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HOW HIGH CAN THEY GO? A LONGER-TERM PERSPECTIVE ON LONG-TERM INTEREST RATES, WITH A FOCUS ON THE US

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William De Vijlder

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After a long decline of real long-term interest rates in advanced economies, the direction has changed in recent years. The prospect of rising private- and public-sector financing needs is raising concern that this movement is not over. Empirical research shows that the long-run dynamics of long-term interest rates are predominantly driven by economic growth, demographic factors (life expectancy and working-age population growth) and financing needs (public debt and pensions). The first two factors are expected to continue exerting downward pressure, whereas upward pressure should come from the huge financing needs. Empirical estimates of the relationship between long-term interest rates and expected borrowing requirements point towards an impact that should be rather limited, all in all. Moreover, markets are already pricing in at least part of this impact. However, there is no room for complacency. For governments, any lasting increase in long-term rates means a larger structural effort to improve the primary balance in countries where the public debt ratio is on a rising trend. Moreover, given the uncertainty that surrounds long-horizon forecasts, markets may not fully price in the upside risks to long-term interest rates. To conclude, real long-term interest rates have risen in recent years, but this movement is probably not over. With this in mind, testing resilience to positive interest rate shocks is critically important.

INTRODUCTION: INTEREST RATES, A KEY ECONOMIC VARIABLE

Rising financing needs and their potential impact on interest rates have become a major point of attention, if not concern. In the US, Treasury Secretary Scott Bessent insists that the Trump administration "*is focused on preventing a financial crisis that could be the result of massive government spending over the past few years.*"[1] In the UK, the head of the Debt Management Office has announced a shift towards shorter-term borrowing in view of the declining institutional demand for long-dated gilts. The IMF's latest World Economic Outlook presents a medium-term reference forecast for the world real long-term interest rate, i.e. the GDP-weighted average 10-year yield of the G7 countries. The 2027–30 average is projected to be 50 basis points higher than in 2024 (1.3% versus 0.8%) and 30 basis points above the 2007–16 average of 1.0%.

The risk of higher interest rates matters for the economy at large through the cost of and access to financing, the impact on asset valuations, the value of loan collateral, investor risk appetite and more. A good understanding of the determinants of interest rates should enable households, companies, investors, central banks and treasury departments to form expectations about investment returns or the cost of financing and, by extension, many other economic variables (such as growth, inflation and asset prices).

This article tries to shed some light on the longer-term outlook for long-term interest rates. The focus will be on the US, given the available empirical research and the central role of US interest rates for the global economy.

THE SEMANTICS OF INTEREST RATES

Analysing interest rates is like peeling an onion. Removing successive layers ultimately brings us to the core, which is the equilibrium rate of interest. The concept of an equilibrium rate was introduced in 1889 by Swedish economist Knut Wicksell, who considered an economy without a banking system in which the available pool of saving matches the demand, at a rate of interest (the natural rate) that is equal to the return on capital and whereby prices are stable. Over the course of time, the financing of economies through banks and capital markets has evolved significantly. In addition, price stability as a policy objective has been replaced with inflation stability at a sufficiently low level (inflation targeting by central banks). This has created some ambiguity about the meaning of the "natural" rate. Holston, Laubach and Williams (2017) define the natural rate of interest as "*the real short-term interest rate consistent with output equaling its natural rate and constant inflation.*"[2] On the other hand, the IMF defines the natural rate as the long-term rate of return on investment that balances desired savings and desired investments.[3] Maurice Obstfeld (2025)[4] distinguishes between the natural rate, which is "*the real rate of interest prevailing in a long-run equilibrium where price rigidities are no longer relevant and other expected economic adjustments have taken place*"[5], and the neutral rate, which is "*the real policy rate of interest that eliminates inflationary or deflationary pressures.*" Although both rates are positively correlated over time, they are not necessarily the same.

The natural rate and the neutral rate are often used interchangeably, but a distinction will be made between the two in the remainder of this text. The neutral rate is a real rate of interest with a shorter-run focus through its role as a reference point for monetary policy. Adding a layer of target inflation gives us the nominal neutral rate. The observed nominal policy rate can be higher or lower, depending on the level of inflation versus its target and the stance of monetary policy.

Adding a normal term premium to the nominal neutral rate gives us the natural rate, which refers to a long-run equilibrium.[6] The term premium is the extra return that investors demand to hold a longer-term bond instead of investing in a series of short-term securities. It is the compensation for being exposed to duration risk, i.e. the uncertainty around the future evolution of short rates. As we will see

1 Source: CNBC, Treasury Secretary Bessent says Trump is heading off financial crisis, 16 March 2025.
2 Source: Holston, Kathryn, Laubach, Thomas, Williams, John C. (2017), Measuring the Natural Rate of Interest: International Trends and Determinants, Journal of International Economics, 108.
3 Source: Harrison, Olamide and Nguyen, Vina (2025), How to Measure the Monetary Policy Stance, IMF note 2025/003, January.
4 Source: Obstfeld, Maurice (2025), Natural and Neutral Real Interest Rates: Past and Future, NBER working paper 31949.
5 In the long-run equilibrium, price rigidities have disappeared, thereby enabling supply and demand to balance in different markets (product markets and labour market). In addition, other economic variables (e.g. net foreign asset position) have also converged to their steady-state value. To quote Obstfeld (2025), "*this is yet another reason to be wary of equating most measures of the natural rate with the neutral rate*".
6 At the risk of confusing the reader, when referring to published research that focuses on the short-term rate, we will use 'neutral rate', although the authors may have used 'natural rate'.

later, it fluctuates over time. Finally, there is a credit risk premium, reflecting the risk of default of the issuer. This will not be covered in the remainder of the text, with the focus being on high-quality sovereign issuers.

THE NEUTRAL RATE OF INTEREST: AN ANCHOR FOR REAL LONG-TERM INTEREST RATES

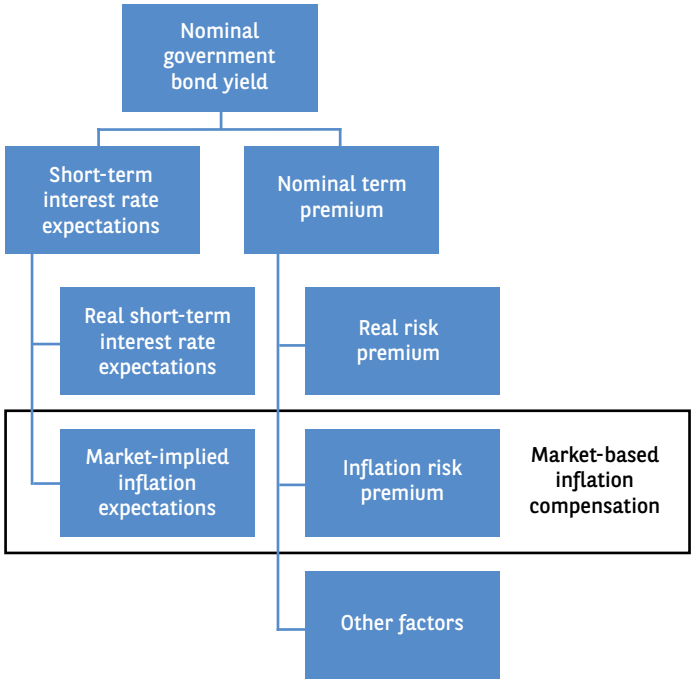
The neutral rate of interest (often referred to as r*) cannot be observed directly, so an estimate must be produced using econometric techniques. In these models, which are mostly inspired by the seminal work of Laubach and Williams (2003),[7] inflation is determined by the output gap, which in turn is a function of the monetary policy stance, i.e. the difference between the real short-term interest rate and the (unobservable) real neutral rate of interest. The latter depends on the real trend growth rate of the economy and other determinants, which are not specified. Various models exist and the results can significantly differ. In the US, recent estimates by the Federal Reserve range between 1 and 2%. In the euro area, the estimates for the real neutral rate span a range between -0.5% and 0.5% and between 1.75% and 2.25%[8] for the nominal rate. Moreover, for a given model, the uncertainty over the estimates is very large "*because the estimated relationships between interest rates and the output gap, and the output gap and inflation, are both relatively weak.*"[9] Consequently, using the neutral rate for assessing the monetary policy outlook is very challenging, a point that has been made on numerous occasions by central bank officials.

When gauging the long-term interest rate outlook, we can suppose that the economy is in equilibrium (the monetary policy stance is neutral), which enables us to focus on what might cause a lasting increase or decline in the neutral rate. This might be an easier task than estimating the exact level of the current neutral rate.

In the original Laubach-Williams model, the neutral rate depends on the real trend growth rate of the economy and 'other' determinants, which are a residual component and not specified as a result. For the former, the US Congressional Budget Office projects a decline in the real growth rate of potential GDP from 2.4% in the 1995–2024 period to 2.0% in 2025–2035 and 1.6% in 2036–2045. This would be driven by slower population growth, as well as slower labour productivity growth.[10] This should weigh on the neutral rate in the US.

Several authors have focused on specific variables, shedding light on the 'other' determinants of the Laubach-Williams model. Hakkio and Smith (2017) of the Federal Reserve Bank of Kansas City believe that bond premiums (the term premium and the corporate bond risk premium) "*are an important determinant of the natural real rate and lead to highly cyclical estimates*", whereby a reduction (increase) in the bond premiums is associated with an increase (decline) in the neutral rate.[11]

EXHIBIT 1 - DECOMPOSITION OF GOVERNMENT BOND YIELDS



SOURCE: BASED ON TERM STRUCTURES IN ECONOMIC ANALYSIS, DEUTSCHE BUNDESBANK MONTHLY REPORT, JANUARY 2023

The negative correlation between the bond premiums and the neutral rate implies that shocks in the former would be counterbalanced to some degree by changes in the opposite direction of the latter. This should reduce the amplitude of cyclical swings in interest rates.

Szoke et al. (2025) have analysed the influence of the convenience yield (measured as the spread between the yield on safe (Aaa) corporate bonds and the 10-year Treasury yield) on the neutral rate.[12] An increase in the convenience yield, e.g. due to a persistent increase in the demand for safe and liquid assets, can shift savings from private assets to government securities, thereby reducing corporate investment and putting downward pressure on the neutral rate.[13] Their estimates suggest that in the US "*over the past five decades changes in the natural rate of interest are accounted for by both changes in the growth rate of potential output and in the trend convenience yield of government securities.*"

7 See Laubach, T. and Williams, J. C. (2003), Measuring the Natural Rate of Interest, The Review of Economics and Statistics, Vol. 85, No. 4.
8 Source: Brand, Claus, Lisack, Noëmie and Mazelis, Falk (2025), Natural rate estimates for the euro area: insights, uncertainties and shortcomings, ECB Economic Bulletin, issue 1.
9 Source: IMF (2023). For the US, the 90 percent confidence interval ranged from 0 to about 3 percent in the second half of the 2010s.
10 Source: Congressional Budget Office, The Long-Term Budget Outlook: 2025 to 2055.
11 Source: Hakkio, Craig S. and Smith, A. Lee (2017), Bond Premiums and the Natural Real Rate of Interest, Federal Reserve Bank of Kansas City Economic Review, First quarter. The decline in the bond premiums is stimulative for the economy through cheaper borrowing conditions and a decline in the savings rate. Both factors combined raise the neutral rate.
12 'Convenience yield' refers "*to the many convenience services provided to investors by these relatively safe assets (e.g., collateral usage, liquidity provision, safety).*" Source: Arcidiacono, Cristian, Bellon, Matthieu and Gnewuch, Matthias (2024), Dangerous liaisons? Debt supply and convenience yield spillovers in the euro area, ESM working paper 63, 23 October.
13 Source: Szoke, Balint, Xavier, Ines and Vazquez-Grande, Francisco (2024), Convenience Yield as a Driver of r*, FEDS Notes, 3 September. However, the maturity difference between the Moody's Aaa index, which has maturities as close as possible to 30 years (source: Bloomberg), and the 10-year US Treasury note implies that fluctuations in this convenience yield also reflect changes in the longer-end slope of the yield curve.

Moreover, the uncertainty around the neutral rate estimates is a lot smaller when considering the convenience yield. Since the early 1990s, the convenience yield has demonstrated a mean-reverting behaviour, whereby its fluctuations are highly correlated with the level of the federal funds rate.[14] During the most recent tightening cycle, it has been at the lower end of the historical range, and, since the Fed started cutting its policy rate, the convenience yield has increased, reaching the 43rd percentile of the historical distribution since 1983.

THE TERM PREMIUM: NICE IN THEORY, COMPLICATED IN PRACTICE

When analysing the evolution of long-term interest rates, sovereign yields must be decomposed in the expected path of nominal short-term interest rates, which are closely tied to the evolution of official interest rates, and a term premium (*Exhibit 1*). This decomposition is necessary due to the empirical failure of the expectations hypothesis of interest rates.[15]

Research shows that fluctuations in the term premium are the dominant force in fluctuations of forward interest rates, and even more so for long horizons.[16] Taking into account inflation expectations makes it possible to determine the expected path of real short-term interest rates, which can be compared with an estimate of the neutral rate of interest.

The term premium crucially depends on the perceived riskiness of longer-term securities and on changes in demand and supply of debt instruments. The former relates to the risk of unexpected changes in real rates and inflation risk, i.e. the risk of inflation turning out differently than expected. The latter, labelled as 'other factors' in *Exhibit 1*, refers to factors such as liquidity considerations, regulations, preferred habitats of investors, safe haven characteristics (flight to quality) and over- or underreactions of bond markets to news.[17]

The term premium cannot be observed directly and different methods are used to produce an estimate, such as econometric models exclusively based on interest rate data,[18] models that incorporate survey data on short-term interest rates,[19] using the fixed leg of the overnight index swap rate as the estimate of the expected short-term rate which makes it possible to infer the level of the term premium,[20] and using the 5Y5Y forward rate, given its high correlation with model-based estimates of the term premium.[21] Although separating short-term rate expectations and the term premium is theoretically very appealing, caution is warranted when using the estimates, given the econometric and practical challenges.

ESTIMATED 10-YEAR TERM PREMIUM FOR US TREASURIES

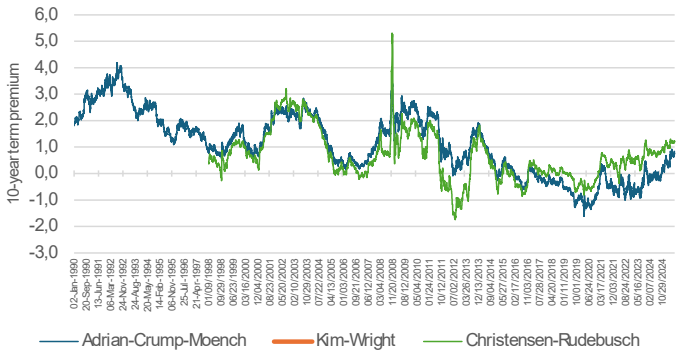


CHART 1 SOURCE: FEDERAL RESERVE NEW YORK, FEDERAL RESERVE BOARD, FEDERAL RESERVE SAN FRANCISCO

The term premium should naturally be positive because investors require compensation for the extra risk of investing in longer maturities rather than short-term paper, but over the past 15 years, it has moved into negative territory on several occasions, sometimes staying there for years (*Chart 1*).[22]

Another striking development is the long-term downtrend in the term premium, followed by a rebound since the latter part of 2020. This raises the question of what is driving the term premium and whether the recent uptrend will continue. The answer matters for the US, but also globally: research by the BIS shows a high correlation between term premia in the US and the euro area.[23] This correlation has been higher than the correlation between the respective interest rate expectations. As shown in *Exhibit 1*, the nominal term premium is made up of an inflation risk premium, a real risk premium and other factors. The estimates of the inflation and real risk premia in US Treasuries produced by the Federal Reserve Bank of Cleveland tend to move in

14 Monetary tightening (easing) causes a decline (increase) in the convenience yield and a narrowing (widening) of the yield spread between high quality corporate bonds and US Treasuries.

15 See e.g. Adrian, Tobias, Crump, Richard K., Diamond, Peter A., and Yu, Rui (2015), Discounting the Long Run, Federal Reserve of New York, Liberty Street Economics, 31 August.

16 "*The contribution of term premiums to the variation of monthly changes in forward rates is substantial at all horizons and increases from 75% at the one-year forward horizon to over 90% at longer forward horizons. In contrast, expected real short rates only account for 18% of the month-to-month variation at the one-year forward horizon, and this contribution quickly drops to zero at longer maturities.*" Source: Crump, Richard K., Eusepi, Stefano, and Moench, Emanuel (2018), The Term Structure of Expectations and Bond Yields, Federal Reserve Bank of New York Staff Reports, no. 775, May 2016; revised April 2018.

17 Source: Kim, Don H and Orphanides, Athanasios (2007), The bond market term premium: what is it, and how can we measure it?, BIS Quarterly Review, June.

18 See e.g. Tobias Adrian, Richard K. Crump, and Emanuel Moench, Pricing the Term Structure with Linear Regressions, Federal Reserve Bank of New York Staff Reports, no. 340, August 2008; revised April 2013.

19 Source: Crump, Richard K., Eusepi, Stefano, and Moench, Emanuel (2018), The Term Structure of Expectations and Bond Yields, Federal Reserve Bank of New York Staff Reports, no. 775, May 2016; revised April 2018.

20 Source: Nangle, Toby (2025), Do we even need bond term premia models?, FT Alphaville, 26 March.

21 This reflects the relative stability of longer-horizon policy rate expectations, which implies that fluctuations in longer-term forward rates reflect changes in the term premium. Source: de Courcel, Camille (2023), Global rates: Term premium comes out of hibernation, BNP Paribas Markets360, 2 November.

22 The chart shows the output of three term premium models at the Federal Reserve. Source: Adrian, Crump and Moench (2013); Kim, Don H. and Wright, Jonathan H. (2005), An Arbitrage-Free Three-Factor Term Structure Model and the Recent Behavior of Long-Term Yields and Distant-Horizon Forward Rates, Finance and Economics Discussion Series working paper 2005-33, Federal Reserve Board, August; Christensen, Jens H.E. and Rudebusch, Glenn D. (2012), The Response of Interest Rates to U.S. and U.K. Quantitative Easing, Economic Journal 122, pp. F385-F414.

23 "*The rolling one-year correlation between monthly changes in US and euro area term premia has typically hovered between 0.6 and 0.9, although it has displayed wider swings since the GFC.*" Source: Cohen, Benjamin H., Hördahl, Peter and Xia, Dora (2018), Term premia: models and some stylised facts, BIS Quarterly Review, September. The correlation of interest rate expectations between the United States and the euro area has fluctuated between 0 and 0.6.

a narrow band and are highly mean-reverting.[24] This implies that the 'other factors' of Exhibit 1 seem to be the dominant driver of the term premium. What can we expect in terms of future evolution?

A first, admittedly very simple approach, in the search for reference points involves looking at the historical relationship between the term premium and near-term monetary policy expectations, as captured by the 1-year risk-neutral yield. *Chart 2* shows that this relationship is poor: for the same level of the risk-neutral yield, the term premium has at times been high and sometimes low. There does seem to be a slight negative correlation between the two, implying that the impact on bond yields of expectations of higher (lower) policy rates is cushioned by opposite changes in the term premium.

This negative correlation should be considered when analysing the consequences of a sudden jump in the term premium. This would tighten financial conditions and weigh on growth, as simulations by Banque de France show that following an increase of 100 basis points in the US term premium, US GDP growth would be 0.4 pp lower after one year compared to the baseline scenario, thereby raising the prospect of rate cuts.[25] The risk-neutral yield would decline, cushioning the impact of the increase in the term premium on bond yields.

Financial markets play an important role in the dynamics of the term premium. Fluctuations in investors' risk appetite trigger portfolio reallocations towards (or away from) safe assets, causing drops (or increases) in the term premium. The correlation between equity and bond returns is key in relation to this. In the US, it has been predominantly negative since 2000: when equity prices declined, bond prices tended to rise (and hence, bond yields declined). An investor who is invested in both asset classes will benefit from a diversification effect, as rising bond prices cushion the impact of a drop in equity prices on the overall performance of the portfolio and vice versa. This effect underpins the demand for bonds, even when yields are very low, and compresses the term premium.[26]

Bond supply versus demand are other important drivers of the term premium. After all, bond yields, and hence the term premium, have to adjust in order to bring the two in line. However, part of the demand can be price-inelastic. This is the case when a central bank conducts quantitative easing (QE). More recently, the focus has been on quantitative tightening (QT), whereby securities that previously had been purchased as part of a QE policy are sold by the central bank ('active QT') or are no longer being reinvested when they mature ('passive QT', which involves a balance sheet run-off). Recent, very comprehensive research shows that QT announcements have had significant but small effects.[27] Foreign investors' demand also matters.

US TREASURIES: 10-YEAR TERM PREMIUM AND 1-YEAR RISK NEUTRAL YIELD (MONTHLY DATA SINCE 2000)

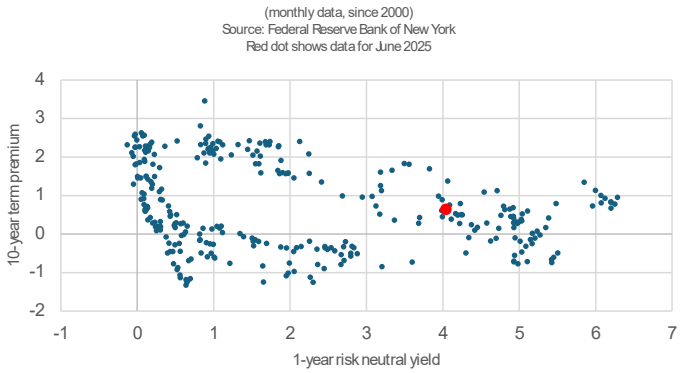


CHART 2 SOURCE: FEDERAL RESERVE BANK OF NEW YORK

Based on a review of the empirical literature for the US and other economies, Zhang and Martínez García (2024) conclude that "*a one percentage point increase in the share of foreign investors in the government bond market reduces government bond yields by 3 to 10 basis points.*"[28]

THE NATURAL RATE OF INTEREST: DRIVERS AND A QUALITATIVE ASSESSMENT OF THE LONGER-TERM OUTLOOK FOR THE US

Broadening the scope from the term premium to bond yields in general, *Table 1* provides an overview of the factors influencing the (long-term) natural rate, the theoretical rationale and a qualitative assessment of the expected impact on the natural rate going forward.

When using *Table 1*, it should be kept in mind that the relative importance of the factors (their impact on bond yields) varies. Moreover, the conviction level about their likely evolution may also differ. With these caveats in mind, most factors point to downward pressure on long-term interest rates going forward. However, the expected evolution of the financing needs, captured by public debt and the investment needs of the private and public sector – two factors on which the confidence level of the projection is high – should exert an upward pressure.

24 "*The inflation risk premium is a measure of the premium investors require for the possibility that inflation may rise or fall more than they expect over the period in which they hold a bond. Similarly, the real risk premium is a measure of the compensation investors require for holding real (inflation-protected) bonds over some period, given the fact that future short-term rates might be different from what they expect.*" Source: Inflation Expectations, Federal Reserve Bank of Cleveland. For a detailed analysis, see: Haubrich, Joseph G., Pennacchi, George, and Ritchken, Peter (2011), Inflation Expectations, Real Rates, and Risk Premia: Evidence from Inflation Swaps, Federal Reserve Bank of Cleveland, Working Paper No. 11-07.

25 Source: Siena, Daniele and Szczerbowicz, Urszula (2018), Spillovers to the euro area from a sudden rise in the US term premium, Banque de France Eco Notepad, 15 March.

26 For more detail see: De Vijlder, William (2024), What drives the correlation between equity and bond markets?, Economic Research, BNP Paribas, 18 April.

27 Source: Du, Wenxin, Forbes, Kristin, Luzzetti, Matthew N. (2024), Quantitative Tightening Around the Globe: What Have We Learned?, NBER Working Paper 32321, April. The authors analyse QT conducted by the Bank of England, the Reserve Bank of New Zealand, Sveriges Riksbank, Bank of Canada, Reserve Bank of Australia, Federal Reserve and the European Central Bank. "*The results suggest that individual QT announcements (broadly defined) correspond to a small but significant increase of about 4-8 bps in government bond yields at horizons of 1 year and longer. When these effects are aggregated by country from 2021-2023, the cumulative effect is an increase in government bond yields of 20-26 bps on average (for horizons of 1 year and longer), although there is substantial heterogeneity across countries and the characteristics of the QT program.*" This paper also summarises the literature on the impact of QE on bond yields and notices that the empirical estimates vary a lot.

28 Source: Zhang, Yixiang and García, Enrique Martínez (2024), The Contribution of Foreign Holdings of U.S. Treasury Securities to the U.S. Long-Term Interest Rate: An Empirical Investigation of the Impact of the Zero Lower Bound, Federal Reserve Bank of Dallas, Globalization Institute Working Paper 430, September.

Table 1 – Drivers of the natural rate and their likely future impact on US long-term interest rates

Driver	Theoretical relationship	Comment	Likely impact
Total factor productivity growth	Higher productivity growth boosts investment in physical capital by firms. Workers expect larger wage growth, so they need to save less to smooth future consumption.	The CBO, as well as the Federal Reserve Bank of Chicago[29], expect slower total factor productivity growth.	↓
Labour force growth. Growth in labour hours.	Slower growth increases the amount of capital per worker in the long term, reduces the return on capital and the return on government bonds and other investments.	The CBO expects slower growth.[30]	↓
Life expectancy	At a constant retirement age, higher life expectancy increases the expected duration in retirement and induces households to save more.	The rise in life expectancy is expected to continue.[31]	↓
Population ageing	A higher dependency ratio lowers saving and raises the real interest rate, as the younger and older cohorts save less than the working-age population. However, in theory, there is a lower output growth rate as well, which has a negative effect on investment, and consequently savings.	The retirement of the Baby-Boomer generation should reduce available savings to finance investment (the retired cohorts dissave more than those that are still active) and push up interest rates. However, many retirees save much more than suggested by theory, perhaps for bequest or precautionary reasons.[32]	?
Inequality	Rising inequality implies that a larger share of output goes to high-saving households, which puts downward pressure on interest rates.	The CBO expects income inequality to increase further, which should weigh on real interest rates.	↓
Capital share of income	A rise in the income share for owners of capital (such as technological change and globalisation) boosts the return on capital and puts upward pressure on interest rates.	The CBO expects that the factors that have led to a rising capital share of income are likely to persist.	↑
Market power	Rise in market power depresses production and demand for savings. Due to the concentration of wealth, profits disproportionately go to the elderly population, which reduces the supply of savings.	There is a risk that structurally lower growth would boost efforts to increase market power to underpin profit growth (Obstfeld (2025)).	?
Public debt	Increase in public debt increases the demand for savings, which puts upward pressure on bond yields.	The IMF projects an increase in world public debt as a percentage of GDP over the next several years.[33]	↑
Net international capital flows (global savings glut)	Capital inflows increase the available savings in the domestic economy, which lowers interest rates.	The CBO anticipates that emerging-market economies will attract a greater share of foreign investment in coming decades, meaning that the downward pressure on US real interest rates from foreign inflows of capital should diminish, but not disappear completely.	↓
US dollar's international currency status	The US dollar's role in the global financial system and the extensive use of US Treasuries as safe assets by international investors lower the required interest rates that the US needs to pay compared to other countries (the so-called exorbitant privilege of the US).[34]	A more inward-looking policy could weigh on the US dollar's international currency status, cause a reduction in its share in international reserves and put upward pressure on bond yields.[35]	↑
Climate change	Climate shocks and climate-related uncertainty can weigh on investment, boost precautionary saving, reduce productivity growth and GDP growth in general, thereby lowering r*. Investments to address climate change can have the opposite effect on real interest rates.[36]		?
Geopolitics	Higher geopolitical uncertainty weighs on growth and boosts precautionary saving. Both factors put downward pressure on interest rates.[37]	According to Obstfeld (2025), greater fragmentation in the world economy should weigh on long-term growth through a reduced diffusion of new ideas and greater uncertainty that discourages risk-taking.	↓
Investment needs	Rising investment needs put upward pressure on interest rates, triggering an increase in saving. The impact on economic growth, inflation and loan demand also plays a role.	Huge investment needs (climate change, digital and defence) should put upward pressure on real interest rates.	↑
Equity risk premium	Negative correlation between the equity risk premium and the natural rate lowers the latter.	The CBO expects the preferences for Treasury securities relative to riskier assets to gradually decline but to remain above their average levels from 1995 to 2004, which is the CBO's reference period.	↓
Convenience yield	Negative correlation between the convenience yield and the natural rate.	Given its current level, the convenience yield will probably have a neutral if not a negative impact on the neutral rate.	=/↓

EMPIRICAL RESEARCH ON THE DRIVERS OF THE NATURAL RATE AND BOND YIELDS

The empirical research on the drivers of long-term interest rates is vast. Does it confirm the theoretical relationship presented above? A useful starting point is a paper by the Bank of England analysing the factors behind the decline of about 450 basis points in real long-term interest rates across the world in recent decades.[38] Weaker trend growth is behind 100 bp of the decline and changes in desired saving (up) and investment (down) are behind 300 bp, split across different factors as shown in *Table 2*.

Several authors have analysed the sensitivity of real interest rates to different economic variables. Across various papers, demographic variables (growth in labour-force hours, the proportion of 40- to 64-year-olds in the population, growth rate of the working-age population and life expectancy[39]) and public finances have a significant impact on long-term interest rates.

For other factors, the results are mixed or even poor. The theoretical relationship is very often not confirmed by the data[40] or the coefficients have the wrong sign. This is the case for productivity growth.[41]

A Bank of Japan working paper examines the determinants of long-term forward government bond yields in 10 advanced economies using annual data over the 1990–2010 period.[42] There are several significant variables (inflation expectations, labour productivity growth, fiscal conditions, foreign borrowing (which has a bigger impact on yields than domestic borrowing) and population ageing, which exerts downward pressure on bond yields), but this may be related to the specific period being analysed.

Table 2 – Secular drivers of the decline in the global real interest rate

Factor	Impact in bps on the real rate
Deterioration in the outlook for trend growth	-100
Desired savings schedule has shifted out materially due to demographic forces	-90
Higher inequality within countries	-45
Preference shift towards higher saving by emerging market governments following the Asian crisis	-25
Decline in desired investment due to a fall in the relative price of capital goods	-50
Lower public investment	-20
Rising spread between rate of return on capital and risk-free rate	-70
Total	-400

SOURCE: RACHEL AND SMITH (2015).

29 Yi, Kei-Mu Yi and Zhang, Jing (2017), Understanding Global Trends in Long-Run Real Interest Rates, Federal Reserve Bank of Chicago Economic Perspectives, 2/2017.
30 Source: Gamber, Edward N. (2020), The Historical Decline in Real Interest Rates and Its Implications for CBO's Projections, Congressional Budget Office Working Paper 2020-09, December.
31 Source: Congressional Budget Office (2024), The Demographic Outlook: 2024 to 2054, January. The CBO expects life expectancy at birth to increase from 78.7 years in 2024 to 82.2 years in 2054. The Census Bureau and the Social Security Administration also expect an increase.
32 Source: Obstfeld M. (2025).
33 Source: IMF (2025), World Economic Outlook, April.
34 Source: Arvai, Kai and Coimbra, Nuno (2023), Privilege Lost? The Rise and Fall of a Dominant Global Currency, Banque de France working paper 392, December.
35 Source: Eichengreen, Barry (2025), Mars or Mercury rebooted: The Trump administration, the dollar, and the geopolitics of international currency choice, CEPR, VoxEU column, 18 April. In a scenario of a 30 percentage-point reduction in the share of the USD in international reserves could imply that *"over $800 billion worth of official US dollar-denominated assets – equivalent to 6% of US marketable public debt – would be liquidated, if the composition of global reserves changes but their level does not, while long-term US interest rates would increase by as much as 80 basis points."*
36 Mongelli, Francesco Paolo, Pointner, Wolfgang and van den End, Jan Willem (2022), The effects of climate change on the natural rate of interest: a critical survey, ECB working paper 2744, November.
37 See e.g. Kapopoulos, Theodore, Anastasiou, Dimitris Anastasiou, Ongena, Steven, Sakkas, Athanasios (2025), Geopolitical Risk and Domestic Bank Deposits, Swiss Finance Institute Research paper 25-64.
38 Rachel, Lukasz and Smith, Thomas D. (2015), Secular drivers of the global real interest rate, Bank of England, Staff Working Paper No. 571, December.
39 Lunsford and West (2019) find the expected sign for the relationship of growth in labour-force hours and the proportion of 40- to 64-year-olds in the population, and real interest rates. Borio et al. (2022) cover many variables for 19 countries and using data since 1870, but life expectancy is the only variable that consistently correlates with real interest rates and with the right sign. Carvalho et al. (2025) cover 19 OECD countries using data since 1979, and find that life expectancy and the growth rate of working-age population are important determinants of real interest rates.
40 Using annual data, mostly from 1890 to 2016, Lunsford and West (2019) analyse the long-run correlation between US real short-term interest rates and a comprehensive list of variables (real per capita GDP growth, growth of real per capita consumption spending, growth in total factor productivity, return for the S&P 500, volatility measures, growth in labour-force hours and in capital per hour, demographic measures, income inequality, relative price of investment, federal government primary deficit relative to GDP, federal debt/GDP, current account expressed relative to GDP, spread between public and private borrowing rates, and money growth). Demographic variables have the expected correlation. For most other variables, the results are mixed.
41 See for this: Lunsford, Kurt G. (2017), Productivity Growth and Real Interest Rates in the Long Run, Economic Commentary, Federal Reserve Bank of Cleveland, Number 2017-20, 15 November.
42 Source: Ichiue, Hibiki and Shimizu, Yuhei (2012), Determinants of Long-term Yields: A Panel Data Analysis of Major Countries and Decomposition of Yields of Japan and the US, Bank of Japan working paper no.12-E-7, May. The countries covered are Japan, the US, the UK, Germany, Canada, Norway, Sweden, Switzerland, Australia, and New Zealand.

Table 3 – Empirical research on the impact of public debt or deficits on long-term interest rates

Author(s)	Scope	Results
Poghosyan (2012)[48]	22 advanced economies.	A 1 percentage point increase in the government debt-to-GDP ratio raises real government bond yields by about 2 basis points in the long run.
Neveu and Schafer (2024)[49]	US.	A 1 percentage-point increase in the projected ratio of debt to gross domestic product raises average long-run interest rates by 2 basis points.
Gust and Skaperdas (2024)[50]	US.	A 1 percentage point increase of the debt/GDP ratio raises bond yields between 1 and 6 basis points.
Plante et al. (2025)[51]	US.	A 1 percentage point increase in the debt-to-GDP ratio raises the 5-year-ahead, 5-year Treasury rate by 3 basis points.
IMF (2025)[52]	US.	An increase of 10 percentage points of GDP in US public debt between 2024 and 2029 could lead to a 60-basis-point rise in the 10-year Treasury nominal yield.
Furceri et al. (2025)[53]	US.	Long-term rates rise by 20 to 30 basis points in response to a 1 percentage point increase in the projected
Norges Bank Investment Management (2024)[54]	US and euro area.	For the US, a 10 percent increase in government debt increases 10-year Treasury yields by approximately 100 bps. For the euro area, the equivalent number is 65 bps.

The impact of government bond supply on interest rates is an important point of attention, given the projections of rising indebtedness,[43] and the risk of a feedback loop due to rising interest charges[44]. A recent paper by the Federal Reserve Bank of San Francisco[45] shows a significant influence of government debt and pension spending on bond yields. Ferreira and Shousha (2023) find that the supply of safe assets is an important driver of longer-run neutral rates, with US Treasuries playing a key role in this respect.[46] Based on the same methodology, Davin and Ferreira (2022) provide updated estimates of the importance of these various factors.[47] According to their results, in the US, the longer-run neutral rate has increased 70 bps since 2008, which included 50 bps between 2020 and 2022 on the back of debt supply and higher productivity. In the euro area, the increase is 40 bps since 2008, with 30 bps in the 2020–2022 period on the back of increased debt supply.

Table 3 presents estimates of the impact of public debt or deficits on interest rates. Looking at the range of estimates, between 10 and 100 basis points for an increase in the US public debt ratio of 10 percentage points, it is tempting to label the impact as (rather) small. However, this should be assessed from a debt sustainability perspective keeping in mind the feedback loop due to rising interest charges. For a given primary budget balance, a worsening of the difference between the average cost of debt (r) and the growth of GDP (g) will reduce fiscal policy leeway (if r<g) or make debt stabilisation more challenging (if r>g).

The empirical research on the determinants of long-term interest rates can help to address a weakness of the qualitative overview discussed before, as factors that make perfect sense in theory may not be statistically significant. *Table 4* presents the coefficients that were statistically significant in the review of the empirical literature and the expected change in the explanatory variables between 2024 and 2030. This provides an estimate of the impact on real long-term rates by 2030. The estimates are in a range of -19 bps and +38 bps, but only one model out of four sees rates moving higher.

43 The latest IMF's Fiscal Monitor (April 2025) projects a further increase of world general government debt in percent of GDP to close to 100% in 2030 from 92.3% in 2024. For advanced economies, an increase is projected from 108.5% in 2024 to 113.3% in 2030, in the US to 128.2% (120.8% in 2024), in China from 88.3% to 116.0%. The increase in the euro area (from 87.7 to 92.9%) is the result of diverging developments with significant debt build-up in France (from 113.1% to 128.4%) and Germany (from 63.9% to 74.8%), a small increase in Italy (from 135.3% to 137.7%) and a big improvement in Spain (from 101.8% to 93.0%). In emerging market and developing economies, the debt ratio is projected to rise from 69.5% to 82.0%.

44 Rising public debt causes an increase in long-term interest rates that worsens the budget deficit, triggering a further rise in public debt and interest rates.

45 Source: Carvalho, Carlos, Andrea Ferrero, Felipe Mazin, and Fernanda Nechio (2025). "Demographics and Real Interest Rates Across Countries and Over Time." Federal Reserve Bank of San Francisco Working Paper 2023-32. The authors cover 19 OECD countries using data since 1979.

46 The authors cover 11 advanced economies. Policy-induced demand for safe assets (the global savings glut and tighter financial regulation), the convenience yield, trend productivity and demographic factors are relevant drivers for neutral rates.

47 Source: Davin, Carolyn and Ferreira, Thiago (2022), Longer-Run Neutral Rates in Major Advanced Economies, FEDS Notes, Board of Governors of the Federal Reserve System, 1st December.

48 Source: Poghosyan, Tigran (2012), Long-Run and Short-Run Determinants of Sovereign Bond Yields in Advanced Economies, IMF Working Paper 12/271, November. The countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Korea, Netherlands, New Zealand, Portugal, Spain, Sweden, Switzerland, the UK and the US.

49 Source: Neveu, Andre R. and Schafer, Jeffrey (2024), Revisiting the Relationship Between Debt and Long-Term Interest Rates, CBO working paper 2024-05, December.

50 Source: Gust, Christopher, and Skaperdas, Arsenios (2024), Government Debt, Limited Foresight, and Longer-term Interest Rates, Finance and Economics Discussion Series 2024-027, Board of Governors of the Federal Reserve System.

51 Source: Plante, Michael D., Richter, Alexander W. and Zubairy, Sarah (2025), Revisiting the Interest Rate Effects of Federal Debt, Federal Reserve Bank of Dallas working paper 2513, April.

52 Source: IMF, Fiscal Monitor, chapter 1, Fiscal Policy under Uncertainty, April 2025.

53 Source: Furceri, Davide, Goncalves, Carlos and Li, Hongchi (2025), The Impact of Debt and Deficits on Long-Term Interest Rates in the US, IMF Working Paper WP/25/141.

54 Source: Norges Bank Investment Management (2024), Investor demand and government bond pricing, Discussion note #1/2024. Using data on investor holdings of sovereign debt for the 2004–2022 period, they study how these holdings change as a function of changes in government debt (the marginal response of investor holdings) and estimate the interest rate elasticity of bond demand.

Table 4 – Projected change in real long-term interest rates in advanced economies

Variables	Source	Change in value	Coefficient	Impact on real long-term interest rates	Total
Hibiki Ichiue and Yuhei Shimizu (2012)					
Net government debt-to-GDP ratio	Gross government debt in advanced economies (IMF)	4.80	0.02	0.08	-0.17
Labour productivity growth rate	US data from CBO. Average 1995-2024 versus 2025-2035	-0.20	0.97	-0.19	
Working-age population ratio growth rate	UN data. Population between 20 and 64 years old versus total population. Universe: Europe, North-America, Australia and New Zealand	-0.02	3.37	-0.05	
Tigran Poghosyan (2012)					
Debt ratio (general government debt in % of GDP, WEO)	Gross government debt in advanced economies (IMF)	4.80	0.01	0.07	0.00
Potential growth	Data for major advanced economies fomr IMF World Economic Outlook, April 2025	-0.10	0.65	-0.06	
Carvalho et al. (2025)					
Life expectancy	United Nations (developed countries)	0.86	-0.54	-0.16	0.38
Growth rate of labour force	UN data. Growth of population between 20 and 64 years old in Europe, North-America, Australia and New Zealand	-0.01	11.59	-0.02	
Government debt	Gross government debt in advanced economies (IMF)	4.80	0.10	0.16	
Pension spending	Data for advanced economies from IMF Fiscal Monitor ch 2, April 2025	0.45	2.65	0.40	
Borio et al. (2022)					
Life expectancy	United Nations (developed countries)	0.86	-0.33	-0.29	-0.19
Public debt	Gross government debt in advanced economies (IMF)	4.80	0.02	0.10	

CONCLUSION

Any prediction about the evolution of interest rates should be accompanied by the caveat that research shows the existence of large and persistent errors in investors' short-term interest rate expectations over the course of a business cycle. The task of producing forecasts of long-term rates is even more daunting. At long forecast horizons, the complexity centres around the drivers of the equilibrium value of short-term interest rates (the neutral rate) and the term premium, which is influenced by multiple factors. The risk of an unanchoring of inflation expectations (which has not been considered in this article) further complicates things.

Factors already priced in by markets should also be considered. The expected evolution of key empirical drivers of long-term interest rates (demographics and financing needs) has been discussed countless times in official reports and the media. Does this mean that everything is already priced in? Not necessarily. The recent announcement by Moody's of the downgrade of the US sovereign rating from Aaa to Aa1 had a significant market impact,[55] even though the CBO and the IMF have been publishing highly discomforting public debt projections for years. This underpricing could be explained by risk aversion, which influences analysts' forecasts and investor positioning. The longer the forecast horizon, the greater the uncertainty about the 'true model' of the economy, raising many questions, such as how productivity will evolve, whether the same economic policy rules will still apply, whether the correlations between economic variables (e.g. the Phillips curve) will change, and how households will react to rising public debt. Faced with these uncertainties, economists may be inclined to make less extreme predictions, whereas investors will refrain from taking huge bets on the future evolution of bond yields.[56] A recent Federal Reserve paper demonstrates that "*limited foresight attenuates the effect of the supply of government debt on longer-term interest rates.*"[57] This implies that the term premium is lower than would be the case if investors had perfect information about how an economy will function in the long run. If it becomes clear at a later stage that investors have underestimated the influence of certain factors (e.g. public debt), bond yields would play catch up and move higher.

With all these caveats in mind, the following conclusions can be made. Firstly, in a qualitative analysis, most factors point to downward pressure on long-term interest rates going forward. However, the expected evolution of the financing needs, captured by public debt and the investment needs of the private and public sector (two factors on which the confidence level of the projection is high) should exert an upward pressure.

Secondly, a quantitative analysis that combines the statistically significant coefficients from the empirical research with the expected change in the explanatory variables between 2024 and 2030 gives an expected impact on global real long-term rates by 2030 in a range between -19 bps and +38 bps, with only one model out of four seeing rates moving higher.

Thirdly, based on the empirical research, arguments can be made that the long-run dynamics of long-term interest rates are driven by economic growth, demographic factors (life expectancy and working-age population growth) and financing needs (public debt and pensions). The first two factors are expected to continue exerting a downward pressure on long-term interest rates. A lasting, structural increase in growth seems unlikely and demographic factors are slowly moving. This would also mean that future fluctuations in bond yields should be largely driven by fluctuations in the financing needs. Upward pressure is to be expected, coming from the private sector (energy and digital transition, AI investments) and the public sector, which is seeing increasing demands (such as education, healthcare, pensions, R&D, climate change and defence) that raise the risk of a further increase in the public debt/GDP ratio. Yet, given the range of estimates of the relationship between this ratio and long-term rates (between 10 and 100 basis points for an increase in the US public debt ratio of 10 percentage points), the impact should remain relatively limited.

Fourthly, there is no room for complacency, however. Any lasting increase in long-term rates implies a larger structural effort to improve the primary balance in countries where the public debt ratio is on a rising trend. Moreover, considering the uncertainty that surrounds long-horizon forecasts, there is a genuine possibility that markets are not fully pricing in the upside risks to long-term interest rates.

The overall conclusion is that real long-term interest rates have seen a reset in recent years that is probably incomplete, thus leaving further upside for bond yields, given the scale of the future public and private sector financing needs. With this in mind, testing resilience to positive interest rate shocks is critically important.

William De Vijlder
Economic advisor of the general management

Article completed on 23 July 2025

55 Financial Times (2025), "US borrowing costs climb after Moody's downgrade", 19 May.
56 A priori, long-term investors who are convinced that public debt will increase significantly in the long run, should limit their duration risk exposure, thereby contributing to an increase in the term premium. Investors who are less sure or have doubts about how such a development would impact the economy, would adopt a less extreme position.
57 Source: Gust, Christopher, and Skaperdas, Arsenios (2024).

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GROUP ECONOMIC RESEARCH

Isabelle Mateos y Lago Group Chief Economist	+33 1 87 74 01 97	isabelle.mateosylago@bnpparibas.com
Hélène Baudchon Deputy Chief Economist, Head of Global Macroeconomic Research	+33 1 58 16 03 63	helene.baudchon@bnpparibas.com

Stéphane Alby Maghreb, Middle East	+33 1 42 98 02 04	stephane.alby@bnpparibas.com
Lucie Barette Europe, Southern Europe	+33 1 87 74 02 08	lucie.barette@bnpparibas.com
Anis Bensaidani United States, Japan	+33 1 87 74 01 51	anis.bensaidani@bnpparibas.com
Céline Choulet Banking Economics	+33 1 43 16 95 54	celine.choulet@bnpparibas.com
Stéphane Colliac Head of Advanced economies – France	+33 1 42 98 26 77	stephane.colliac@bnpparibas.com
Guillaume Derrien Europe, Eurozone, United Kingdom – World Trade	+33 1 55 77 71 89	guillaume.a.derrien@bnpparibas.com
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François Faure Head of Country Risk – Türkiye	+33 1 42 98 79 82	francois.faure@bnpparibas.com
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Thomas Humblot Banking Economics	+33 1 40 14 30 77	thomas.humblot@bnpparibas.com
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Johanna Melka Asia	+33 1 58 16 05 84	johanna.melka@bnpparibas.com
Marianne Mueller Europe, Germany, Netherlands	+33 1 40 14 48 11	marianne.mueller@bnpparibas.com
Christine Peltier Head of Emerging economies – Asia	+33 1 42 98 56 27	christine.peltier@bnpparibas.com
Lucas Plé Sub-saharan Africa, Colombia, Central America	+33 1 40 14 50 18	lucas.ple@bnpparibas.com
Jean-Luc Proutat Head of Economic Projections	+33 1 58 16 73 32	jean-luc.proutat@bnpparibas.com
Laurent Quignon Head of Banking Economics	+33 1 42 98 56 54	laurent.quignon@bnpparibas.com
Tarik Rharrab Data scientist	+33 1 43 16 95 56	tarik.rharrab@bnpparibas.com

Mickaëlle Fils Marie-Luce Media contact	+33 1 42 98 48 59	mickaelle.filsmarie-luce@bnpparibas.com

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