# No longer convenient? Safe asset abundance and r*

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## Abstract

Despite inflation receding, financial market pricing suggests maintaining price stability will require higher real interest rates in the future than before the pandemic. This shift reflects two key observations. First, the era of persistent downside risks to inflation may have ended, as geopolitical fragmentation, climate change and labour scarcity pose upside risks. Second, the global economy is shifting from a "savings glut" to a "bond glut," with fiscal deficits and central bank balance sheet normalisation reducing the bond convenience yield, reversing a key driver weighing on real rates, and hence r*, during the 2010s. There are three implications for monetary policy: a higher r* calls for careful monitoring of when policy stops being restrictive; balance sheet policies may affect r* through the convenience yield, making them less effective; and it is optimal to provide reserves elastically on demand as excess liquidity declines.

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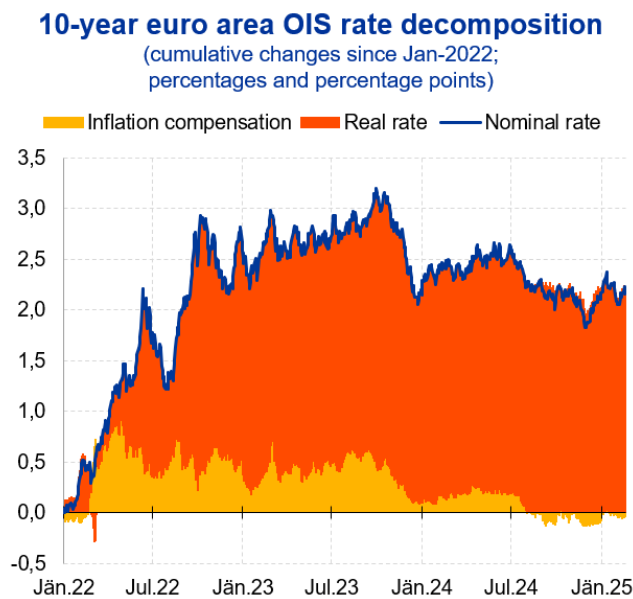## Upward shift in r* signals lasting change in the inflation regime

Starting in 2021, long-term government bond yields rose measurably across advanced economies. Today, the ten-year yield of a German government bond is about two and a half percentage points higher than in late 2021.

What is remarkable about the rise in nominal bond yields in the euro area over this period is that it was not driven by a change in inflation compensation. Investors' views about future inflation prospects are broadly the same today as they were three years ago.

### Nominal long-term interest rates are higher because of a persistent rise in real rates

**10-year sovereign bond yields**
(percentages)
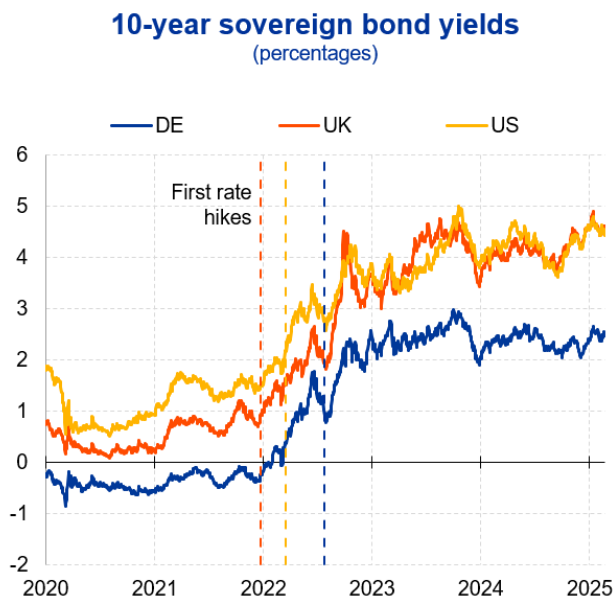
Source: Bloomberg.
Notes: The vertical dashed lines indicate the date of the first rate hike implemented by the ECB, FED and BoE, respectively. Latest observation: 21 February 2025.

**10-year euro area OIS rate decomposition**
(cumulative changes since Jan-2022; percentages and percentage points)

Source: Bloomberg.
Latest observation: 21 February 2025.

Rather, nominal interest rates rose because *real* interest rates increased. Euro area real long-term rates are now trading at a level that is substantially higher than the level prevailing during most of the post-2008 global financial crisis period.

Part of the rise in real long-term interest rates is a mechanical response to the tightening of monetary policy.

Long-term interest rates are an average of expected short-term interest rates over the lifetime of the bond, plus a term premium. As the ECB raised its key policy rates in response to the surge in inflation, the average real rate expected to prevail over the next ten years increased.[1]

What is more striking, however, is that investors also fundamentally revised the real short-term rate expected to prevail once inflation has sustainably returned to the ECB's target. This rate is typically taken as a proxy for the natural rate of interest, or r*.

The real one-year rate expected in four years (1y4y), for example, is now at the highest level since the sovereign debt crisis. Even at very distant horizons, such as in nine years, the expected real short-term rate (1y9y) has increased measurably in recent years.

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[1] At the very short end of the yield curve, real interest rates are closely tied to the actions of central banks. As prices are rigid in the short run, monetary policy can directly affect real short-term interest rates by changing the nominal policy rate.
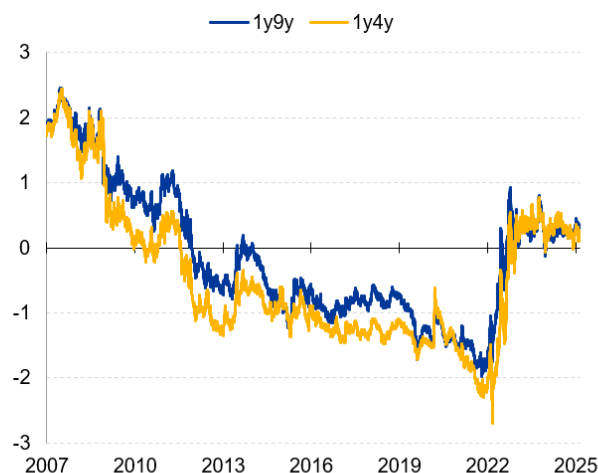
## Real short-term interest rates are expected to remain higher over the medium to long term

**10-year euro area real OIS rate**
(percentages)

**Euro area real forward OIS rates**
(percentages)

— 1y9y   — 1y4y

Source: Bloomberg.
Latest observation: 21 February 2025.

Sources: Bloomberg, ECB calculations.
Notes: Forward rates calculated from OIS/ILS spot rates; real rate as difference between nominal rate and inflation compensation.
Latest observation: 21 February 2025.

To a significant extent, these developments reflect a genuine reappraisal of the real equilibrium interest rate that is consistent with the ECB's 2% inflation target. A rise in the term premium, which is the excess return investors demand for the uncertainty surrounding the future interest rate path, can explain less than half of the change in the real 1y4y rate.[2]

These forward rates have also remained surprisingly stable since 2023, with a standard deviation of around just 15 basis points, despite the measurable decline in inflation, the protracted weakness in aggregate demand and the series of structural headwinds facing the euro area.

We are seeing a similar upward shift in model-based estimates of r*. According to estimates by ECB economists, the natural rate of interest in the euro area has increased appreciably over the past two years, and even more so than what market-based real forward rates would suggest[3].

This result is robust across many models and even holds when accounting for the significant uncertainty surrounding these estimates. In other words, for drawing conclusions about the directional change of r* from the rise in market and model-based measures, the actual rate *level* is largely irrelevant.

What matters is the direction of travel. And that is unambiguous: we are unlikely to return to the pre-pandemic macroeconomic environment in which central banks had to bring real rates into deeply negative territory to deliver on their price stability mandate. This suggests that the nature of the inflation process is likely to have changed lastingly.

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[2] Longer-term interest rates are arguably more relevant for the transmission of monetary policy than the short-term rate. So, if the changes in term premia reflect a structural shift in the compensation investors demand for holding long-term bonds – reflecting, for example, higher uncertainty about inflation and hence the future course of monetary policy – the natural rate of interest will be higher across the maturity spectrum.

[3] See Brand, C., Lisack, N. and Mazelis, F. (2025), "Natural rate estimates for the euro area: insights, uncertainties and shortcomings", Economic Bulletin, Issue 1, ECB.

Model-based estimates also signal a marked upward shift in the natural rate of interest r*

**Euro area real natural rate of interest estimate**
(percentages per annuum)
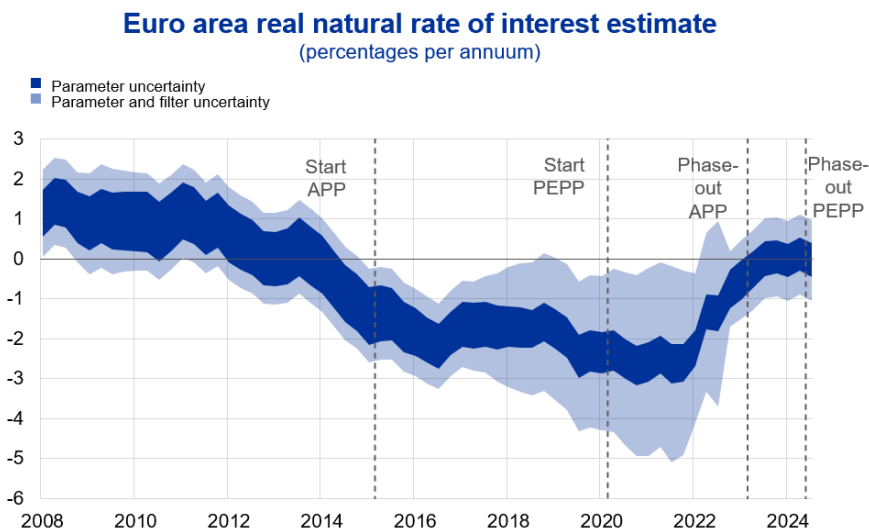


Source: ECB calculations.
Notes: Estimates are based on Brand, C. and Mazelis, F., "Taylor-rule consistent estimates of the natural rate of interest", Working Paper Series, No 2257, ECB, Frankfurt am Main, March 2019 (extended to include stochastic volatility in the output gap, a long-term interest rate, asset purchase effects and the effective lower bound). The RISE toolbox for parameter estimation and regime-switching Kalman filtering enables the extraction of covariance matrices of unobserved states (see Maih, J. "Efficient perturbation methods for solving regime-switching DSGE models," Working Paper, 01/2015, Norges Bank, 16 January 2015). Parameter and filter uncertainties are displayed as 95% uncertainty bands, calculated following the methods for statistical inference with the Kalman filter described in Chapter 13.7 of Hamilton, J.D., "Time Series Analysis", Princeton University Press, 1994. Since computing the maximum likelihood estimate directly is impractical in this setting, the mode of the posterior distribution is used as an approximation. The filter uncertainty is based on the regime-specific covariance matrix of unobserved states from the predominant regime in the model, which features low volatility in the output gap and a policy rate that follows the Taylor rule. Considering regime-specific covariances or joint covariance matrices across different regimes would further enlarge the uncertainty ranges. The dashed lines indicate the start of APP and PEPP, respectively. The second lines mark the beginning of partial reinvestments for each programme.

# Real interest rates are only loosely tied to trend growth

Why do markets expect such a trend reversal for real interest rates in the euro area?

One answer is that some of the forces that weighed on inflation during the 2010s are now reversing.

Globalisation is a case in point. The integration of China and other emerging market economies into the global production network and the broad-based decline in tariff and non-tariff barriers were important factors reducing price pressures in advanced economies over several decades.[4]

Today, protectionist policies, the weaponisation of critical raw materials and geopolitical fragmentation are increasingly dismantling the foundations on which trade improved the welfare of consumers worldwide.

These forces can be expected to have first-order effects on inflation.

European gas prices, for example, are up by 65% compared with a year ago despite the significant decline over recent days. Oil prices, too, have increased since September of last year, in part reflecting the marked depreciation of the euro.

While commodity prices are inherently volatile, and may reverse quickly, other deglobalisation factors, such as reshoring and the lengthening of supply chains, are likely to increase price pressures more lastingly.

And yet, the persistent rise in real forward rates poses a conundrum in the euro area.

The reason is that increases in long-term real interest rates are typically thought of as being associated with improvements on the supply side of the economy, such as productivity growth, the labour force and the capital stock.

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[4] Schnabel, I. (2022), "The globalisation of inflation", speech at a conference organised by the Österreichische Vereinigung für Finanzanalyse und Asset Management, Vienna, 11 May; Ciccarelli, M. and Mojon, B. (2010), "Global Inflation", The Review of Economics and Statistics, Vol. 92, No 3, August, pp. 524-535; Forbes, K. (2019), "Has globalization changed the inflation process?", *BIS Working Papers*, No 791, Bank for International Settlements, June; and International Monetary Fund (2006), "How Has Globalization Affected Inflation?", World Economic Outlook, Chapter III.

At present, however, these factors do not point towards an increase in r* in the euro area.

Potential growth has generally been revised lower, not higher, as many of the factors currently holding back consumption and especially investment are likely to be structural in nature, such as a rapidly ageing population and deteriorating competitiveness.

The weak link between the structural factors driving potential growth and r* is, however, not exceptional from a historical perspective.

Indeed, over time there has been little evidence of a stable relationship between real interest rates and drivers of potential growth, such as demographics and productivity.[5] They have had the expected relationship in some subsamples but not in others.[6]

Similarly, in the most popular framework for estimating r*, the seminal model by Laubach and Williams, potential growth has played an increasingly subordinated role in explaining why the natural rate of interest has remained at a depressed level in the United States following the global financial crisis.[7]

Rather, the persistence in the decline in r* is explained to a large extent by a residual factor, which lacks economic interpretation.

Moreover, if growth was the main driver of r*, then one would expect all real rates in the economy to adjust in a similar way. But while real rates on safe assets have declined since the early 1990s, the return on private capital has remained relatively constant.[8]

## Decline in the convenience yield is pushing r* up

A growing body of research attempts to reconcile these puzzles. Many studies attribute a significant role to the money-like convenience services that safe and liquid assets, such as government bonds, provide to market participants.

The yield that investors are willing to forgo in equilibrium for these services is what economists call the "convenience yield".[9]

This yield, in turn, critically depends on the net supply of safe assets: When these are scarce, investors are willing to pay a premium to hold them, depressing the real equilibrium rate of interest. And when they are abundant, the premium falls, putting upward pressure on r*.

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[5] Schnabel, I. (2024), "R(ising) star?", speech at The ECB and its Watchers XXIV Conference session on "Geopolitics and Structural Change: Implications for Real Activity, Inflation and Monetary Policy",; and Borio, C., Disyatat, P., Juselius, M. and Rungcharoenkitkul, P. (2022), "Why So Low for So Long? A Long-Term View of Real Interest Rates", *International Journal of Central Banking*, Vol. 18, No 3, pp. 47-87, September. Frankfurt, 20 March.
[6] The Industrial Revolution in the 18th century is a striking example. It coincided with a downward trend in real rates despite the persistent increase in total factor productivity growth during this period.
[7] Laubach, T. and Williams, J. (2003), "Measuring the Natural Rate of Interest", *The Review of Economics and Statistics*, Vol. 85, No 4, pp. 1063-1070.
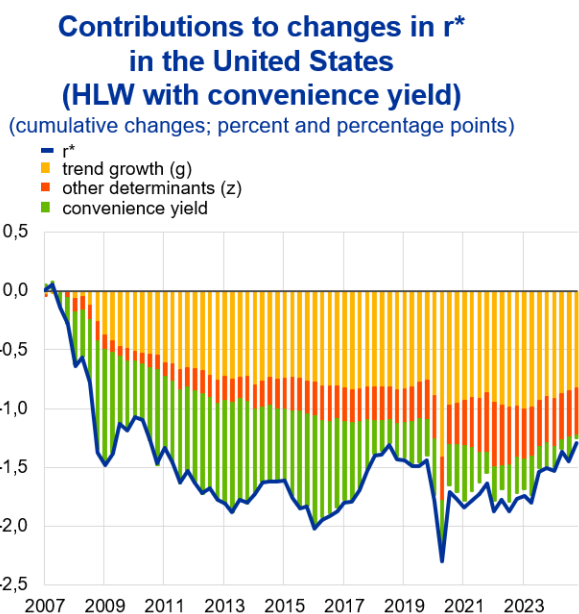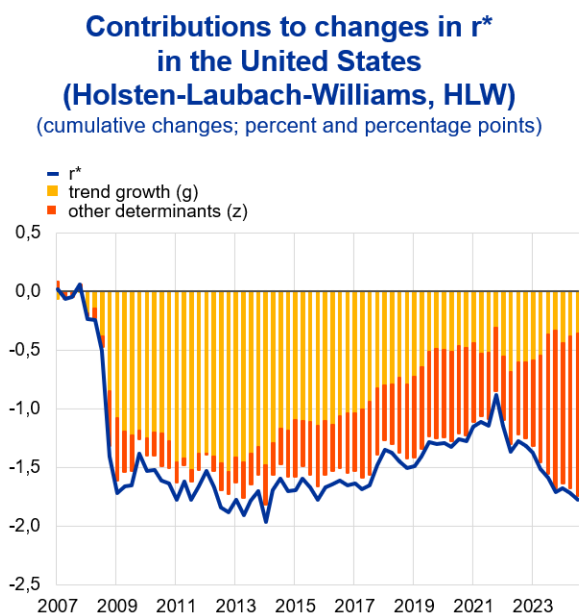[8] Jordà, Ò. et al. (2019), "The Rate of Return on Everything, 1870–2015", *The Quarterly Journal of Economics*, Vol. 134, No. 3, pp. 1225-1298; and Reis, R. (2022), "Which r-star, public bonds or private investment? Measurement and policy implications", mimeo, London School of Economics.
[9] Krishnamurthy, A. and Vissing-Jorgensen, A. (2012), "The Aggregate Demand for Treasury Debt", *Journal of Political Economy*, Vol. 120, No 2, pp. 233-267.

New research by economists at the Board of Governors of the Federal Reserve System shows how incorporating the convenience yield into the Laubach and Williams framework significantly improves the explanatory power of the model.[10]

In fact, the convenience yield can explain most of the residual factor and is estimated to have caused a large part of the secular decline in the real natural rate in the United States.

## Changes in the convenience yield can help explain shifts in r* in the United States

**Contributions to changes in r***
**in the United States**
**(Holsten-Laubach-Williams, HLW)**
(cumulative changes; percent and percentage points)

- r*
- trend growth (g)
- other determinants (z)

**Contributions to changes in r***
**in the United States**
**(HLW with convenience yield)**
(cumulative changes; percent and percentage points)

- r*
- trend growth (g)
- other determinants (z)
- convenience yield

Sources: Szoke, B., Xavier, I. and Vazquez-Grande, F. (2024), "Convenience Yield as a Driver of r*", FEDS Notes, 3 September; and Holston, K., Laubach, T. and Williams, J. (2017), "Measuring the Natural Rate of Interest after COVID-19 ", Journal of International Economics 108, Supplemental 1 (May): S39–S75.
Latest data: 2024 Q3 for HLW and 2024 Q4 for the model by Szoke et al.

Liquidity requirements that regulators imposed on banks in the wake of the global financial crisis, the Federal Reserve's balance sheet policies and the integration of many large emerging market economies into the global economy have led to an unprecedented increase in the demand for safe and liquid assets, driving up their convenience yield.[11]

These findings are in line with earlier research showing that the convenience yield has played an equally important role in depressing the real equilibrium rate in many other advanced economies, including the euro area, during the 2010s.[12]

This process is now reversing. According to the work by the Federal Reserve economists, r* has recently increased visibly, contrary to what the model without a convenience yield would suggest.

Asset swap spreads are a good indicator of the convenience yield. Both interest rate swaps and government bonds are essentially risk-free assets, so they should in principle yield the same return.

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[10] Szoke, B., Xavier, I. and Vazquez-Grande, F. (2024), "Convenience Yield as a Driver of r*", *FEDS Notes*, Board of Governors of the Federal Reserve System, 3 September. The authors also find that accounting for the convenience yield in the estimation of r* significantly improves inference, thereby reducing uncertainty bands.
[11] See also Caballero, R.J., Farhi, E. and Gourinchas, P.-O. (2008), "An Equilibrium Model of 'Global Imbalances' and Low Interest Rates", *American Economic Review*, Vol. 98, No 1, pp. 358-393.
[12] See, for example, Ferreira, T. and Shousha, S. (2023), "Determinants of global neutral interest rates", Journal of International Economics, Vol. 145; Del Negro, M. et al. (2017), "The Great Escape? A Quantitative Evaluation of the Fed's Liquidity Facilities", American Economic Review, Vol. 107, No 3, pp. 824-857; and Del Negro, M., Giannone, D., Giannoni, M.P. and Tambalotti, A. (2019), "Global trends in interest rates", *Journal of International Economics*, Vol. 118, pp. 248-262.

For a long time, this has been the case: before the start of quantitative easing (QE) in the euro area in 2015, the spread between a ten-year German Bund and a swap of equivalent maturity was close to zero on average.

Over time, however, with the start of QE and the parallel fiscal consolidation by governments reducing the net supply of government bonds in the market, the premium that investors were willing to pay to secure their convenience services rose measurably. At the peak, ten-year Bunds were trading nearly 80 basis points below swap rates.

But since about mid-2022 the asset swap spread has persistently narrowed. In October of last year it turned positive for the first time in ten years, and it now stands close to the pre-QE average again.

Other measures of the convenience yield paint a similar picture. The spread between ten-year bonds issued by the Kreditanstalt für Wiederaufbau (KfW) and German Bunds has narrowed from about -80 basis points in October 2022 to just -30 basis points today.[13]
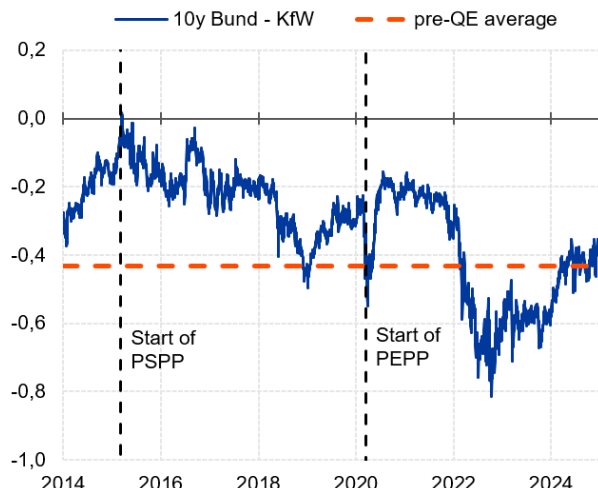
## Convenience yield has declined measurably over the past two years

### 10-year Bund – OIS spread
(percentages)
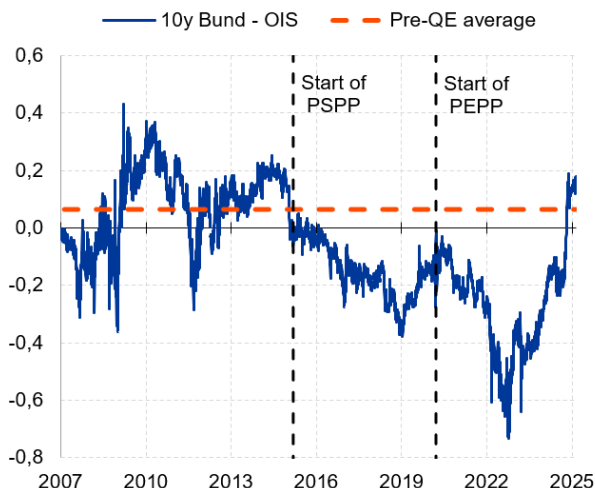
### 10-year Bund – KfW spread
(percentages)



Source: Bloomberg. Notes: The pre-QE average covers the period from 2 January 2007 to 31 December 2013. Latest observation: 21 February 2025.

Source: Bloomberg. Notes: The pre-QE average covers the period from 2 January 2007 to 31 December 2013. Latest observation: 21 February 2025.

Furthermore, in the repo market, a steady and measurable rise in overnight rates and a convergence across collateral classes can be observed.[14]

Over the past few years, transactions secured by German government collateral, in particular, were trading at a significant premium over others. This premium has declined considerably, reflecting a reduction in collateral scarcity.

Finally, in the United States, the spread between AAA corporate bonds and US Treasuries has declined from almost 100 basis points in 2022 to 40 basis points today. It currently stands close to its historical low.

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[13] Bonds issued by the KfW are guaranteed by the German Government, so any difference in the return is due to the liquidity services government bonds offer to investors.

[14] Schnabel, I. (2024), "The ECB's balance sheet reduction: an interim assessment", speech at the annual ECB Conference on Money Markets, Frankfurt, 7 November.

## Collateral abundance drives repo rates up and compresses corporate spreads over USTs

**Spread of repo rates to deposit facility rate**
*(basis points)*
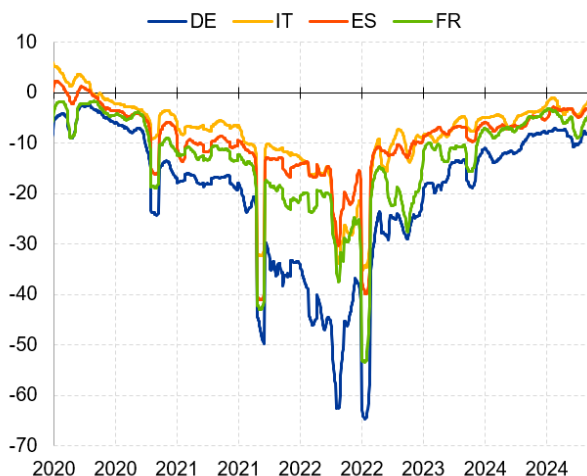


Source: MMSR.
Notes: Repo 1-day against government collateral – DFR, smoothed by 20-days moving average.
Latest observation: 21 February 2025.

**Spread of USD Corporates AAA 10-15y index vs equivalent US treasury**
*(basis points)*



Source: Markit iBoxx.
Notes: The chart illustrates the premium for USD AAA-rated corporate bonds with maturities of 10 to 15 years over the corresponding US Treasury yield. The relevant US Treasury yield is determined through linear interpolation between two benchmark bonds, whose maturities are slightly above and below the bond's maturity date.
Latest observation: 21 February 2025.

## Global savings glut has turned into a global bond glut

All this suggests that, today, market participants value the liquidity and safety services of government bonds less than they did in the past, as the net supply of government bonds has increased and continues to increase at a notable pace.

In Germany and the United States, for example, the sovereign bond free float as a share of the outstanding volume has increased by more than ten percentage points over the past three years. It is projected to steadily increase further in the coming years.

So, the global savings glut appears to have turned into a global bond glut, which reduces the marginal benefit of holding government bonds.

There are several factors contributing to the rise in the bond free float.[15]

First, and most importantly, net borrowing by governments remains substantial. The public deficit is estimated to have been around 5% of GDP across advanced economies last year, and it is expected to decline only marginally in the coming years.

[15] Schnabel, I. (2024), "Navigating towards neutral", keynote speech at the CEPR Paris Symposium 2024 hosted by the Banque de France, Paris, 16 December.

## Global bond free float is rising notably and is expected to increase further

**Sovereign bond free float**
(% of outstanding)

— DE    - - - DE (projected)    — US
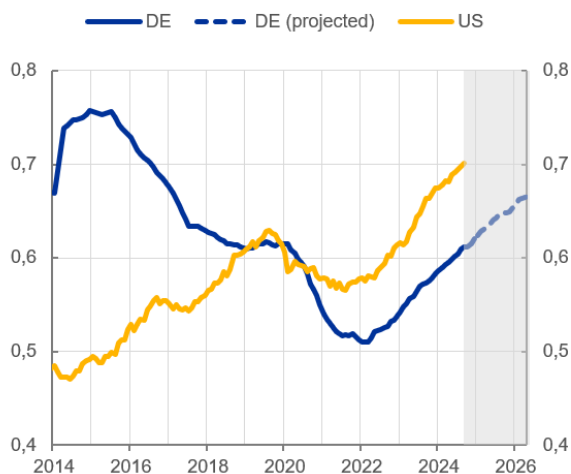


Source: ECB. Notes: The DE free-float measure is defined as holdings of DE public sector bonds by price-sensitive investors defined as all sectors other than the foreign official sector, and the Eurosystem as a share of total outstanding DE public sector bond supply. The US free float is computed as share of outstanding marketable US Treasury debt not held in the Federal Reserve's SOMA portfolio, nor is reported as being held by foreign official investors. Foreign official holdings as reported in the US TIC data are transformed into nominal values based on the average price of outstanding US Treasury debt according to the Federal Reserve. Latest observation: 31 January 2025 for DE, 30 November 2024 for US.

**Fiscal balance**
(% of GDP)

— Advanced economies
— Emerging & developing economies
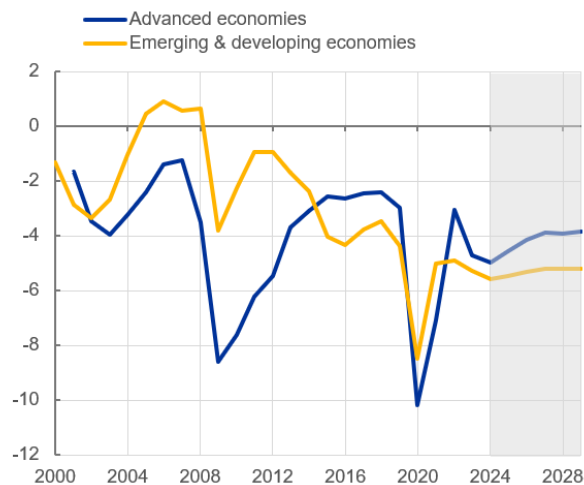


Source: October 2024 IMF World Economic Outlook (WEO) via Haver Analytics.
Notes: Fiscal balance refers to general government net lending / borrowing as a percentage of GDP.
Latest observation: 2023.

Second, rising geopolitical fragmentation is likely to be contributing to a drop in demand for government bonds in some parts of the world.

In the United States, for example, there has been a marked decline in the share of foreign official holdings of US Treasury securities since the global financial crisis. It is now at its lowest level in more than 20 years.[16] The US Administration's attempt to reduce the current account deficit is bound to further depress foreign holdings of US Treasuries.

Third, central banks are in the process of normalising their balance sheets. Unlike when central banks announced large-scale asset purchases, the effects of quantitative tightening (QT) on yields are likely to materialise only over time, as many central banks take a gradual approach when reducing the size of their balance sheets.

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[16] This has coincided with the price of gold – the world's other safe haven asset – having more than doubled over the past ten years.

## Global fragmentation and the unwinding of QE are adding to the bond free float

**Share of foreign official holdings of US Treasury securities**
(percent)

**Central bank monetary bond portfolio**
(as percent of GDP)

Sources: LSEG and ECB staff calculations.
Notes: Share calculated over the total marketable US Treasury securities outstanding.
Latest observation: November 2024.
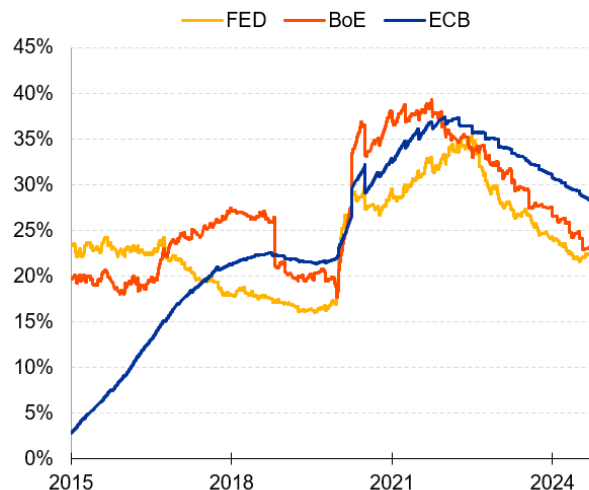
Sources: Bloomberg, BoE Weekly Reports.
Notes: BoE data is estimated from BoE weekly reports.
Latest observation: 20 February 2025.

## Higher r* calls for cautious approach to rate easing

These developments have three important implications for monetary policy.

One is that central banks are dialling back policy restriction in an environment in which structural factors are putting upward pressure on the real equilibrium rate. Recent analysis by the International Monetary Fund (IMF), for example, suggests that a fall in the convenience yield to pre-2000 average levels could raise natural rates by about 70 basis points.[17]

While a significant part of these effects may have already materialised, other factors could push real rates up further over the medium term. The IMF projects that, in the coming years, overall global investment – public and private – will reach the highest share of GDP since the 1980s, also reflecting borrowing needs associated with the digital and green transitions as well as defence spending.

Recent global initiatives aimed at boosting the development and use of artificial intelligence underscore these projections. Overall, these forces may well be larger than those that continue to weigh on the real equilibrium rate, such as an ageing population.

Central banks, therefore, need to proceed cautiously. They do not fully understand how the pervasive changes to the economies are affecting the steady state, or what the path to the new steady state will look like.

In this environment, the most appropriate way to conduct monetary policy is to look at the incoming data to assess how fast, and to what extent, changes to the ECB key policy rates are being transmitted to the economy.

For the euro area, this assessment suggests that, over the past year, the degree of policy restraint has declined appreciably – to a point where we can no longer say with confidence that our policy is restrictive.

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[17] IMF (2023), "The natural rate of interest: drivers and policy implications", World Economic Outlook, April. This estimate does not yet take into account a potential shift in the preferences of foreign investors.

According to the most recent bank lending survey, for example, 90% of banks say that the general level of interest rates has no impact on the demand for corporate loans, with 8% saying that it contributes to boosting credit demand. This is a marked shift from a year ago when a third of all banks reported that interest rates were weighing on credit demand.

For mortgages, the evidence is even more striking. Today almost half of the banks report that the level of interest rates supports loan demand, while a year ago more than 40% said the opposite. As a result, a net 42% of banks report an increase in the demand for mortgages, close to the historical high.

Survey evidence is gradually showing up in actual lending data. Credit to firms expanded by 1.5% in December, the highest rate in a year and a half, and credit to households for house purchases grew by 1.1%.
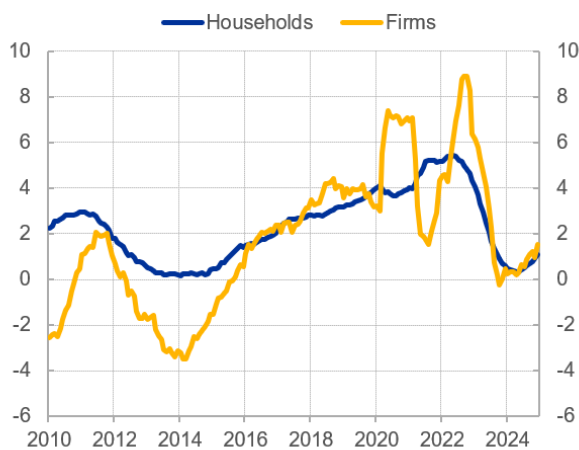


Monetary policy restriction has declined markedly, calling for prudence in rate easing

Impact of general level of interest rates on loan demand
(percent)
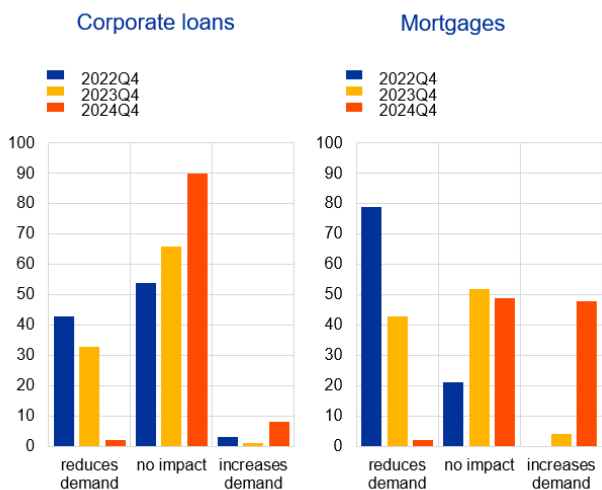
Source: ECB Bank Lending Survey.

Lending to firms and to households for house purchase
(annual percentage changes)

Sources: ECB (BSI) and ECB calculations.
Notes: Lending growth to households for house purchase prior to December 2015 is based on internal series.
Latest observation: December 2024.

Strong bank balance sheets are contributing to the recovery and, given the lags in policy transmission, further easing is still in the pipeline.

Lending conditions are also relatively favourable from the perspective of borrowers. The spread between the composite cost of borrowing for households and sovereign bond yields is well below the level seen over most of the 2010s and is now close to the historical average.[18]

And while some maturing loans from the period of very low interest rates will still need to be refinanced at higher rates, over time this debt has declined in real terms and interest payments as a fraction of net income are buffered by rising nominal wages.

Overall, therefore, it is becoming increasingly unlikely that current financing conditions are materially holding back consumption and investment. The fact that growth remains subdued cannot and should not be taken as evidence that policy is restrictive.

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[18] The "equilibrium" mortgage rate will naturally be higher as markets reprice the real equilibrium rate for government bonds.

As the ECB's most recent corporate telephone survey suggests, the continued weakness in manufacturing is increasingly viewed by firms as structural, reflecting a combination of high energy and labour costs, an overly inhibitive and uncertain regulatory environment and increased import competition, especially from China.[19]

Such structural headwinds reduce the economy's sensitivity to changes in monetary policy.

## Borrowing costs of households are relatively favourable compared with the 2010s

### Spread between composite cost of borrowing for households and 10-year euro area government bond yield
(percentage points)



Sources: ECB (MIR, FM) and ECB calculations.
Notes: The 10-year euro area government bond yields are GDP-weighted. The historical average is calculated since January 2005.
Latest observation: December 2024.

## QE's impact on r* is reducing its effectiveness

The second implication from the impact of the convenience yield on r* is related to the use of balance sheet policies.

If QE raises the convenience yield by reducing the net supply of government bonds, it may ultimately lower the real equilibrium interest rate. Importantly, this channel – the convenience yield channel – is distinct from the term premium channel.[20]

So, doing QE could be like chasing a moving target.

It reduces long-run rates by compressing the term premium.[21] But by making investors willing to pay a higher safety premium when the supply of safe assets shrinks, it may also reduce the interest rate level below which monetary policy stimulates growth and inflation.

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[19] Maruhn, F., Morris, R. and Slavik, M. (2025), "Main findings from the ECB's recent contacts with non-financial companies", *Economic Bulletin*, Issue 1, ECB.

[20] Krishnamurthy, A. and Vissing-Jorgensen, A. (2011), "The Effects of Quantitative Easing on Interest Rates: Channels and Implications for Policy", NBER Working Paper, No 17555; and Krishnamurthy, A. and Vissing-Jorgensen, A. (2012, op.cit.). There is also evidence of a distinction between the bond premium and convenience yield channel through exchange rates. See Jiang, Z. et al. (2024), "Convenience Yields and Exchange Rate Puzzles", *NBER Working Paper*, No 32092.

[21] Vayanos, D., and Vila, J.-L. (2021), "A preferred-habitat model of the term structure of interest rates", Econometrica, Vol. 89, pp. 77-112; and Greenwood, R. and Vayanos, D. (2014), "Bond Supply and Excess Bond Returns", *The Review of Financial Studies*, Vol. 27, No 3, pp. 663-713.

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This can also be seen by looking at how QE changes the balance of savings and investments. Fiscal deficits absorb private savings and thereby increase r*. By doing QE, central banks absorb fiscal deficits and thereby lower r*.

In other words, central bank balance sheet policies may be less effective than previously thought.[22] This could be an additional factor explaining why large-scale asset purchases did not succeed in bringing inflation back to 2% before the pandemic.

Of course, the same logic holds true when central banks reduce their balance sheets.

If QE contributed to depressing r*, QT will raise it. Any rise in real rates may then be less consequential for growth and inflation. It would then be misguided to compensate for higher long-term interest rates resulting from QT with lower short-term rates.

This is indeed what recent research suggests: QT announcements tend to cause a significant decline in the convenience yield of safe assets.[23]

There is one caveat, however.

QE and QT are implemented by issuing and absorbing central bank reserves, which themselves are safe assets – in fact, reserves are the economy's ultimate safe asset because they are free of liquidity and interest rate risk.[24]

Banks therefore highly value the convenience services of central bank reserves. So, when evaluating the effects of central bank balance sheet policies on r*, it is necessary to consider both the asset and liability side.

Research by economists from the Bank of England does exactly that.[25] They show that the effects of QT on the real equilibrium rate depend on the relative strength of two factors.

One is the effect on the *bond* convenience yield, which causes r* to rise as the supply of government bonds increases.

The other is the effect on the convenience yield of *reserves*. That effect is highly non-linear: when reserves are scarce, banks are willing to pay a high mark-up on wholesale interest rates, as was evident in the United States in 2019 when repo rates surged strongly.

So, if QT leads to a scarcity of reserves, it may cause the overall convenience yield to rise, and hence equilibrium rates to fall.

[22] Schnabel, I. (2024), "The benefits and costs of asset purchases", speech at the 2024 BOJ-IMES Conference on "Price Dynamics and Monetary Policy Challenges: Lessons Learned and Going Forward", Tokyo, 28 May. This channel may also question a fundamental tenet of macroeconomics: the long-run neutrality of money. There is a growing body of research showing evidence that monetary policy can have long-lasting real effects. See, for example, BIS (2024), "Quo vadis, r*? The natural rate of interest after the pandemic", Quarterly Review, March and Hillenbrand, S. (2023), "The Fed and the Secular Decline in Interest Rates", Working Paper, Harvard Business School, March.
[23] Du, W., Forbes, K. and Luzzetti, M. (2024), "Quantitative Tightening Around the Globe: What Have We Learned?", *NBER Working Paper*, No 32321.
[24] See, for example, Vissing-Jorgensen, A. (2023), "Balance Sheet Policy above the ELB", ECB Forum on Central Banking, Sintra, Portugal, 28 June.
[25] Kumhof, M. and Salgado-Moreno, M. (2024), "Quantitative easing and quantitative tightening: the money channel", Staff Working Paper, No 1,090, Bank of England.

## Convenience of reserves and the ECB's operational framework

The ECB took this factor into account when it reviewed its operational framework last year.[26] This is the third implication for monetary policy.

The new framework allows banks to demand as many reserves as they find optimal at a spread that is 15 basis points above the rate which the ECB pays to banks when they deposit their excess reserves with us. So, the opportunity cost of holding reserves is comparatively small, given the convenience services reserves provide to banks.

In addition, the ECB framework allows banks themselves to generate an increase in safe assets – by pledging non-high quality liquid assets (non-HQLA) in its lending operations. In doing so, banks on average generate € 0.92 of net HQLA for every euro that they borrow from the Eurosystem.[27]

The ECB framework therefore recognises that years of crises, more stringent regulatory requirements and the advance of new technologies – some of which increase the risk of "digital" bank runs – imply that banks may wish to hold larger liquidity buffers than they historically have done.

Supplying central bank reserves elastically will ensure that reserves will not become scarce as balance sheet normalisation proceeds. And if banks access the ECB standard refinancing operations when they are in need of liquidity, they will also not have to adjust their lending activities in response to the decline in reserves, as is sometimes feared.[28]

For now, the recourse to ECB lending operations has been limited, as there is still ample excess liquidity. However, as the euro area transitions to a world in which reserves are less abundant, banks will increasingly start borrowing reserves via the ECB operations.

Three ideas could be explored to make this transition as smooth as possible.

First, regular testing requirements in the counterparty framework could help ensure operational readiness while also allowing counterparties to become more comfortable with participating in ECB operations. A lack of operational readiness was one of the factors contributing to the March 2023 turmoil in the United States.[29]

Second, and related, obtaining central bank funding requires thorough collateral management, especially if the collateral framework is as broad as the Eurosystem's. For non-HQLA collateral, in particular, the pricing and due diligence process can be operationally complex and time-consuming.

For this reason, central banks sometimes require counterparties to pre-position collateral to ensure that funding can be readily obtained.[30] In the euro area, some banks already pre-position collateral voluntarily, in particular non-marketable collateral which cannot be used in private repo markets.

Banks could be further encouraged to mobilise with the central bank the collateral that is eligible but currently stays idle on their balance sheets. This would increase operational readiness, mitigate financial stability risks and reduce precautionary reserve demand as banks would have higher certainty that they can access central bank liquidity at short notice.

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[26] Schnabel, I. (2024), "The Eurosystem's operational framework", speech at the Money Market Contact Group meeting, Frankfurt am Main, 14 March.

[27] Hartung, B. (2024), "Liquidity transformation and Eurosystem credit operations", Working Paper Series, No 2933, ECB.

[28] Altavilla, C., Rostagno, M. and Schumacher, J. (2023), "Anchoring QT: Liquidity, credit and monetary policy implementation", CEPR Discussion Papers, No 18581.

[29] See, for example, BCBS (2023), Report on the 2023 banking turmoil, October.

[30] Group of Thirty (2024), Bank failures and contagion – Lender of last resort, liquidity, and risk management, Washington, D.C.

In the Eurosystem, given its broad collateral framework, such an approach may be more effective in helping banks adapt their liquidity management to the characteristics of a demand-driven operational framework compared with a blanket requirement to pre-position collateral.

Finally, in some jurisdictions central bank operations are fully integrated into the platforms commonly used by banks to operate in private repo markets.

This offers banks a number of advantages, including seamless access to transactions with the market and with the central bank, and – depending on the design of clearing arrangements and accounting rules – it could potentially allow banks to net out their positions, thereby freeing up valuable balance sheet space.

Offering banks the possibility to access Eurosystem refinancing operations through a centrally cleared infrastructure could contribute to making the ECB operations more economical in an environment in which dealer balance sheets are increasingly constrained.[31]

## Testing, pre-positioning and central clearing could ease transition to less ample reserves

**Composition of collateral buffer mobilised with Eurosystem and unencumbered collateral**
(in billion euro)
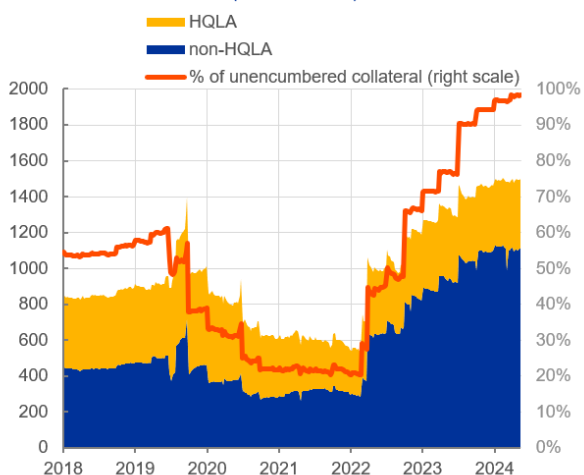


Source: ECB calculations
Notes: Chart shows composition of collateral mobilised by banks with the Eurosystem but not used for outstanding credit. Non-HQLA comprises predominantly non-marketable assets (credit claims), own-used covered bonds and retained ABS. Red line shows the share of unencumbered assets as a share of collateral mobilized with the Eurosystem but not used for actual borrowing. The increase in collateral buffers at the end of 2022 reflects that the sizable TLTRO-III repayments were not accompanied by a one-for-one reduction in mobilised collateral. The chart accounts for the 'waterfall' treatment of asset encumbrance under the LCR, i.e. that less liquid assets are counted as encumbered first.

**Ratio of free float of euro area government bonds and capital of primary dealers**



Sources: ESMA, CSEC, BSI, ECB calculations.
Notes: Dealer capital for primary dealers institutionally reporting as MFIs in the IBSI data collection. EGB free float based on central government issued bonds.
Last observation: December 2024.

The design of such arrangements should preserve equal treatment across the diverse range of ECB counterparties, regardless of their size, jurisdiction and business model, maintain the possibility to mobilise a broad range of collateral and be compatible with the ECB's risk control framework.

Further reflection is needed on these considerations, including a comprehensive assessment of the benefits and costs.

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[31] Duffie, D. et al. (2023), "Dealer Capacity and U.S. Treasury Market Functionality", Staff Report, No 1070, Federal Reserve Bank of New York. Similar suggestions are being proposed for the Federal Reserve. See Logan, L. (2023), "Ample reserves and the Friedman rule", remarks before the European Central Bank Conference on Money Markets, 10 November.

## Conclusion

The shocks experienced since the pandemic led to an abrupt end of the secular downward trend in real interest rates. Whether this will be merely an interlude, or the beginning of a new era, is inherently difficult to predict.

But looking at the ongoing transformational shifts in the balance of global savings and investments, as well as at the fundamental challenges facing societies today, higher real interest rates seem to be the most likely scenario for the future.

This will have implications for monetary policy. Central banks will need to adjust to the new environment, both to secure price stability over the medium term and to implement monetary policy efficiently.

## About the author

**Isabel Schnabel** is a Member of the Executive Board of the European Central Bank (ECB) where she is responsible for Market Operations, Research and Statistics. Before joining the ECB, she was Professor of Financial Economics at the University of Bonn (currently on leave) and spokesperson of the Cluster of Excellence "ECONtribute: Markets & Public Policy". From 2014 to 2019 she served as a member of the German Council of Economic Experts, and in 2019 she was Co-Chair of the Franco-German Council of Economic Experts.

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