BANCA D'ITALIA
EUROSISTEMA

Monetary policy in a shifting landscape

Inaugural Conference of the Research Network
on 'Challenges for Monetary Policy Transmission in a Changing World' (ChaMP)*

Dinner speech by Fabio Panetta
Governor of the Bank of Italy

Frankfurt, 25 April 2024

First of all, I wish to thank the organizers for inviting me. It is a great pleasure to be back at the ECB, although it feels strange to be here as a guest.

Our vision of how the economy works is in perpetual motion. In 1949, Bill Phillips unveiled the 'Phillips Machine'.[1] This ingenious contraption used water to represent money flowing through the economy, with valves that could be opened or closed to simulate the effects of policy interventions on consumption and investment. The economy was presented as a *fixed and deterministic* system of relations that could be investigated until its functioning became clear once and for all.[2]

We know that, for better or for worse, the real world is very different. Indeed, if economic relations were fixed and deterministic, our jobs would be easy but boring. Economic relations are not fixed because the economy evolves following slow-moving structural trends. And they are not deterministic, because there are many events that we tend to conceptualize as 'shocks' – perhaps due to the limitations of our knowledge. The last four years have been exceptional in this regard: from the Covid pandemic onwards, we have witnessed a combination of shocks and structural changes with few historical precedents.

The global landscape has changed radically as a result, with important implications for both the theory and the practice of monetary policy. A constructive interaction between policy and research is key: at times like this, the dialogue between researchers and policy makers becomes critical. Your job within the ChaMP Network is to help us improve our understanding of the economy and the monetary policy transmission mechanism.

---

* I would like to thank Piergiorgio Alessandri, Margherita Bottero, Antonio Conti, Francesco Corsello, Stefano Neri and Eliana Viviano for their contributions.

1 The machine was also known as the *Monetary National Income Analogue Computer*, or MONIAC.

2 Phillips found that, even in his stylized setup, policy interventions based on feedback rules could be highly sensitive to lags, delays and over or undershooting issues. See 'MONIAC: Phillips Monetary National Income Analogue Computing Machine', special issue of *Economia Politica*, December 2011.

My remarks this evening have two objectives. First I will revisit the story of 2021-2023, taking stock of where the events have taken us. Then I will discuss the implications of the current outlook for the monetary policy stance of the ECB.

My intention of course is to flesh out puzzles and questions, not to lecture you, or indeed hand out prescriptions as to what the ECB or other central banks around the world should do next. Yet the picture that has emerged from the data has important implications for the ECB's next steps.

1. Lessons from the 2022-2023 tightening cycle

Let me start by reviewing the main lessons from the tightening cycle of the last two years.

We have been hit by large supply shocks while undergoing a structural shift away from globalization

The lockdowns that came with the Covid pandemic hit firms' activities and households' income prospects at the same time, affecting both the demand and supply of goods and raising the spectre of a prolonged economic depression.[3] The interplay between demand and supply also played a key role in the subsequent recovery. At the end of the pandemic, consumption increased as citizens regained confidence and resumed their pre-pandemic routines. However, this demand boost took place at a time when supply disruptions had not yet been resolved, exacerbating bottlenecks and putting further pressure on global supply chains (Figure A1).[4] Production cuts by oil exporting countries and jumps in gas prices pushed up inflation (Figure A2). Prices rose dramatically for a range of goods, including food and agricultural products. The Russian aggression against Ukraine greatly magnified these shocks, pushing up energy and food prices and adding to the general uncertainty about the outlook. What had started as an ambiguous combination of demand- and supply-side factors rapidly evolved into a situation dominated by imported supply-side shocks.

The Russia-Ukraine war was in itself unpredictable, but it erupted – and it keeps unfolding – against a background of increasing geopolitical disputes. The world has recently experienced a series of major setbacks to geopolitical stability, with a number of violent conflicts that sets a tragic record in the post-World War II era.[5] Globalization has slowed as a result. We are now moving towards a fragmented global landscape characterized by rising protectionism and volatile trade flows. This shift has important long-run implications,

---

3 The pandemic called into question the very difference between demand and supply shocks: sometimes, adverse supply shocks give place to demand shortages, pushing economic activity below its potential. See V. Guerrieri, G. Lorenzoni, L. Strauband and I. Werning, 2022, 'Macroeconomic Implications of COVID-19: Can Negative Supply Shocks Cause Demand Shortages?', *American Economic Review*, 112 (5), 1437-74.

4 See F. Panetta, 'Everything everywhere all at once: responding to multiple global shocks'; panel on "Global shocks, policy spillovers and geo-strategic risks: how to coordinate policies" at The ECB and its Watchers XXIII Conference, Frankfurt am Main, 22 March 2023; and S. Neri, ''There has been an awakening'. The rise (and fall) of inflation in the euro area', Banca d'Italia, Questioni di Economia e Finanza (Occasional Papers) 834, 2024.

5 F. Panetta, 'The future of Europe's economy amid geopolitical risks and global fragmentation', speech delivered at Università degli Studi Roma Tre, Rome, 23 April 2024.

but it also matters in the short-run (and hence for monetary policy) because it affects firms' profitability, riskiness and investment plans.

Of course, I am deliberately painting a broad picture of global developments. As you know, there are important differences in the way the story unfolded in Europe and in the US.

The US experienced a much larger fiscal expansion, and – being a net exporter of food and energy – was less affected by volatility in commodity prices. In the euro area, by contrast, shocks to energy supplies had a strong impact on both income and production. This means that the euro area saw a relatively larger share of inflation of the 'bad' type, which is typically more problematic for monetary authorities.[6]

The exposure of the euro area to foreign shocks is largely due to two structural features. One is the well-known scarcity of natural resources – and hence a high dependence on energy imports, especially Russian gas. The other one is the historical reliance on an 'open economy' model where growth depends heavily on foreign demand and trade openness. These features may also play a role during the green transition, because the production and storage of renewable energy relies on rare materials that, like oil and gas, Europe needs to import from abroad.

How did the ECB manage all this? Taking decisions in real time was tricky …

The ECB responded to the rise in inflation with an unprecedented sequence of interest rate hikes.

Calibrating the interventions in real time was truly challenging. As you know all too well, distinguishing between demand and supply shocks is never easy, and became more difficult in the pandemic era. This identification problem becomes even harder when prices are affected by a combination of many different shocks. Furthermore, getting the identification right is not enough: you also need to form a view on how the shocks propagate through the economy. This is not trivial if you are dealing with events that have not been seen for decades – like a war on your doorstep – and markets with very peculiar structural features – such as the natural gas market.[7]

---

6 In previous speeches I distinguished between good, bad and ugly inflation. 'Good' inflation is driven by buoyant domestic demand and a wage growth consistent with the target; monetary policy should nurture it until the target is reached. 'Bad' inflation reflects negative supply shocks that raise prices and depress economic activity; monetary policy should look through it. 'Ugly' inflation is driven by a de-anchoring of inflation expectations; monetary policy should immediately stamp it out. F. Panetta, 'Patient monetary policy amid a rocky recovery', speech delivered at Sciences Po, Paris, 24 November 2021.

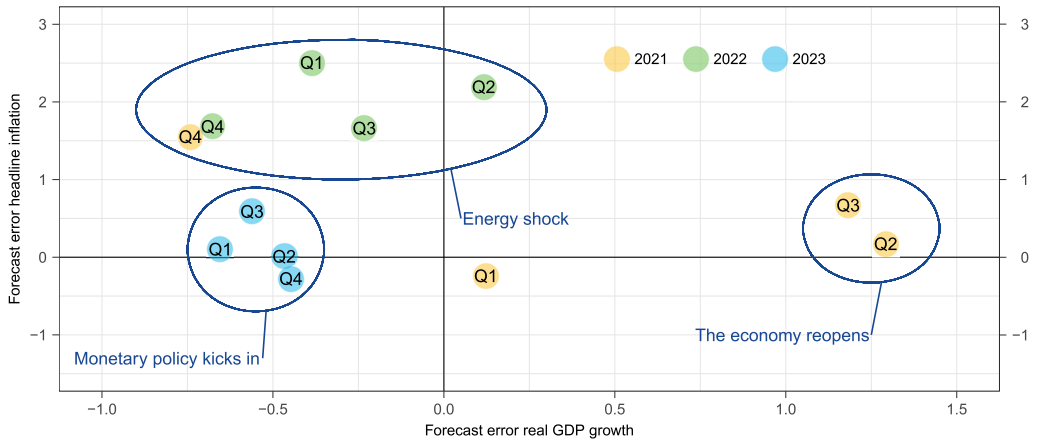
7 Wholesale gas prices are sticky because trading is often based on long-term contracts indexed to past prices. Furthermore, retail prices adjust slowly to changes in wholesale prices due to regulatory frictions. In the oil market, trading is instead based on spot contracts, and retail (gasoline) prices closely track wholesale prices. As a result, oil shocks have a large impact on consumer prices in the short run, whereas gas shocks cause a slow, persistent increase in inflation with peak responses that can take place almost two years after the shock (see P. Alessandri and A. Gazzani, 'Natural gas and the macroeconomy: not all energy shocks are alike', Banca d'Italia, Temi di Discussione (Working Papers) 1428, 2023). After the invasion of Ukraine, energy markets were also heavily influenced by strategic supply manipulations enacted by Russian producers.

With the luxury of hindsight, we can now read the macro outlook more accurately.

Consider for instance the discrepancies between the macroeconomic data observed in 2021-2023 and the official forecasts formulated by central banks one year in advance (a statistic to which the media paid a lot of attention both in Europe and in the US[8]). In its one-year ahead forecasts, the ECB was surprised on the upside by both inflation and GDP growth in Q2 and Q3 2021, presumably because of the unexpected demand boost associated to the re-opening. After that, it systematically observed positive surprises for inflation and negative surprises for GDP growth until Q3 2023 (Figure 1).

Figure 1

Surprises in quarter-on-quarter real GDP growth and inflation in the euro area (1)
(quarterly data; percentage points)



Sources: Calculations based on ECB and Eurostat data.
(1) Difference between realized values and 4-quarter ahead forecasts for quarter-on-quarter real GDP growth (horizontal axis) and consumer price inflation (vertical axis).

This pattern corroborates the view that adverse supply shocks, which push prices and quantities in opposite directions, played a key role in causing the rise in inflation.[9]

The credit market – a good barometer of the business cycle in the euro area – reinforces the view that the corporate sector was not faring too well. Credit demand declined steadily since the end of 2022, especially for the loans that firms use to finance fixed investments.[10] But geopolitical shocks and high energy prices also reduced firms' revenues and increased their riskiness, contributing to a stronger-than-expected contraction in the supply of bank credit (Figure A3).[11]

8 See e.g. Financial Times, 'Why are central bank forecasts so wrong?', 18 May 2023.

9 S. Neri, F. Busetti, C. Conflitti, F. Corsello, D. Delle Monache and A. Tagliabracci, 'Energy price shocks and inflation in the euro area', Banca d'Italia, Questioni di Economia e Finanza (Occasional papers) 792, 2023.

10 With potentially important implications for productivity: more on this below.

11 For evidence on the transmission of policy rates to lending rates and credit quantities in 2022-2023, see P.R. Lane, 'Inflation and monetary policy', presentation delivered at the Policy Lecture at Aix-Marseille School of Economics (AMSE), Marseille, 22 March 2024.

In short, the catch-up in demand stemming from the post-Covid recovery was compounded by an unlucky sequence of large and previously unseen supply shocks. All in all, supply shocks may have had a more significant impact on prices and economic activity than demand shocks.[12]

... but the key priority was clear: to put a lid on inflation

Does this mean that the Governing Council overlooked supply-side dynamics and got its policy choices wrong? This conclusion may be tempting for critics, but it would be unjustified for two reasons.

In mid-2022, the key ECB interest rates were still negative: a recalibration of the stance was clearly needed. Furthermore, the rise in inflation came at a time of tight labour markets, raising serious concerns that a wage-price spiral (and potentially a de-anchoring of inflation expectations) could follow. This is a risk that no central bank can take, nor downplay on the basis of flimsy separations of demand and supply shocks. As of 2022, the priority for the ECB was to bring inflation down, keep long-term inflation expectations anchored and preserve its own credibility. A bold response to the price pressures achieved all three objectives.

2. Where do we stand?

The macro outlook has changed, and risks from wages are decreasing

It is clear that the situation has changed substantially over time. Core inflation has been falling steadily since July 2023, while GDP growth has been hovering around zero. Furthermore, in the last quarter of 2023 both inflation and GDP growth surprised to the downside. This indicates that, while supply shocks and energy prices receded, aggregate demand also weakened, partly in response to the monetary restriction.

Inflation expectations are well-anchored and the probability of a self-sustained inflationary spiral is low. Labour market data suggest that wage growth may have peaked in 2023 and is evolving in line with our projections, which foresee a return to our target in 2025.[13]

More importantly, discussing wages in isolation can be very misleading: we need to consider wages along with other input costs, profits and productivity too. With this in mind, we can identify three hypothetical scenarios where wages grow without creating inflationary pressures.

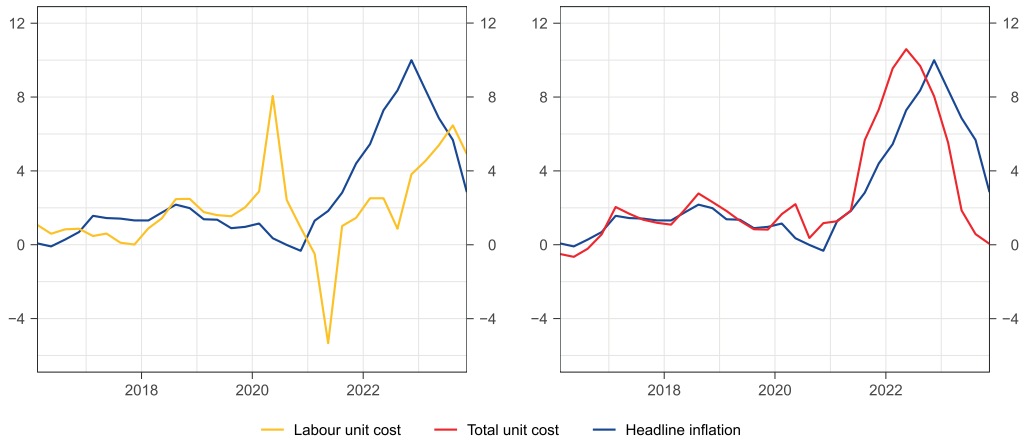
---

12 F. Panetta, 'The complexity of monetary policy', CEPR-EABCN conference on "Finding the Gap: Output Gap Measurement in the Euro Area", European University Institute, Florence, 14 November 2022; and F. Panetta, 'Getting disinflation right', Bocconi University, Milan, 3 August 2023.

13 P. Cipollone, 'The confidence to act: monetary policy and the role of wages during the disinflation process', House of the Euro and the Centre for European Reform Brussels, 27 March 2024.

Figure 2

Total unit cost, labour unit cost and headline inflation in the euro area (1)
(quarterly data; year-on-year percentage changes)



Sources: Based on data from Destatis, Eurostat, Insee and Istat.
(1) Estimates based on the data for France, Germany and Italy. Unit costs are calculated as the ratio of total costs to total output in real terms. The last observation is Q4 2023.

First, the wage rise could take place in a context where firms' total production costs (of which wages are only one component) decline or remain constant. Firms price their goods by applying markups to total costs rather than solely to wages. Consequently, if the costs of other inputs drop, wages can, in principle, rise without affecting prices. After the sharp acceleration observed in 2022, total costs have decelerated and they are now growing at a rate that is consistent with the pre-pandemic norm (Figure 2).[14] This is indeed the reason why the acceleration in wages did not prevent a decline in inflation in 2023.

Second, firms may absorb the rise in wages (and potentially even in total costs) by reducing their profit buffers. This compensation requires a temporary compression in firms' profit margins and, as such, it is more likely to take place when demand is weak and margins are high. This is currently the case in the euro area.[15]

Third, the rise in wages could be accompanied by a rise in productivity. An improvement in productivity raises the workers' output, implying that unit labour cost (the ratio of hourly compensation to hourly output) can remain constant or even decline despite a

14 See Panetta, F., 'Economic developments and monetary policy in the euro area', speech delivered at the 30th ASSIOM FOREX Congress, Genoa, 10 February 2024. According to Banca d'Italia estimates, labour contributes less than other production inputs to total costs; considering only the direct shares of labour and intermediate inputs, labour accounts for around 40 per cent of the total. Impulse-responses from a quarterly VAR model indicate that shocks to energy prices have a large and quick impact on producer price inflation (PPI) for intermediate goods, and are then gradually and only partially transmitted to consumer good PPI, core consumer price inflation (CPI) and wages. Wages peak over a year after the shock, with a maximum response that is one order of magnitude smaller than the shock itself (about 0.3 percentage points for a hypothetical 5 per cent increase in energy prices).

15 In 2023 mark-ups in the three largest euro area countries were around 1.5 percentage points higher than in 2022 on average.

higher wage bill. This mechanism is likely to play a role as well. Productivity declined in 2022-2023, but the decline was partly due to divergences among the prices of different production inputs: faced with extremely high energy costs, firms had a clear economic incentive to use more labour in production, which in turn led to a decline in output per worker. The drop in productivity might be naturally reabsorbed over time, as the relative costs of labour and non-labour inputs and the capital to labour ratio revert to their long-run levels.

Looking beyond the near term, I would also emphasize that productivity hinges critically on the capital stock. Firms should invest more in order for workers to become more productive. This is clearly a complex theme that goes beyond the remit of central banks. And I do not necessarily subscribe to the (fascinating) view that monetary policy can affect capital stocks and productivity into the distant future.[16] However, hesitations in adjusting interest rates to the fall in inflation would discourage firms from investing, delaying the expansion of the capital stock, hampering productivity and generating a competitive disadvantage for the euro area in global markets.

The 'balance of risks' looks very different now

Not surprisingly, the risks surrounding the macroeconomic outlook have also changed under the combined influence of these factors. According to the ECB Survey of Professional Forecasters, the upside risks for inflation that dominated in 2022-2023 have receded, leaving the uncertainty around price dynamics roughly balanced, while the risks for economic activity remain tilted to the downside (Figure A4).

There are two reasons why mitigating these downside risks is important.

The first one is that the interest rate hikes implemented thus far will keep biting well into 2024. Estimates by Banca d'Italia staff suggest that their impact on inflation will actually be greater in 2024 than it was in 2023, with a non-negligible contribution provided by the bank lending channel (Figure A5).

The second one is that the ECB is also shrinking its balance sheets, and it is doing so faster than most other central banks. We have relatively little evidence on the relationship between the availability of central bank liquidity and credit conditions. This is a theme that deserves more research in the future, also in light of the planned reduction in excess liquidity. In any case, the responses to the Bank Lending Survey (BLS) suggest that, inasmuch as QE provided a positive boost until 2022, the reduction of the Eurosystem's balance sheet – even at this early stage – may exert a negative influence on the liquidity position and lending volumes of euro-area banks (Figure A6). The figures are small, and they come with the usual caveats attached to survey data, but they point to another potential brake on economic activity.

---

16 See e.g. Ò. Jordà, S. R. Singh, and A. M. Taylor, 'The long-run effects of monetary policy', National Bureau of Economic Research WP 26666, 2020.

3. (Re)calibrating the monetary stance

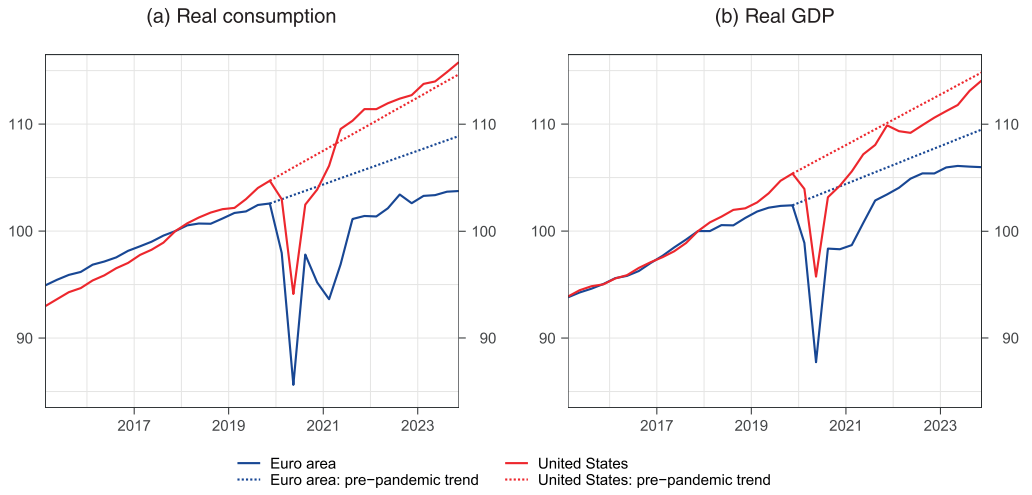
From now on, we must weigh the risk of monetary policy becoming too tight …

With inflation progressively moving towards our target, the question arises of what the ECB should do next. The emergence of downside risks to the outlook implies that the ECB should consider the possibility that monetary policy could become 'too tight' going forward. Monetary policy is obviously too tight if it ends up causing a deep recession, but it is also too tight if it pushes inflation below target and causes a prolonged economic stagnation. We are reasonably far from the first scenario, but we cannot (yet) rule out the second one.

In the United States, GDP and consumption have converged back to their pre-pandemic long-term growth paths; in the euro area, they are still well below trend (Figure 3). Furthermore, in its most recent projections, the International Monetary Fund (IMF) predicts the US to grow over thrice as much as the euro area in 2024 (2.7 per cent versus 0.8 per cent).[17] Monetary policy is certainly not the only or even the main cause of this divergence, but it is important that it does not become an unnecessary obstacle that prevents the euro area from achieving its full potential. Combined with weak business dynamism and relentless competitive pressures from abroad, a tight monetary stance could generate hysteresis effects that would increase the risk of a protracted period of economic weakness.

Figure 3

Consumption and GDP in real terms in the euro area and the United States (1)
(quarterly data; index numbers, Q4 2017=100)



Sources: Calculations based on Bureau of Economic Analysis and Eurostat data.
(1) Seasonally adjusted. The last data is Q4 2023.

17 IMF, World Economic Outlook, April 2024.

Looking back, the Great Recession and the sovereign debt crises caused a long period of too low inflation (Figure A7) and a downward de-anchoring of long-term inflation expectations (Figure A8).[18] For years the ECB spent most of its energies trying to lift the euro area out of that equilibrium. Inflation expectations are not a problem today, but that experience demonstrates that letting inflation slip below the 2 per cent target could be very costly. It would also be inconsistent with the symmetrical nature of the price stability target enshrined in the latest Strategy Review (and could potentially undermine it).

... and assess our policy options accordingly: what goes up must come down[19]

It is of paramount importance to act in a timely manner to minimize these risks. In my view the ECB's action should be guided by three considerations.

First, we should think about the big picture surrounding decisions on interest rates. Central banks do not act in a vacuum: they have to take into account a large number of exogenous factors that interfere with the transmission of monetary policy and/or have an independent (and potentially large) impact on prices and economic activity. As of today, the big picture includes modest growth prospects at global level and high political uncertainty. In Europe, it also includes a more restrictive fiscal stance[20] and a run-down of central bank balance sheets – a policy mix that is unlikely to support aggregate demand.

Second, inaction is not neutral. Based on current expectations, the ECB stance is likely to remain restrictive – with real rates above their 'natural' level – well into 2025 (Figure A9). Keeping in mind the 'long and variable lags' in the transmission mechanism, this state of affairs clearly calls for timely action: steering monetary policy is like steering a tanker, and if the helmsman (or helmswoman) does not act well in advance, they will crash into the harbour altogether. As I said, unnecessary delays may take us uncomfortably close to the effective lower bound at a later stage if stagnation is entrenched and inflation expectations fall below target.

Third, gradualism is important. Timely action would allow the ECB to be nimble and move in small, progressive steps. Small rate cuts would counter weak demand, and could be paused at no cost if upside shocks to inflation were to materialize along the way. They would also minimize the likelihood of the ECB falling behind the curve and having to hastily resort to larger rate cuts in the future. There are many reasons why large cuts

---

18 F. Corsello, S. Neri, and A. Tagliabracci, 2021, 'Anchored or de-anchored? That is the question', *European Journal of Political Economy*, 69, 102031.

19 This popular expression is sometimes attributed to Sir Isaac Newton. The attribution is, in all likelihood, apocryphal, but the question of whether interest rates can defy Newton's law of gravitation is valid all the same.

20 In the last Macroeconomic Projection Exercise, the cyclically-adjusted primary balance of the euro area is expected to increase from -1.5 per cent in 2023 to -0.7 per cent in 2025. The new fiscal framework may generate a further tightening of the stance in the medium term.

are generally unpalatable.[21] One of them is that they could create a credibility issue, especially after an unprecedented tightening cycle.

An important question that has recently come up in the debate is to what extent the ECB's decisions should be linked to the course followed by the Fed. The ECB's mandate is to pursue price stability in the euro area, and the ECB's actions are not conditioned by developments in other jurisdictions. However, US monetary policy has powerful spillovers in the rest of the world, including the euro area.[22] A failure to account for these spillovers could lead to an inaccurate calibration of policy interventions.[23]

I do not see this hypothetical 'decoupling' between the Fed and the ECB as particularly critical at the current juncture.

The ECB's projections always take into account the expected path of interest rates in the US and beyond. Governing Council members evaluate their policy options using GDP and inflation forecasts that – to the best of their knowledge (or rather the staff's knowledge) – already account for the influence of the Fed's decisions on the euro area. The Fed's strategy is just one of the factors that must be reflected in the projections, although it is certainly an important one.

Unexpected changes in the Fed's stance cannot by definition be included in the forecasts. But, if anything, they are likely to reinforce the case for a rate cut rather than weakening it. If markets expect interest rates to drop but the Fed keeps them unchanged (for instance on the back of strong inflation data), the rest of the world faces an unexpected monetary tightening. And a tightening in the US has a negative impact on inflation and output in the euro zone.[24] The reason is that – besides a depreciation of the euro (which is the obvious, textbook type of effect) – the shock also causes a decline in global demand and a tightening in financial conditions. Historically, the latter channels have been quantitatively dominant, implying that the net impact of a spillover in the medium term is both recessionary and deflationary.

---

21 B. Sack and V. Wieland, 2000, 'Interest-rate smoothing and optimal monetary policy: a review of recent empirical evidence', *Journal of Economics and Business*, 52 (1-2), 205-228; M. Woodford, 2003, 'Optimal interest-rate smoothing', *The Review of Economic Studies* 70 (4), 861-886; T. Nakata and S. Schmidt, 2019, 'Gradualism and liquidity traps', *Review of Economic Dynamics*, 31, 182-199; L. Metelli, F. Natoli and L. Rossi, 'Monetary Policy Gradualism and the Nonlinear Effects of Monetary Shocks', Banca d'Italia, Temi di Discussione (Working Papers) 1275, 2020.

22 See e.g. H. Rey, 2013, 'Dilemma not trilemma: the global cycle and monetary policy independence', Proceedings of the Jackson Hole Economic Policy Symposium, Federal Reserve Bank of Kansas City; V. Bruno and H. S. Shin, 2015, 'Capital flows and the risk-taking channel of monetary policy', *Journal of Monetary Economics*, 71, 119-132; H. Rey, 2016, 'International channels of transmission of monetary policy and the mundellian trilemma', *IMF Economic Review*, 64 (1), 6-35; B. S. Bernanke, 2017, 'Federal reserve policy in an international context', *IMF Economic Review*, 65 (1), 5–36.

23 F. Panetta, 'Mind the step: calibrating monetary policy in a volatile environment', Keynote speech at the ECB Money Market Conference, Frankfurt am Main, 3 November 2022.

24 See L. Dedola, G. Rivolta, and L. Stracca, 2017, 'If the Fed sneezes, who catches a cold?', *Journal of International Economics*, 108, 23-41; and R. Degasperi, S. S. Hong, and G. Ricco, 'The Global Transmission of U.S. Monetary', CEPR Discussion Paper 14533, 2020.

4. Conclusions

The last two years have been tough for policy, but inspiring for research: it is not common to witness geopolitical shifts, a 1970s-style energy crisis, large swings in inflation and a record monetary tightening cycle in the space of 24 months. It may not be over yet. After the direct confrontation between Israel and Iran over the past few weeks, another worrying historical development, political tensions in the Middle East are bound to remain high.

Being on the policy side of this trench, I hope that researchers will make the most of this experience. You should dissect these complex events and turn them into a new and better understanding of how the economy works. I suspect this process will take us farther away from the 'Phillips Machine'. In any case, it should provide us with notions and tools that can be deployed in the not-too-distant future to render monetary policy more effective.

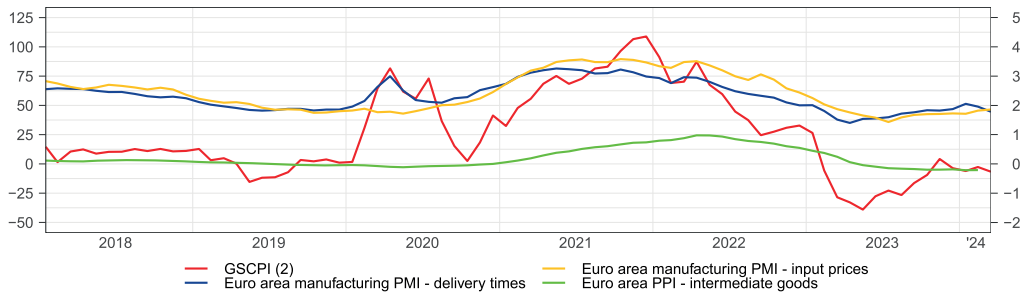
I hope my remarks tonight have given you an idea of some of the issues that sit at the top of the priority list for me, and presumably for many of my colleagues within the ESCB.

Thank you for your attention and enjoy the rest of the evening.

SUPPLEMENTARY FIGURES

Figure A1

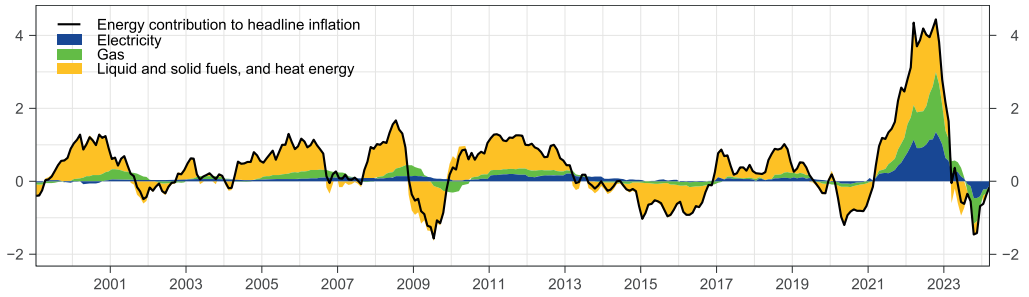
Indicators of global supply bottlenecks and producer prices in the euro area (1)
(monthly data)



Sources: ECB, Federal Reserve Bank of New York and S&P Global.
(1) The Global Supply Chain Pressure Index (GSCPI) integrates transportation cost data and manufacturing indicators to derive a measure of global supply chain conditions; it is measured in standard deviations from the average value. The delivery times PMI has been inverted by deducting the index value from 100, so that an increase identifies longer delays. The PPI is expressed in annual percentage changes. The last observation is March 2024 for GSCPI and PMI, February 2024 for PPI. – (2) Right-hand scale.

Figure A2

Energy contribution to headline inflation in the euro area (1)
(monthly data; percentage points)

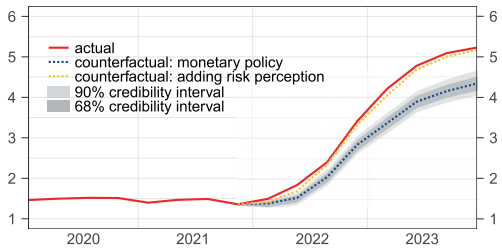


Source: ECB.
(1) Contributions to year-on-year changes in the HICP. The black line represents the overall contribution of the HICP energy component to headline inflation. The last observation is March 2024.

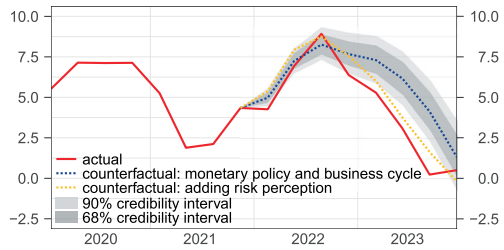
Figure A3

Model-based counterfactuals for corporate lending rates and loans in the euro area

(a) Loan rates (1)
(quarterly data; per cent)



(b) Lending volumes (2)
(quarterly data; year-on-year percentage changes)



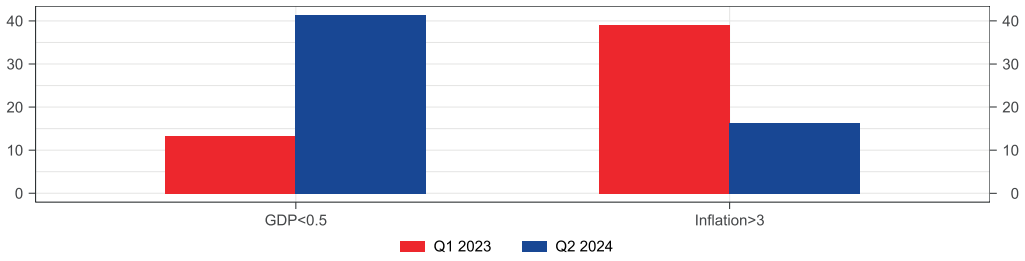
Source: A.M. Conti, S. Neri and A. Notarpietro, 'Credit Strikes Back: The Macroeconomic Impact of the 2022-2023 ECB Monetary Tightening and the Role of Lending Rates', 2024, Banca d'Italia, Questioni di economia e finanza (Occasional papers), forthcoming.
(1) The red line is the composite indicator of cost of borrowing for non-financial corporations (NFCs). The blue line is a counterfactual obtained from a Bayesian VAR conditioning on the actual path of 3-month and 10-year nominal interest rates (with 68% and 90% credible intervals). The yellow line is a counterfactual obtained by conditioning also on the actual path of banks' risk perception from the Bank Lending Survey. The estimation sample is: Q1 2003 - Q4 2021.

Source: S. Auer and A.M. Conti, 'Bank Lending in an Unprecedented Monetary Tightening Cycle: Evidence from the Euro Area', 2024, Banca d'Italia, Questioni di economia e finanza (Occasional papers), forthcoming.
(2) The red line is the year-on-year growth rate of loans to NFCs. The blue line is a counterfactual obtained from a Bayesian VAR conditioning on the actual path of 3-month and 10-year nominal interest rates, real GDP and HICP (with 68% and 90% credible intervals). The yellow line is a counterfactual obtained by conditioning also on the actual path of banks' risk perception from the Bank Lending Survey. The estimation sample is: Q1 2003 - Q4 2021.

Figure A4

Probabilities of high inflation and low growth in 2024 in the euro area (1)

(per cent)

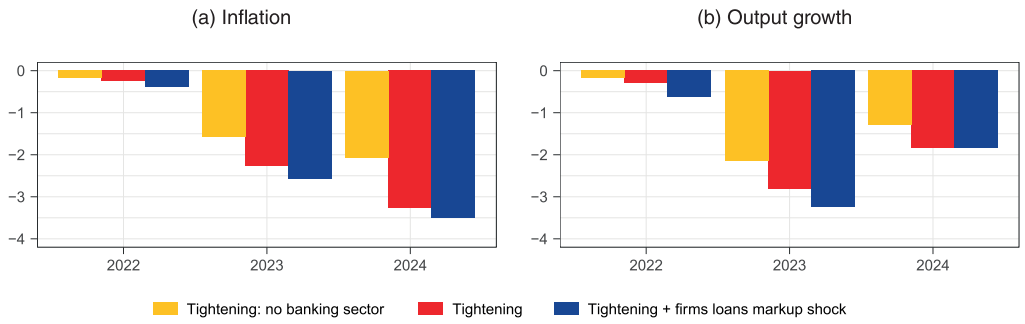


Source: ECB Survey of Professional Forecasters.
(1) The figure reports the average probabilities, according to the ECB's Survey of Professional Forecasters respondents, of having high inflation (above 3 per cent) and low GDP growth (below 0.5 per cent) in 2024. These probabilities are reported separately for the Q1 2023 and Q2 2024 surveys.

Figure A5

Macroeconomic effects of the 2022-23 monetary tightening in the euro area (1)

(year-on-year percentage changes)

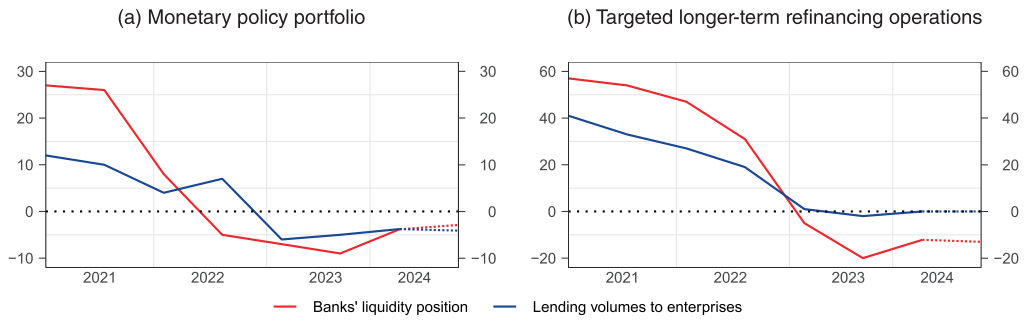


Source: A.M. Conti, S. Neri and A. Notarpietro, 'Credit Strikes Back: The Macroeconomic Impact of the 2022-2023 ECB Monetary Tightening and the Role of Lending Rates', 2024, Banca d'Italia, Questioni di economia e finanza (Occasional papers), forthcoming.
(1) The figure reports the mean effects across two sets of simulations, each based on the posterior mean of the distribution of the parameters. The first set of simulations uses results from model estimation up to Q4 2019, the second one uses estimates up to Q4 2023. The scenario "Tightening: no banking sector" is obtained by shutting off the banking sector in the model; the scenario "Tightening" is obtained by simulating the model, which implies an imperfect pass-through of the monetary policy impulse on banks' lending rates; the scenario "Tightening + firms loans markup shocks" is obtained by adding shocks to banks' markup on the rate on loans, to allow the model to reproduce the actual path of the lending rates to non-financial corporations.

Figure A6

Impact of changes in the Eurosystem's balance sheet on banks' liquidity position and lending (1)

(half-yearly data; net percentage shares)

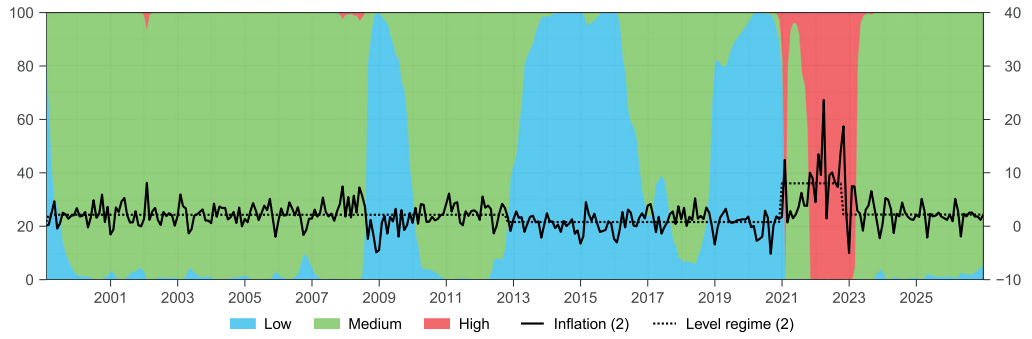


Source: ECB Bank Lending Survey.
(1) A negative net percentage share indicates a negative effect in the preceding six-month period. The last observation refers to the April 2024 survey and incorporates banks' expectations for the next six-month period (dashed line).

Figure A7

Inflation regimes in the euro area (1)

(monthly data; per cent)

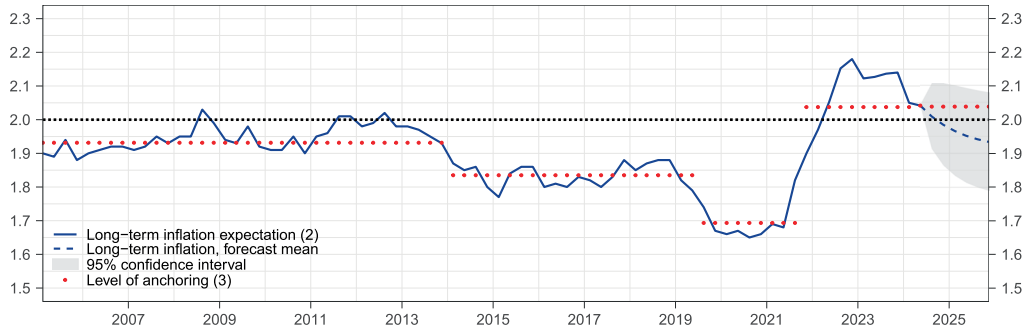


Source: Calculations based on Eurostat and ECB data.
(1) The shaded areas (regime probabilities) are estimated using the Markov Switching model, while the dashed line uses the Bai and Perron methodology (J. Bai and P. Perron, 2003, 'Computation and analysis of multiple structural change models', *Journal of applied econometrics*, 18(1), p. 1-22). The latest NIPE and MPE projections (March 2024) are employed to extend the estimates until 2026. – (2) Annualized monthly changes; percentage points; right-hand scale.

Figure A8

Risk of inflation expectation de-anchoring in the euro area (1)

(quarterly data; per cent)

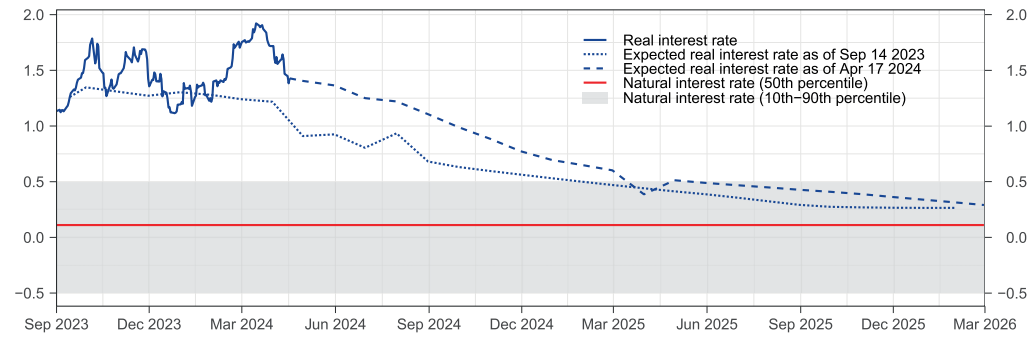


Source: Calculations based on ECB Survey of Professional Forecasters data. For the methodology see S. Neri, "There has been an awakening'. The rise (and fall) of inflation in the euro area', Banca d'Italia, Questioni di Economia e Finanza (Occasional Papers) 834 2024.
(1) The projected path of long-term inflation expectations is conditional on the Eurosystem's June 2023 Broad Macroeconomic Projection Exercise. The last observation is Q2 2024. – (2) Five-year ahead forecast of HICP inflation. More precisely, four calendar years ahead in the Q1 and Q2 rounds and five calendar years ahead in the Q3 and Q4 rounds. For example, in the surveys of the first two quarters of 2018, the long-term forecast refers to 2022, while in the last two it refers to 2023. – (3) The level-anchoring analysis is conducted using the methodology in J. Bai and P. Perron, 2003, 'Computation and analysis of multiple structural change models', *Journal of applied econometrics*, 18(1), p. 1-22.

Figure A9

Expected evolution of short-term real interest rates in the euro area (1)

(daily data; per cent)



Source: M. Bernardini, L. D'Arrigo, A. Lin and A. Tiseno, 2024, 'Real interest rates and the ECB's monetary policy stance', Banca d'Italia, Questioni di economia e finanza (Occasional papers), forthcoming.
(1) The figure shows (i) a market-based measure of the 1-year real rate, (ii) its expected paths starting at different points in time and (iii) a range of Eurosystem quarterly estimates of the natural rate (10th and 90th percentiles) as of Q3 2023. The red line denotes the median of this range.