2.

International migration flows are also of substantial relevance for the European economy but are not covered in this speech.

3.

The value-added approach in Chart 1, panel c) captures the proportion of the value of the final product that is created domestically versus what is sourced from other countries as foreign inputs. The value added perspective provides a clearer view of competitiveness, specialisation, and exposure to external demand

and is particularly relevant for the euro area, where the economies are closely integrated both with each other and with the rest of the world. Within the euro area, value-added analysis shows how production is shared across member states and how much each member state contributes to final goods and services. Outside the euro area, it helps in assessing dependence on non-euro-area suppliers and markets. Verifying where value added in gross flows is created is therefore essential for understanding true trade positions, supply-chain vulnerabilities, and the distribution of income and employment gains from trade.

4.

Attinasi, M.G., et al. (2021), "[Supply chain disruptions and the effects on the global economy](#)", Economic Bulletin, Issue 8, ECB.

5.

This period has also seen a weakening of European regional trade integration due to Brexit and the unjustified Russian invasion of Ukraine which triggered sanctions on Russia.

6.

The underperformance of euro area exports between 2019 and 2025 is particularly marked in the chemical, automotive, mechanical and electrical equipment sectors. Global demand has shifted away from some of these sectors, challenging the export market share of the euro area. Yet changes in the global consumption basket explain only part of the export market share decline; the euro area has also underperformed relative to other countries within each of these industries. See Banin, M. et al. (2025a) "[Have euro area exports missed the tech train?](#)" Economic Bulletin, Issue 2/2025, ECB.

7.

ECB (2017), "[China's economic growth and rebalancing and the implications for the global and euro area economies](#)". *Economic Bulletin*, Issue 7, ECB; Dieppe, A., et al. (eds.) (2018), "[The transition of China to sustainable growth – implications for the global economy and the euro area](#)", *Occasional Paper Series*, No 208, ECB, January.

8.

Emter, L., Gunnella, V. and Schuler, T., (2023) "[The energy shock, price competitiveness and euro area export performance](#)", *Economic Bulletin*, Issue 3, ECB.

9.

Lodge, D., Manu, A.-S., and Van Robays, I. (2023) "[China's footprint in global financial markets](#)," *Working Paper Series*, No. 2861, ECB.

10.

Bañbura, M., Bobeica, E., and Martínez Hernández, C. (2026), "[What drives core inflation? The role of supply shocks](#)", Working Paper Series No 2875, ECB. Kuik, F., Adolfsen, J.F., Lis, E.M. and Meyler, A. (2022), "[Energy price developments in and out of the COVID-19 pandemic – from commodity prices to consumer prices](#)", *Economic Bulletin*, Issue 4, ECB.

11.

Attinasi, M.G. et al. (2021), op. cit.; Banin, M., D'Agostino, M., Gunnella, V., and Lebastard, L. (2025b), "[How vulnerable is the euro area to restrictions on Chinese rare earth exports?](#)", *Economic Bulletin*, Issue 6, ECB.

12.

Evenett, S. J., and Fritz, J. (2023), "[The Scramble for Critical Raw Materials: Time to Take Stock?](#)", The 31st Global Trade Alert Report, Global Trade Alert; Bown, C.P. (2024), "[Trade policy, industrial policy, and the economic security of the European Union](#)," *Working Paper Series*, No 24-2, Peterson Institute for International Economics.

13.

Fidora, M. and Gunnella, V. (2024), "[Past and future challenges for the external competitiveness of the euro area](#)", *Economic Bulletin*, Issue 6, ECB.

14.

Lane, P. R. (2025) "[Inflation deviations and monetary policy](#)", keynote speech at the 15th Workshop on exchange rates, 3 December.

15.

While there has been a persistent surplus, there has also been some volatility in the external balance which partly absorbed the terms of trade deteriorated induced by the 2021-22 energy price shock. See: Emter, L., Fidora, M., Pastoris, F. and Schmitz, M. (2023), "[The euro area current account after the pandemic and energy shock](#)", *Economic Bulletin*, Issue 6, ECB.

16.

Although not the focus of this speech, ECB staff have also used these models extensively to assess the macroeconomic impact of tariffs on the euro area. See ECB (2025), "[The impact of tariffs on the March 2025 staff projections](#)", *ECB staff macroeconomic projections for the euro area*, ECB, March; ECB (2025), "[US tariffs and trade policy uncertainty](#)", *Eurosystem staff macroeconomic projections for the euro area*, ECB, June; ECB (2025), "[Sensitivity analyses on the impact of US tariff policies](#)", *ECB staff macroeconomic projections for the euro area*, ECB, September; Jouvanceau, V., Darracq Pariès, M., Dieppe, A. and Kockerols, T. (2025), "[Trade wars and global spillovers. A quantitative assessment with](#)

[ECB-global](#)", *Working Paper Series*, No. 3117, ECB; and Gnocato, N., Montes-Galdón, C. and Stamato, G. (2025), "[Tariffs across the supply chain](#)", *Working Paper Series*, No 3081, ECB.

17.

Baqaei, D. and Farhi, E. (2024), "[Networks, Barriers, and Trade](#)", *Econometrica*, Vol. 92, Issue. 2, pp. 505-541.

18.

See Dieppe, A. et al. (2017), "[ECB-Global: introducing ECB's global macroeconomic model for spillover analysis](#)", *Working Paper Series*, No 2045, ECB, April; and Georgiadis, G. et al. (2021), "[ECB-Global 2.0: a global macroeconomic model with dominant-currency pricing, tariffs and trade diversion](#)", *Working Paper Series*, No 2530, ECB, March.

19.

See Dieppe, A. Frankovic, I, Liu, M, "Changing Global Footprints: Implications for countries and spillovers", ECB Working Paper forthcoming.

20.

Aguilar, P., et al. (2026), "Tariffs, Production Networks, and Spillovers: the Case of a US-China Trade War", *Working Paper Series*, ECB, forthcoming

21.

The model is a four-region extension of the framework outlined in Gnocato, N., Montes-Galdón, C. and Stamato, G. (2025), "[Tariffs across the supply chain](#)", *Working Paper Series*, No 3081, ECB.

22.

For more details on the application, see Amicucci, A. et al. (2026), "[The impact of China's industrial rise on the euro area](#)", *Economic Bulletin*, Issue 3, ECB. Another recent application has explored the effect of global versus regional energy shocks: see, for details, Lane, P. R. (2026) "[Analytical perspectives on energy supply shocks](#)", dinner remarks at the Centre for European Reform, London, 13 May.

23.

See Cesa-Bianchi, A., Ferrero, A., Fornaro, L. and Wolf, M. (2026), "[Industrial policies, global imbalances and technological hegemony](#)," Centre de Recerca en Economia Internacional, forthcoming. If a surge in imports results in the exit of domestic producers from an industry, the increase in the market power of the foreign firms can lead to an increase in mark ups and a longer-run drop in consumer welfare. For related work, see Cheng, C., Corsetti, G., Crowley, M. and L. Han (2026), "Trade wars and the reallocation of market power in global export markets," work in progress, European University Institute.

24.

See also Clayton, C., Maggiori, M. and Schreger, J. (2026), "A framework for geoeconomics," *Econometrica*, Vol. 94, No. 1, pp. 105-136.

25.

Aguilar, P. et al. (2026), "Tariffs, Production Networks, and Spillovers: the Case of a US-China Trade War", *Working Paper Series, ECB*, forthcoming. This builds on Aguilar, P., Dominguez-Diaz, R., Gallegos, J.- E. and Quintana, J. (2026), "[The Transmission of Foreign Shocks in a Networked Economy](#)", *Working Papers*, No 2607, Banco de España.

26.

See Aguilar, P. et al. (2026), "[Global implications of export controls on rare earths: a model-based assessment](#)", *Occasional Paper Series*, No 384, ECB.

27.

For an application assessing the impact of Russian gas disruptions, see Bachmann, R., et al. (2024), "What if? The macroeconomic and distributional effects for Germany of a stop of energy imports from Russia", *Economica*, Vol. 91, No 364, pp. 1157-1200.

28.

In September 2010, China halted exports of rare earth elements to Japan amid a bilateral territorial dispute. Despite a surge in global rare earth prices by factors of ten to 45, the macroeconomic impact remained limited - an outcome later dubbed "the crisis that wasn't" (Gholz, E. (2014), "[Energy Report: Rare Earth Elements and National Security](#)". Council on Foreign Relations, October). Japanese firms responded by accelerating the application of existing innovations, recycling rare earths, and reducing their use in lower-value goods, while authorities launched emergency programmes to diversify sourcing and build strategic stockpiles (see Gholz, E. and Hughes, L. (2021), "Market structure and economic sanctions: the 2010 rare earth elements episode as a pathway case of market adjustment", *Review of International Political Economy*, Issue 28, No 3, pp. 611-634; Alfaro, L., Fadinger, H., Schymik, J. and Virananda, G. (2025), "Trade and Industrial Policy in Supply Chains: Directed Technological Change in Rare Earths", *Working Paper*, No 25-059, Harvard Business School, Boston, MA). These adjustments explain the comparatively lower vulnerability of Japan to subsequent supply disruptions.

29.

Aguilar, P., Dominguez-Diaz, R., Gallegos, J.-E. and Quintana, J. (2026), "[The Transmission of Foreign Shocks in a Networked Economy](#)", *Working Papers Series*, No 2607, Banco de España. If a surge in imports results in the exit of domestic producers from an industry, the increase in the market power of the foreign firms can lead to an increase in mark ups and a longer-run drop in consumer welfare. For related

work, see Cheng, C., Corsetti, G., Crowley, M. and L. Han (2026), "[Trade wars and the reallocation of market power in global export markets](#)," European University Institute, forthcoming.

30.

Darracq Pariès, M. et al. (2026), "Introducing DREAM: A flexible multi-country framework for structural policy analysis at the ECB", *mimeo*, ECB.

31.

Gopinath, G., et al. (2020), "[Dominant Currency Paradigm](#)", *American Economic Review*, Vol. 110, No 3 show empirical support for the dominant currency paradigm, under which firms set export prices in a dominant currency, which is most often the US dollar.

32.

Rey, H. (2015), "[Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy Independence](#)," Working Papers, No 21162, National Bureau of Economic Research.

33.

Shocks originating in Asia that increase Asian GDP by 1 per cent result in a sustained increase in euro area GDP of 0.7 per cent in the Bayesian VAR introduced by Bonomolo, P., Brand, C., Muehlenweg, L.A., and A. Ristiniemi (2026) "Assessing the impact of US shocks on euro area monetary policy", *ibid*. However, the impact predicted by the ECB-Global model is more limited.

34.

The model includes US real GDP, US CPI, US two-year nominal interest rate, euro area real GDP, HICP, euro area two-year OIS, Asian real GDP including all major Asian economies except for Japan, and the real USD/EUR exchange rate. The identification scheme imposes sign and zero restrictions on the contemporaneous response of the endogenous variables. US shocks are identified assuming that euro area and Asia affect US with a lag. For details see Bonomolo, P., Brand, C., Muehlenweg, L.A., and Ristiniemi, A. (2026), *ibid*.

35.

De Sanctis, A., Gebauer, S., Schumacher, J. and Ungarelli, F. (2026), "[Lower inflation, weaker activity: what foreign import tariffs mean for the euro area](#)", *The ECB Blog*, 10 February. A standard response of the euro exchange rate would have been to depreciate in response to the recent tariff shocks. Instead, the euro appreciated, causing the decline in inflation.

36.

Dedola, L., Rivolta, G., and L. Stracca (2017) "If the Fed sneezes, who catches cold?". *Journal of International Economics* Vol. 108 shows that in most countries in the sample of 36 countries, a US

tightening leads to a depreciation against the dollar.

37.

The higher interest rate in the euro area also reflects a tightening of financial conditions due to strong financial linkages, while the negative effect on inflation is strengthened by a commodity price channel. Empirical evidence for both channels is provided by Degasperis, R., Hong, S.S. and G. Ricco (2026), "[The global transmission of U.S. monetary policy](#)", *Journal of International Economics*, Vol. 161.

38.

This exercise is consistent with the broader literature emphasising that "the shocks matter" for estimates of exchange rate pass-through and for the policy response to exchange rate movements. See, for example, Forbes, K., Hjortsoe, I., and Nenova, T. (2018) "[The shocks matter: Improving our estimates of exchange rate pass-through](#)" *Journal of International Economics*, Vol. 114, and Forbes, K. (2026), "*The Art of Monetary Policy: Lessons from Sun Tzu for Central Banks*", MIT Press.

39.

The global risk factor shock is identified as leading to a decline in global activity and an appreciation of the US dollar via safe-haven flows. For more details on the methodology, see Brandt, L., Saint Guilhem, A., Schroder, M., and Van Robays, I. (2021) "[What drives euro area financial markets? The role of US spillovers and global risk](#)", *Working Paper Series*, No 2560, ECB.

40.

See Ca' Zorzi, M. et al. (2023). "[Monetary policy and its transmission in a globalised world](#)", *Discussion Paper Series*, No.10, ECB.

41.

Model-based analyses of tariffs typically generate that the tariff-imposing country experiences currency appreciation. A second "risk" shock is required to replicate the Q2 2025 episode.

42.

For more details, see the press release "[ECB enhances repo facility for central banks](#)" released on 14 February 2026

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