The distinction between Keynesians and Monetarists makes no sense anymore

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Abstract

This paper argues that the distinction between Keynesianism and Monetarism is not a useful frame for the debate on monetary policy during the past decade. The main driver of this debate is the secular decline in the real interest rates over the past four decades. It is more useful to distinguish between those who hold that this decline is due to shifts in supply and demand of capital (referred to as Neoclassicals) and those who hold central banks responsible (referred to as Neo-Austrians). Both views have widely different policy implications, both for the past decade of QE as well as for central banks' subsequent response to the outburst of inflation since the fall of 2021. The confusion in the public is partly due to the disciplines adherence in its teaching programs to the quantity theory of money. This theory is inconsistent with today's payment system that is no longer based on bank notes but on credits on cash-accounts.

1 Introduction

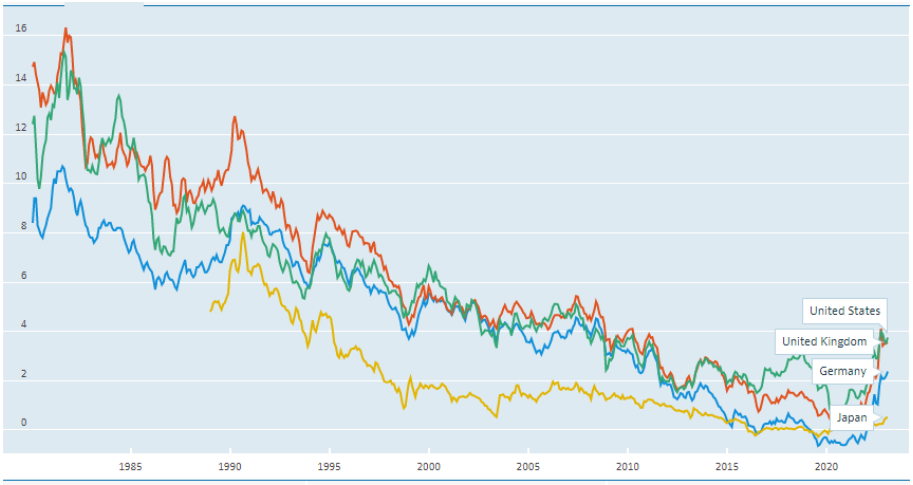
The burst in inflation after the Covid lockdowns of 2020 and 2021 and the rise of gas prices after the start of the war in the Ukraine early 2022 has spurred a public debate on macro-economic policy. Since their peak in the early 1980s, interest rates had entered an era of a secular decline, see Figure 1. Nominal interest rates (*r*) fell (far) below the nominal growth rate of gdp (*g*), making it look as if governments could increase public debt without cost. Even more remarkable, nominal rates fell below zero. The sharp rise in inflation sparkled a public controversy. Did central banks keep rates too low for too long? Should central banks have raised interest rates from (below) zero to more natural levels of around 4%, in accordance with the current stage of business cycle? Have low interest rates contributed to excessive risk taking and did they keep alive unsustainable business models? Were low rates the root cause of high house prices and price-to-earnings ratios for financial assets? And finally, were the low rates of the past decade the harbingers of the current surge in inflation?

This debate is frequently framed in terms of the classic controversy between Keynesianism and Monetarism that dominated the public debate in 1970s. Projected on the current debate, Keynesians are supposed to be the advocates of the lax monetary policy, while Monetarists propagate a return to normality. In this paper, I will argue that this is not a useful frame. It is based on concepts as the quantity theory of money that lack adequate theoretical and empirical underpinning. Instead of a distinction between Keynesianism and Monetarism, it is more useful to distinguish between the Neoclassical and the Neo-Austrian view. Where most (though not all) economists subscribe to the Neoclassical view, most of the financial press adheres to the Neo-Austrian school.

Back in 1970, Keynesians held the view that the fiscal policy had to play a crucial role in maintaining full employment. When unemployment was above its equilibrium level, expansionary fiscal policy

would drive up inflation, thereby lowering real wages and hence reducing unemployment, a mechanism epitomized by the Phillips curve: a downward sloped relation between inflation and unemployment.

Figure 1 Secular decline in 10 year interest rate in four main monetary blocks since 1980



Green: US, blue: Germany, red: UK, yellow: Japan. Source: OECD

In the late sixties, Milton Friedman began to dispute this view. He proposed the concept of a natural rate of unemployment. In his view, this natural rate was determined by institutional factors like minimum wages, trade unions and social security, and not by fiscal policy. Trying to push unemployment below this natural rate by expansionary fiscal policy would merely raise long run inflation, it would not lower unemployment. The Phillips curve was a short run phenomenon only. Institutional reform was the only option for a reduction of unemployment. His ideas became known as Monetarism.

Friedman's intervention came at a time that inflation and unemployment were still manageable. However, after the oil-price shocks of the 1970s due to wars in the Middle East, his worries turned out to be all but real. The Phillips curve broke down: both inflation and unemployment surged. Robert Lucas extended Friedman's ideas by adding rational expectations, showing that active fiscal policy would only destabilize inflation expectations.

Monetarists won the day. Starting in 1980, the world economy went through an episode of where central banks pushed up interest rates to bring inflation expectations under control. Europe in particular was hit by hysteresis, see Blanchard and Summers (1986): shocks to the economy did only increase unemployment, the mechanism to bring employment back to its equilibrium had broken down. Unemployment in many European countries was around 10%. Europe started a long and painful process of institutional reform. The Hartz reforms of the German labour market in 2003-2005 (which tightened job search requirements and access criteria for unemployment benefits) were just the final steps of this process. This wave of institutional reform has greatly increased the resilience of the European labour market compared to that of US. During the past two decades labour market participation is trending up in Europe, while trending down in the US.

This controversy between Keynesianism and Monetarism, however, is a counter-productive frame for understanding the current policy debate. I propose an alternative classification, contrasting the Neoclassical view of the interest rate as the price that clears the intertemporal market for consumption today and tomorrow, to the Neo-Austrian school that this market does not operate smoothly and that

only a sufficiently high interest rate forces inefficient entrepreneurs to close down, thereby freeing up productive resources for new endeavours.

I shall proceed to show that the confusion in this debate is due to the discipline's adherence to the quantity theory of money in our macro-economics 1-0-1 classes. In a world where the role of cash is dwindling and transactions are increasingly done by means of bank transfers, the view of interest rates as the price of cash does not make sense anymore. Banks can (and recently: do) pay interest on cash accounts as they do on any other deposit. We should look for an alternative theory that links interest rates to inflation.

For this, we have to dig deeper in the causes and consequences of the fall of *r* below *g* since the 2008 financial crisis; *r* being below *g* suggests that we live in a dynamically inefficient world, where everybody would be better off when the current generation would consume part of the existing capital stock. In a risk free world it is hard to understand how *r* could fall below *g*. I discuss the role of the saving glut in the secular decline of *r* over the past decade, focussing on two potential explanations: demography and the high barriers to entry in the IT industry. But that still does not explain how *r* could fall below *g*. Risk is an inevitable ingredient of the story. This framework opens the space for an alternative to the quantity theory of money: Merton's (1969) and Samuelson's (1969) theory of optimal consumption planning and the demand for safe assets. Public debt supplies the financial buffers demanded by the private sector. The public sector acts as an insurance company selling safe assets to current generations on behalf of future generations in exchange for a risk premium. This analysis helps understanding the Quantitative Easing (QE) conducted by central banks world-wide during the decade 2010-20: why this policy, which greatly increased the money supply, did not cause massive inflation.

Next, I discuss a specific implication for the Eurozone. For a long time, economists have argued that monetary-without-fiscal union was deemed to fail. Though history has not proven them right as yet and though the Eurozone has proven to be remarkable resilient, nobody denies that the euro-crisis has revealed serious weaknesses in its architecture. My framework allows a sharper analysis of the mechanism behind these weaknesses.

Finally, we discuss the outlook for the interest rate in medium and longer run: will $r - g$ change signs? This would have profound consequences for fiscal policy. Capital markets do not seem to expect a fall of interest rates for 10 year bonds below 2% any time soon. However, they might price in the likelihood of a rise of central banks' inflation target from 2% to 3%, raising the nominal growth rate of gdp by 1%. There are strong arguments, both pro and contra this increase in the inflation target.

2 The new divide: Neoclassicals versus Neo-Austrians

Our 1-0-1 class micro-economics teaches the standard Neoclassical model of the real interest rate as the price that clears the intertemporal market for consumption today versus tomorrow. Whether we embed this model in a world of perfectly competitive Walrasian markets or that we allow for oligopolistic pricing as in the models by Dixit-Stiglitz or Melitz does not matter much for the role of real interest rates. The interest rate is driven by supply and demand for future consumption. For example, when we expect to live longer, this increases the demand for future consumption, which will reduce the interest rate. Similarly, when future productivity is expected to increase by some new innovations, this will increase the supply of future consumption goods, which will in turn will increase the interest rate. A rise in interest rates raises the price of current consumption, which will lead to intertemporal substitution towards future consumption, and vice versa for a fall in interest rates. In this view, the

natural rate is therefore not a number magically fixed by some divine twist. The natural rate is just the price that happens to clear the intertemporal market for consumption.

In that same class micro-economics, we teach the classical dichotomy between money and relative prices. In the absence of nominal contracts, doubling everybody's money holdings will double all prices, which therefore leaves all relative prices unaffected. What money is and where it comes from remains somewhat of a mystery at this stage of our education. As long as we keep the distribution of money holdings constant, the average level of the money holdings is immaterial to real outcomes: relative prices remain unaffected; only nominal prices will change all by the same percentage. We can extend this idea to a dynamic context, where everybody's money supply is increased by some percentage every year. This will raise all next year's nominal prices by this same percentage, while the nominal interest rate – the real interest rate plus the expected inflation – will rise by the same percentage points, in order to keep the relative price of future consumption constant. The classical dichotomy holds therefore that the economy can operate at any level of predictable inflation. Which level policymakers choose is immaterial to real outcomes. As Milton Friedman stated: inflation is always a monetary phenomenon. It is not real phenomenon, as it leaves relative prices unaffected.

So far for micro-economics. Macro-economics emerges when we begin asking questions about where the money comes from and what happens if inflation is not predictable. Money is a claim on future consumption. The more money a person holds, the larger her claim on future consumption. Unpredictable inflation is therefore a bad thing for her, since she cannot be sure about the real value of her claim. Last year, she planned to set apart sufficient money to buy a new car next year, but now that next year has arrived it turns out that this money does not buy her this car since its price has gone up unexpectedly. The occurrence of unexpected inflation makes us warry of inflation in general, since high inflation has been the harbinger of high unexpected inflation, as shown by Barro (1995). Since most of us are risk averse most of the time, we do not like this uncertainty. This makes inflation and in particular unpredictable inflation costly.

This reasoning leads to standard Neoclassical macro-economics. Efficient monetary policy makes inflation predictable, since predictability minimizes the cost uncertainty. Central banks set niominal interest rates. When the demand for current consumption unexpectedly exceeds its supply – current production – producers will benefit from this opportunity to increase their profits by raising their selling prices. This leads to unexpected inflation. According to the Taylor rule, central banks must respond by raising nominal interest rates. This reduces the relative price of future consumption, which leads to intertemporal substitution: consumers substitute away from current to future consumption, thereby reducing the upward pressure on current prices. The Taylor rule enables central banks to contain inflationary pressure. This makes money an attractive store of value relative to other assets, since its future value is most predicable.

This argument focusses on the role of consumption in the adjustment process. It incorrectly ignores the role of investment. Investment provides a means for storing value by shifting production forward in time. By spending current production on investment in future production rather than on current consumption, society shifts resources to the future. When there is excess demand for current consumption, shifting resources back from the future to today by reducing investment helps solving the problem. This is exactly what a higher interest rate brings about by means of a standard substitution effect: it reduces the investment demand for current output and hence inflationary pressure.

This model helps analysing the causes and consequences of the secular decline in nominal interest rates since 1980. Central banks' role in this decline must be limited since expected inflation has been

stable at a level somewhat below central bankers' target of 2% up until the second half of 2021. The secular decline must therefore be due to a fall in Wicksell's natural interest rate: either current consumption-demand must have gone down, or current output-supply must have gone up. Central banks' low nominal interest rates are therefore not a cause but a consequence of the fall in Wicksel's natural rate. Any means for storing current production for future consumption is highly valuable. Since investment is an important means of shifting resources to future consumption, production becomes more capital intensive and the return to capital falls due to the declining marginal productivity of capital.

Finally, consider what happens to the price of assets with a cash flow that is somehow fixed till eternity, either a bond or a house that generates a constant rental income. Since the price of such an asset is its cash flow divided by the market rate of return, the price of these assets will rise. Again, this is due not to central banks' interest rate policy, but to the fall in Wicksell's natural rate. When there is high demand for future consumption, the price of financial assets as stores of value increases since people want to hold claims on future consumption. The rising prices of these stores of value should therefore not be interpreted as a signal of excess demand for current output. Quite the contrary, increases in the prices of financial assets are a sign of excess demand for future output. High asset prices or asset price inflation should therefore not be included in the inflation statistic that central banks use when deciding on monetary policy.

This Neoclassical argument can therefore be summarize in 7 bullets:

1. Wicksell's natural real interest rate clears the market for intertemporal consumption trades;
2. Long run classical dichotomy: doubling money holdings has no impact on relative prices;
3. Inflation is a monetary phenomenon;
4. Central banks' interest policy should stabilize expected inflation;
5. Central banks' nominal interest rate is not cause, but consequence of changes in the natural rate;
6. A fall in Wicksell's natural rate invokes substitution to more capital intensive production;
7. This fall increases the price of financial assets as stores of value.

Although the details of the exact mechanism differ, this view is essentially shared by a wide diversity of macro-economists, ranging from John Cochrane from the University of Chicago, who is working in the rational expectations tradition of Robert Lucas, see Cochrane (2022), to Olivier Blanchard and Paul Krugman from MIT/Princeton, see Blanchard (2023). Despite the fierce attack of Cochrane on Blanchard on Twitter, both use essentially the same models, which are firmly based on standard micro-economic theory.

However, this view is not shared by all economists. Some seem to share a different cluster of viewpoints to which I refer as the Neo-Austrian view. The relevance of these viewpoints is greatly enhanced by the fact that most of the financial press seems to adhere to them, including many commentators of The Financial Times. It is somewhat difficult to do justice to them, as they tend to be less firmly based on standard micro-economic theory. Nevertheless, I shall make a try.

This group of economist seems to hold the view that the natural rate of interest is indeed a fixed number, apparently about 4%. Central banks should lower interest rates below that natural rate during the downturn of the cycle to stimulate economic activity. They should increase interest rates in the upturn, to cool down the economy. This view is most clearly epitomized by the frequent observation in the financial press that *"the past decade has been an episode of extremely lax monetary policy"*. In the Neoclassical view, this statement does not make sense, since central banks' interest rate policy aims to stabilize inflation expectations. If anything, these expectations have been below the 2% target

during the past decade 2010-20. Hence, if anything, central banks have held interest rates too high. In the Neo-Austrian view, to the contrary, this statement makes perfect sense, since nominal interest rates have been far below the natural rate of 4%.

Note by the way that another popular statement in the financial press claims that inflation has been low not due to successful monetary policy, but due to cheap imports from China. For those who believe that inflation is always a monetary phenomenon, this statement obviously does not make sense.

The idea of a natural rate of 4% is embedded in the view that the market-mechanism for corporate governance is heavily distorted. Where in the Neoclassical view only those firms can attract productive resources that generate highest value added with these resources, in the Neo-Austrian view the market mechanism cannot be trusted to yield an efficient allocation of capital. When interest rates are too low, inefficient firms can survive that would otherwise have been forced to close their doors since these firms can get funding at too low interest rates. Central banks should increase interest rates not to stabilize inflation expectations, but to force inefficient firms to close down. Where Neo-Austrians see inappropriately low central banks' interest rates allowing inefficient business models to survive, Neoclassicals interpret the same phenomena as substitution towards more capital intensive production in response to an upward shock to capital supply, which drives down the natural real rate of interest as the equilibrium price of funding.

The paradox here is that Neo-Austrians are usually supposed to be the ultimate believers in the blessing of the free market. Nevertheless, they also seem to believe that financial markets are a fragile infant that has been heavily distorted by central banks' monetary policy during the decade 2010-20.

3 The demise of the quantity theory of money

A cornerstone of many students' macro-economics 1-0-1 course is the quantity theory of money and the Fisher equation: $M\ V = P\ T$, or in words: the money supply times the velocity of the money-circulation is equal to the price level times the volume of transactions. When we consider the volume of transactions in current output as being fixed by the production capacity of this output and when we consider the velocity of the money-circulation as being fixed by the way in which transactions are organized (e.g. monthly salary payments), then the money supply determines the price level. When we view the money supply to be to the number of bank notes in circulation, printing too many bank note is the root cause of inflation. This is the benchmark theory of inflation used either in- or explicitly by most economist and financial commentators. It has its origins in the traumatic hyperinflation in Germany in 1923, when Germany's debt service obligations to the victors of World War I drove the German government to excessive money printing. It made sense in 1923, it does not make sense today.

Why does this theory not apply to our modern world? The quantity theory makes a sharp distinction between non-interest-bearing money (= bank notes) and interest-bearing bank-deposits. The interest rate is viewed as the cost of holding bank notes as a means of transactions rather than storing your wealth at a bank-deposit. Wording it for the layman: "*Money burns in your pocket. You should hold as little as is indispensable for your planned transactions and you should therefore make these transactions as quickly as possible, since any money holding comes expense of holding interest bearing deposits.*" In a world where cash-accounts substituted bank notes, this world-view is obsolete. There are bank-deposits with varying durations (= maturity) for which the interest rate is fixed. A cash-account is just a specific type of deposit, a zero-maturity deposit. There is no reason why a zero-maturity deposit, a cash-account, would pay no interest. Modern IT-technology allows daily calculation of the interest. In fact, cash-accounts do pay interest (though market conditions have dictated it to be zero or even negative in recent years). Money has been attributed three functions: i) accounting-unit,

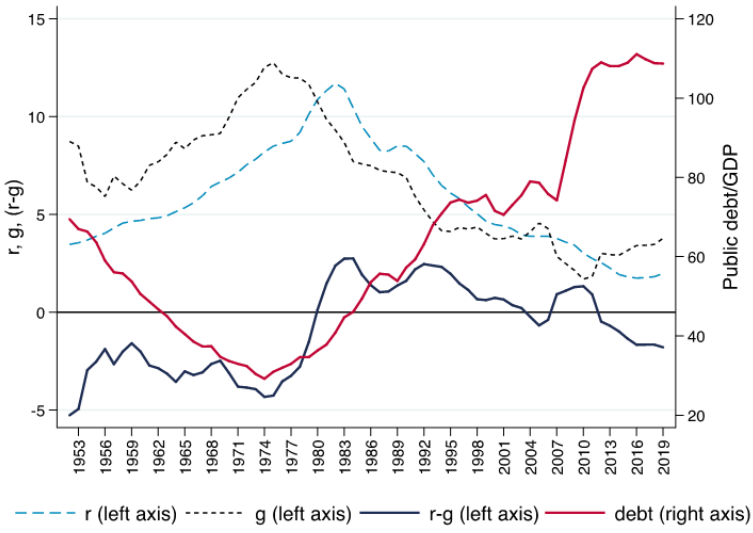
ii) store-of-value, and iii) means of exchange. The separation between the last two functions has disappeared.[1]

Margaret Thatcher has used the quantity theory to bring down the high inflation that had ravaged the UK economy during the 1970s. However, central banks did not directly control the money supply. By giving credit to their customers, commercial banks create money, debiting their account with debt and crediting their cash-account with credit. Following the quantity theory, she used the interest rate to indirectly control the money supply, by making holding cash more expensive. While this policy succeeded in getting the inflation genie back in the bottle, it failed completely in controlling the money supply. As John Cochrane (2022) noted: "*But our central banks set interest targets, and do not even pretend to control money supplies.*" Where the quantity theory of the money as the old linking pin between monetary phenomena and inflation does not fit modern monetary institutions, we are in need for a new theory. The Thatcher experience laid part of the groundwork for the subsequent development of the modern Taylor rule for central bank's monetary policy, see Section 2 above.

4 The *r* – *g* conundrum and dynamic inefficiency

Figure 2 shows a second important feature of the macro-economic environment of the past decade: the nominal interest rate *r* had fallen way below the nominal growth rate of gdp *g*. As Figure 2 shows, a similar episode with *r* < *g* was during the first three decades after World War II. *r* being smaller than *g* yields two conceptual problems.

Figure 2 The nominal interest rate *r* has fallen below *g* since 2010



Source: https://cepr.org/voxeu/columns/risks-high-public-debt-despite-low-interest-rate-environment

First, it implies that sovereign debt is "free". Consider a government that wants to maintain a constant debt-to-gdp ratio. Hence, the debt must grow at the same rate *g* as gdp. The interest on the existing debt is *r* times that gdp. Hence, this government can spend (*g* – *r*) times its debt every year without having to raise taxes at any time in the future. It can roll over its existing debt for ever. It is even

[1] This holds in particular in the context of a continuous-time Walrasian model with perfectly competitive markets for all commodities at every point in time. Hence, all transaction can be executed instantaneously at zero transaction cost. In these models, the only reason for holding any positive measure of money is the potential asynchrony in the timing of revenues and expenditure, which makes money a store of value rather than a means of exchange. See Lagos and Wright (2005) for a non-Walrasian model with search frictions on commodity markets, where money is a means of exchange.

stranger: suppose that this government runs a sovereign debt that is twice as high as previously planned. Then, it can spend twice as much every year without having to raise taxes. The higher the debt-to-gdp target of government, the more it can spend "freely". Obviously, this cannot be true: trees do not grow up to the sky. This unattractive implication of low interest rates might be the main reason for the fierce macro-economic debate on central banks' interest rate policy.

Second, r being smaller than g implies that financial assets cannot be priced properly. A bond that generates an interest income of one from now till infinity yields a price of $1/r$, which is equivalent of the present value of this income stream:

$$\text{Sum from } t=0 \text{ to infinity of: } 1 \times (1-r)^t = 1/r.$$

Suppose, however, that this economy has a Cobb Douglas aggregate production function with three inputs: labour, capital, and land. This production function features a unit elasticity of substitution between these three inputs, so that the share of each input in the market value of output is constant. The supply of labour and capital may change over time, but the supply of land is fixed. By definition, the market value of output grows at rate g. Since the supply of land is fixed and since the share of land rent in gdp is constant, it must be that the rental rate of a plot of land grows at rate g. Then, the price of a plot of land must satisfy:

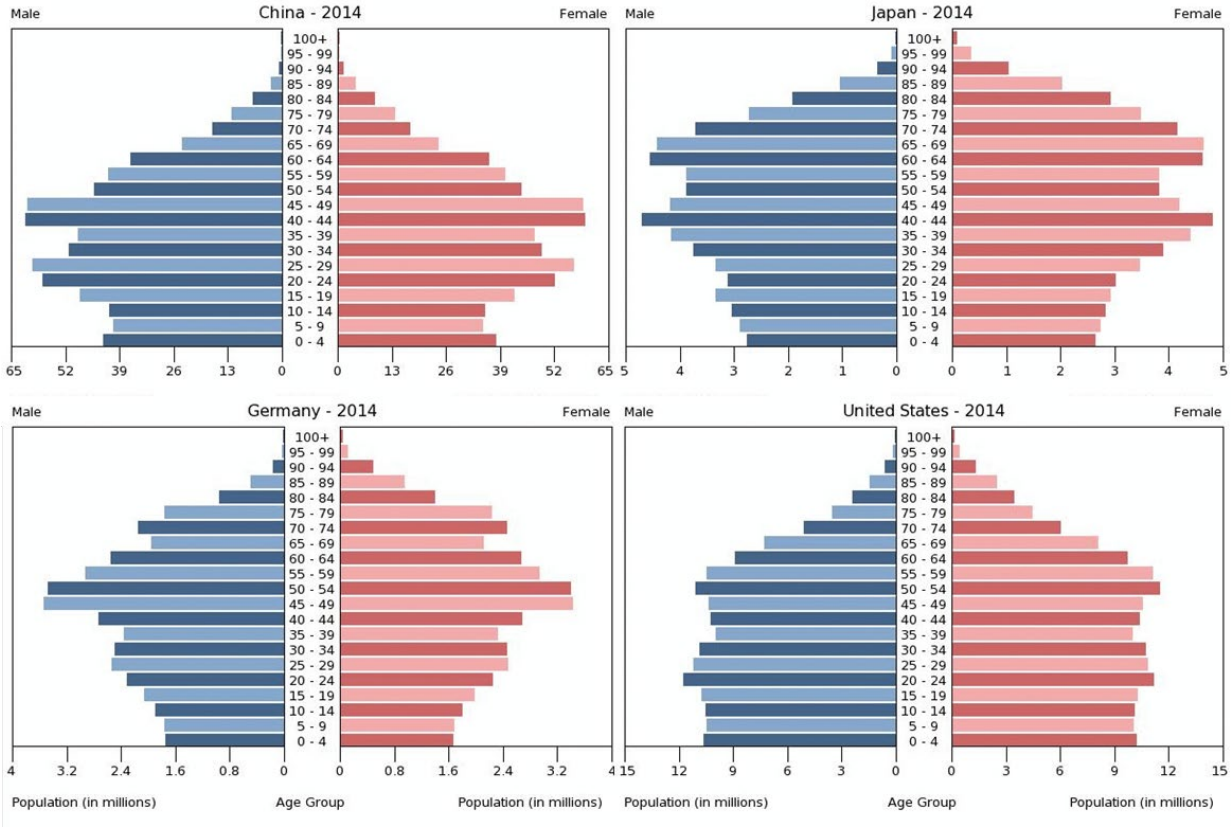
$$\text{Sum from } t=0 \text{ to infinity of: } 1 \times (1+g-r)^t = \text{infinite},$$

since $1 + g - r > 1$. Again, this can obviously not be true: there is a market for land, so its price cannot be infinite.

What explains the fall in Wicksell's natural rate below the growth rate of gdp? Economists have come up with several explanations, of which I discuss two. The first is demography, see Figure 3, showing the age pyramid of the four largest economies in the world: the US, China, Japan and Germany. The US stands apart, but the other three all experienced a drastic fall in fertility, changing the classical age pyramid in an age vase, with a fat belly around the age of 60 in Japan, 45 in Germany and 40 in China (as measured in 2014). Why Japan had such a sharp fall in fertility around 1955 (= 2014 – 60) is a bit of mystery. For Germany the fall in fertility around in 1970 is likely to be related to the introduction of the contraceptive pill, while China's fall in fertility five years later seem to be related to Mao's one-child-policy. A fall in fertility from above to below 2 implies that the cohorts just before this fall are exceptionally large: previous cohort were smaller, since the population was still growing, while subsequent cohorts are smaller since the population is shrinking from that moment on.

From a life cycle consumption plan perspective, cohorts save during the working life to fund consumption during their retirement period. Hence, the stock of pension savings reaches a peak just before the retirement-age. Hence, a country faces large supply of savings around the time that the last cohort before the fall in fertility retires, in Japan around 2020, in Germany around 2035, and in China around 2040. A large supply of savings depresses Wicksell's natural rate. This analysis can explain why the decline of the interest rate in Japan preceded that in the rest of the world by some 15 years, see Figure 1. Note that this explanation differs from the usual argument that the rise in life expectancy explains the fall in the natural rate since this requires people to save more. This explanation does not fit the data very well however, partly because people have responded to this rising life expectancy by retiring at a later age.

Figure 3 Fall in fertility in Japan, Germany and China has changed an age pyramid in an age vase



Source: Lu & Teulings (2016)

Figure 4 documents a second explanation of the fall in Wicksell's natural rate. It shows the extraordinary increase in market capitalisation of the big four in IT (before: the big five; Facebook/Meta dropped out), by listing the market capitalisation of the world five largest companies and – as a point of reference – Exxon, which figures high in this ranking for decades. Where Exxon could see itself as being part of the same pack back in 2017, it has lost contact to the front-runners from the IT industry in 2022. It looks as if the entry barriers in this network industry are that high, that firms can sustain substantial profits without having to invest to deter competitors to challenge their market, see De Ridder (2019). Since profits are more likely to be saved for future consumption than labour income and since these profits do not require as much investment to sustain them, they distort the balance between supply and demand of capital.

Figure 4 The market capitalisation in billions of the big four in IT exploded in recent years

Rank	2022		**2017**		2000		1980	1960
1	Apple	2850	Apple	868	Microsoft	492	IBM	Gen.Mot.
2	Microsoft	2311	Alphabet	727	Cisco	454	AT&T	**Exxon**
3	Alphabet	1842	Microsoft	659	**Gen. Elect.**	417	**Exxon**	Ford
4	Amazon	1658	Amazon	563	Intel	392	Std.Oil Ind.	**Gen. Elect.**
5	Tesla	1113	Facebook	512	**Exxon**	269	Schlumberg	US Steel
6-15	**Exxon**	350	**Exxon**	340		265	**Gen. Electr.**	

A first resolution of these puzzles is to realize that the equilibrium interest rate is not a fixed number, see the discussion in Section 2; it is the price for funding that clears the capital market, that is, that sets equal the supply of savings to the demand for funding. When the government increases its

demand for funding by running a larger sovereign debt, this will shift the demand for funding up, and hence the interest rate that clears the capital market. If *r* is smaller than *g*, everybody is better off by the society gradually depreciating parts of its capital stock and spending the depreciation on current consumption. This is called *dynamic inefficiency*: depreciating part of the capital stock makes every generation better off. The government can facilitate this consumption of part of the capital stock by running a higher debt and spending the revenues from this debt issuance on tax relief and public consumption.

Here, we see the roles of monetary and fiscal policy. Monetary policy sets the nominal interest rates at a level that keeps inflation constant at its target value, currently 2%. If monetary policy is fully successful, in the longer run nominal interest rates will be equal to Wicksell's natural real rate of interest plus 2% inflation. Fiscal policy determines the natural real rate of interest by choosing a target for the debt-to-gdp ratio. The higher the debt, the higher the public demand for funding and hence the higher the real natural interest rate. In the longer run, fiscal policy determines interest rate by absorbing part of the supply of capital. The extremely low interest rate in the Euro-zone in the decade 2010-20, see Figure 1, suggests that the Euro-zone countries have run too low a sovereign debt to absorb the large supply of saving due to ageing and the IT revolution.

A second resolution of these puzzles comes from realizing that all future income streams are risky and that agents are averse to taking risks. When buying financial assets to store value for future consumption, they prefer safe assets, assets that yield a fixed return. Since all investment in future production capacity has a risky return, the return to most assets is risky. The return on these assets must carry a risk premium above safe assets. Since the interest rate *r* is the return on safe assets, this might resolve the puzzles:

$r < g < r$ + risk premium.

Take for example land: the risk premium required for savers to be prepared to hold land drives the market return on land to a level above the expected nominal growth rate of gdp *g*.

This raises the question where the safe assets come from. When all investment is risky, how can there be safe assets? Which party can issue obligations that entitles the holder to a safe claim on future consumption? Only the government can do so. Why is it able to do so? Because in the end, when the water flows over the dykes and the government can no longer repay its debt from the revenues of issuing new bonds, it can always tax new generations.

Since we are risk averse, we all want to hold at least part of our wealth as safe assets. However, for every risk free claim on future consumption, there must be another party holding the obligation to supply this consumption, whatever the future cost of supply will be. Due to the rules of double-entry accounting, the sum of safe claims must be equal to the sum of safe obligations, or in different words, the sum of the deposits of all agents must be equal to the sum of their debts. In practice, the private sector wants to hold a share of its wealth in safe assets – a net claim on future consumption. Then, inevitably, the public sector must hold a net debt of exactly equal size. Commentaries in the financial press, and even renowned international institutions like the IMF, often make claims like: "*There is too much debt in the world. Both the private and the public sector should hold more buffers to absorb shocks and should lower their debt.*" This statement is inconsistent: since the net debt of the public sector is equal to the net buffers of the private sector (households and firms), you cannot simultaneously reduce the one and increase the other.

This argument reveals the logic behind central banks' main or even sole policy objective: keeping expected inflation constant and hence predictable. Government bonds can only serve as safe assets

when their real value on the date of expiration is predictable. The lower the predictability of their real value, the less adequate they can perform their function as safe stores of value.

This argument also offers a first insight in the role of public debt. The public debt supplies safe assets to the private sector. It shifts risks from currently living to future generations. The government acts as an insurance company. It sells risk free claims to current generations, but charges an insurance premium for this activity to the benefit of future generations: the risk premium. The risk for future generations is that when the government tries to roll over its debt the interest rate on newly issued bonds will be higher and future generations will have to shoulder a higher interest burden. The optimal amount of public debt is therefore trade-off between the benefit of the insurance premium $g - r$ per euro of debt on the one hand and the risk of a future increase in interest rates on the other hand. The higher the debt, the higher the cost of a future increase in interest rates.

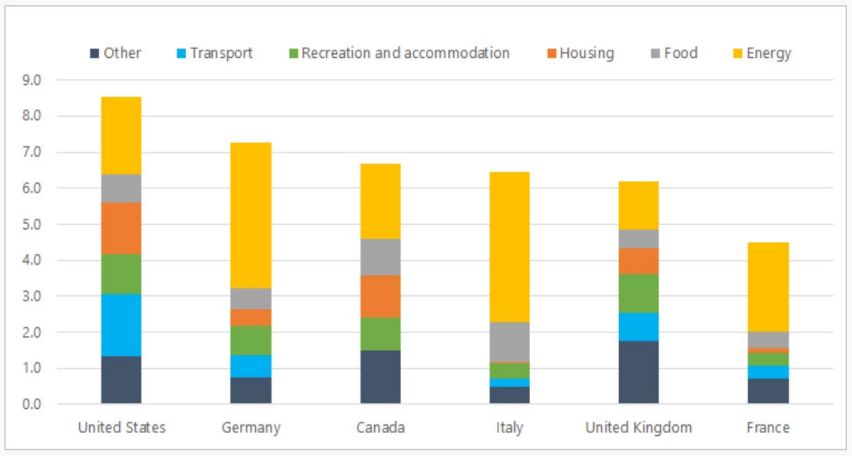
This analysis also offers a special, though unintended role for unexpected inflation. Unexpected inflation occurs after either a positive demand or a negative supply shock has surprised markets. Then, current expenditure exceeds current production, enabling producers to raise their selling prices. Our argument below focusses on a negative supply shock. This shock makes a country less wealthy. Whether it is current of future consumption, something will have to give to reclose the intertemporal budget constraint. In case of a large shock, the absolutely safety of safe assets' safe claim on future consumption might be unsustainable. Unexpected inflation shifts part of burden of necessary adjustment to the holders of safe assets, by reducing their real value, and by implication, the real value of public debt. Central banks commit to keeping expected inflation fixed at the inflation target of currently 2% to make the real value of safe assets as safe as possible, but they cannot guarantee the absence of unexpected inflation shocks. From that perspective, unexpected inflation serves as a safety valve against overburdening future generations. [2]

Reis (2022) has argued that the ECB has been too slow in responding to the rise in inflation and should have increased interest rates already in the fall of 2021. A decomposition of the inflation by commodity classes sheds lights on this issue, see Figure 5. In the Eurozone (Germany, Italy and France), more than two thirds of the inflation is due to energy and food, two factors that are most likely due to the war in the Ukraine. This entirely different in the US, where two thirds of the inflation comes from other sources than energy and food. The large increase in inflation in the Eurozone is therefore largely due to the war. As this war started only at 24 February 2022 and as Putin's decision to invade took many observers by surprise, as did the longevity of the war and the toughness of the EU's response to Putin's invasion, it seems hard to blame the ECB for not having raised interest rate pre-emptively, in particular since inflation has fallen short of the 2% target for most of the preceding decade.

One can doubt whether blaming central banks for the current inflation helps much to enhance their credibility among the general public. For the general public, inflation is largely a synonym for the loss in purchasing power due to the rise in energy prices after the start of the war. Suggesting that an earlier response of central banks would have avoided inflation is easily interpreted by the general public that this would have prevented their loss in purchasing power. Presumably, this interpretation has motivated Lizz Truss to blame Bank of England for too slow a response during her campaign for the leadership of the Conservative Party. If anything, an earlier response of central banks would have aggravated the immediate purchasing power loss by slowing down expenditure at an earlier stage.

[2] Technically, a proper modelling of this mechanism is involved. My conjecture is that it is most easily done using a continuous time model where the growth rate of supply follows the continuous time version of an AR(1) process (an Ornstein-Uhlenbeck process), see Lange & Teulings (2022) for a model of this type applied to investment in real estate. Rutger-Jan Lange and I are working on macro-models along these lines.

Figure 5 The causes of inflation has been different in the Eurozone versus the US

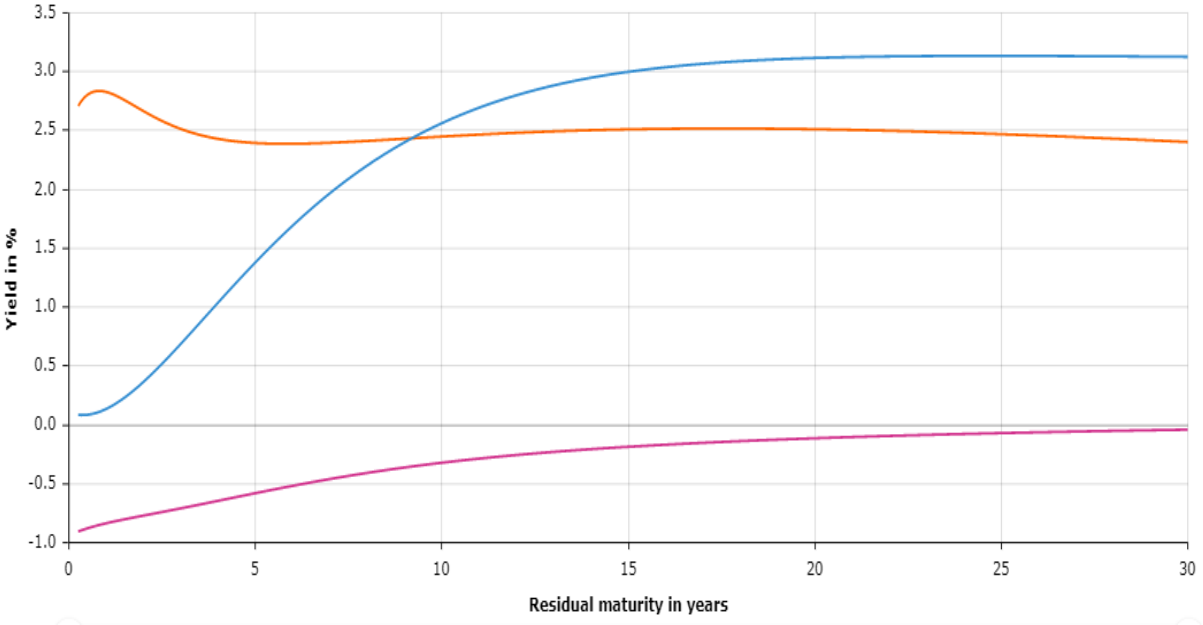


Source: OECD

5 The term structure interest rate and funding sovereign debt

Figure 6 shows the yield curve – the interest rate for risk free government bonds from zero to 30 years maturity – for the Euro area for three dates: in 2012 (before the start of QE by the ECB), in 2021 (just before the war in the Ukraine), and in 2023 (15 months later). Two observations are in place. First, from historical perspective, the latter two yield curves are highly flat, with the rate for a 30 year maturity bond just before war being less than 1% above the rate for a zero maturity bond. Back in 2012, before QE, this differential was still 3.0%. Second, the outburst of inflation after the Ukrainian war and ECB's policy response has raised rates by some 2.5%, but have flattened the yield curve even further.

Figure 6 The yield curve is flat from a historical perspective and has spiralled up by 3% since 2021



Orange: 7 March 2023, red: 1 December 2021, blue: 1 March 2012
Source: https://www.ecb.europa.eu/stats/financial_markets_and_interest_rates/euro_area_yield_curves/html/index.en.html

The large yield differential back in 2012 cannot be interpreted as a reward for the riskiness of holding bonds with longer maturity. Indeed, the prices of long maturity bonds are more volatile in response to shocks in the interest rate, but they guarantee a safe nominal payoff in 30 years' time, a safety that cannot be obtained by buying a sequence of one year maturity bonds 30 years in a row, since the interest rate may change over time. The optimal duration of your bond holdings depends therefore on your consumption profile. A pension fund that has to pay pensions in 30 years' time should buy 30 year maturity bonds. When you save for a buying a new car next year, buy one year bonds. And when you want to be able to make an impulse purchase when wandering around in a shopping mall, zero maturity bonds are your best bet. The yield curve is the equilibrium outcome of supply and demand for safe assets with varying maturities, see Cox, Ingersoll & Ross (1985).

Consider the public sector's budget constraint. Its deficits can be funded by issuing bonds as long as the private sector is willing to spend part of its income on these bonds because it wants to hold safe assets as a safe claim on future consumption. The best starting point for an analysis of the public sector's budget constraint is therefore the theory of lifetime consumption planning and asset allocation as developed by Merton (1969) and Samuelson (1969). The interest rate and the risk premium simultaneously determine agents' lifetime consumption plan and the allocation of their assets to risky projects on the one and safe assets on the other hand. Since the net demand for safe assets of the private sector is equal to the supply of government bonds, this determines the sustainable level of public debt.

As discussed in Section 2, modern day money – or: credit on a cash-account – is just the retail version of a zero maturity bond on which the interest rate can be changed overnight. Today's interest on money is therefore high from a historical perspective, which is fully explained by the inflation being way above the 2% target. Central banks throughout the world had to raise interest rates to reduce current spending, both on consumption and investment.

From this perspective, along with the quantity theory of money, the concept of monetary financing of public debt does not make much sense in the modern world. Any excessive issuance of safe claims by the government which is not backed by a willingness to postpone private consumption to future dates will lead to price increases for current output, that is: inflation. Whether that issuance is zero maturity money or longer maturity bonds is immaterial to the problem.

By choosing the maturity structure of its debt, the public sector indirectly determines the slope of the yield curve. By issuing long debt, the public sector takes on board the risk of a fall in interest rates since this increases the price of long maturity bonds. Conversely, by issuing short debt, the public sector takes on board the risk of an increase in interest rates. Since central banks are subsidiary of the government, their balance sheet can be consolidated with that of their government. Hence, the taxpayer is the residual claimant of central banks' profits and losses.

ECB's QE – trading long term government bonds for zero maturity central bank bonds – (the ECB was the last to start these operations, the FED started already in 2008) has therefore shifted the risk of an increase in interest rates to governments and hence to taxpayers. The ECB engaged in QE to avoid the Zero Lower Bound (ZLB) for the interest rate: the interest rate of zero maturity bonds cannot not be reduced much below zero, because then people will start holding bank notes rather than credit on a cash-account. According to the Taylor rule, a further reduction in interest rates was required as inflation was below the 2% target. Since the interest rate on longer duration bonds was still positive back in 2012, see Figure 6, by trading long for short bonds, the ECB has rotated the yield curve clockwise around the rate of zero for zero maturity bonds, thereby reducing interest rates for long maturity bonds more than would have been possible focussing its policy interventions solely on the

interest rate for zero maturity bonds, since the latter was bound by the ZLB. This explains the flattening of the yield curve after 2012. Holding safe claims on consumption in the far future became very expensive, causing outrage in countries like the Netherlands with large pension funds which wanted just this type of assets on their balance sheet to match their high maturity pension obligations.

Seen through the lens of the quantity theory of money and the fear for monetary financing of public deficits, this policy must have brought hyper-inflation since swapping long for zero maturity bonds increased the money supply. Indeed, QE stimulate consumption during the past decade, but it had to as inflation remained low during most of the period, underscoring that both concepts are not useful for understanding inflation in a modern world where cash-accounts have replaced bank notes. Only after the end of the Covid pandemic and the war in the Ukraine, inflation exploded due to the combination of a positive demand and a negative supply shock.

6 Unexpected inflation in a monetary-without-fiscal union

Economists have always warned about a monetary-without-fiscal union: a group of countries like the Eurozone with one central bank conducting a common monetary policy, where each country runs its own fiscal policy. Indeed, the Eurocrisis from 2010 until 2015, where the governments of Greece, Ireland, Italy, Spain and Portugal either defaulted or almost defaulted has revealed serious weaknesses in the monetary union's architecture. The previous analysis of public debt as a means of supplying safe assets to the private sector and unexpected inflation as a safety valve to reduce the values of these claims in case of emergency sheds light on the reasons why a monetary-without-fiscal union may run into trouble: member states lack the safety valve of unexpected inflation and devaluation to adjust the real value of their public debt in response to unexpected negative shocks.

Britain after Brexit provides an excellent example of the response of an economy that is not part of monetary union. Figure 7 shows the fall of the exchange rate the pound vis-à-vis the euro and the dollar by 10% immediately after the Brexit. Brexit was an unwise choice, as markets realized immediately. Leaving the common market was the equivalent of a negative supply shock, which tightened Britons' budget constraint. Something would have to give, either current of future consumption. The fall of the pound solved the problem. Its lower value imported inflation as the prices of imports increased. The real value of nominal claims on future consumption went down, thereby shifting part of the burden of adjustment to those who sought to insure themselves against these shocks by buying safe assets. Since the public sector is the counter-party for these safe assets, this is equivalent to a reduction of the real value of Britain's public debt.

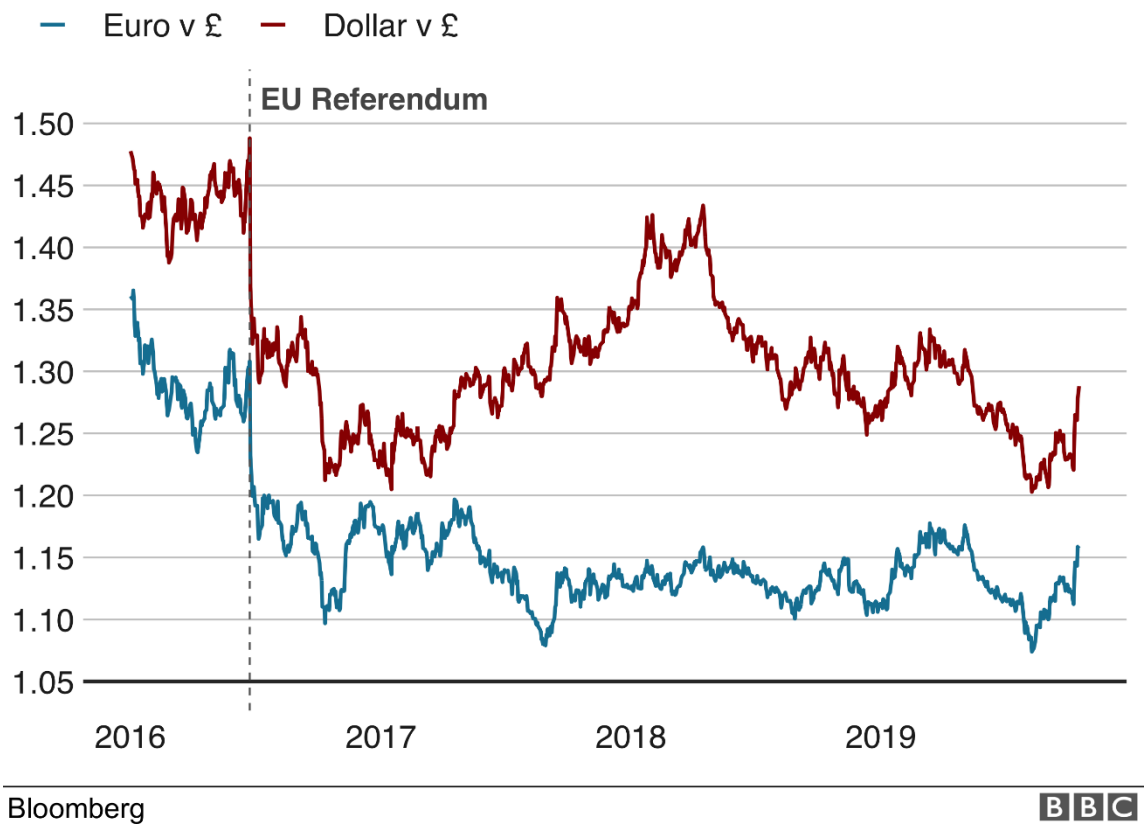
As a result of the Brexit referendum, Britain therefore effectively defaulted on 10% of its public debt, even though there was no formal default. Hence, nobody complained. Imagine instead that Italy had defaulted on 10% of its debt. This would have invoked a wave of outrage. This points to a critical difference between member states of a monetary union and states with their own monetary policy: exchange rate adjustments allow a smoother absorption of negative supply shocks then sovereign default.

For the dynamics of default, it is important to understand why usually countries do not default in the first place. Since public debt supplies safe assets to the private sector, current generations – those who vote – hold this debt. They do not want the government to default on these claims. This explains why default occurs rarely.

Cole & Kehoe (2000) analyse the mechanics of sovereign default. Rolling over public debt is an a continuous process. Old bonds which reached their maturity are repaid by issuing new bonds. This process comes to a sudden stop as soon as the capital market is no longer willing to buy these bonds,

at which point a country defaults. Their critical insight is that default is a sunspot equilibrium: the timing of default is always random. Suppose that the timing of this event would be perfectly predictable. Then, the day before default nobody would be prepared to buy these bonds anymore, knowing that a default is eminent. Now, suppose that contrary to the Brexit vote, were the bad news of Brexit came in at one point in time causing a downward jump in Britain's creditworthiness, usually the bad news is a sequence of events which gradually erode the tax base on which the repayment of the debt ultimately depends. Every event further deteriorates the country's debt servicing capacity and hence increases the probability of default, but none of these events on its own is sufficient to cause default. Actual default is the realisation of an independent random variable, unrelated to the supply shocks that hit the country.

Figure 7 The pound declined vis-à-vis the euro and the dollar after the Brexit-vote



Consider a sequence of negative supply shocks to Italy of similar magnitude as the Brexit referendum. Since Italy's exchange rate is linked to the rest of the eurozone, devaluation to reduce its excessive public debt is not an option. Each shock will further increase the probability of default. Potential buyers of debt know this and are prepared to buy Italian bonds only if they get compensated for the risk of default by a higher interest rate. Moreover, the probability of default introduces further risk above the underlying risk of negative shocks: the risk that a default shock arrives as a sunspot random event. Compared to British bonds, buying Italian bonds carry therefore an additional risk factor: the realisation of a sunspot. Since any non-diversifiable risk carries a risk premium, Italy has to pay an additional risk premium in its interest rate relative to Britain. In that sense, dealing with negative shocks by means of exchange rate adjustments is more efficient than by sovereign defaults.

This problem is even more severe since contrary to Britons, Italians have a perfect alternative for buying Italian bonds: they can substitute away to German bonds. Britons cannot do equally well as Italians, because by buying Italian bonds they take on board the exchange rate risk between the pound

and the euro. The availability of an easy substitute further weakens the position of the weakest member-state, since as long as more reliable substitutes are available, savers are prepared to buy bonds of the weaker member-states only if they pay a premium above the interest rate of the most credible member-state. The risk premium becomes a self-reinforcing loop.[3]

Member-states of the Eurozone are aware of this problem. Hence, they try to avoid at all cost that the market views them as the weakest member-state. The run for safety is an arms race, which leads to under provision of safe assets due to too low a public debt, and hence to too low an interest rate, in particular after a sequence of bad shocks, as in 2010, when the euro-crisis started. This might explain why the interest rate in the Eurozone has been low relative to other monetary blocks in the decade after 2010's euro-crisis.

The resolution for this problem would be that the union as a whole instead of individual member-states issues sovereign debt. Then all the union's taxpayers share the burden of negative shocks. As long as negative shocks are exogenous, this type of insurance across member-states unequivocally improves the risk sharing. As soon as negative shocks are partly due to bad policy choices by member-states risk sharing is not necessarily welfare improving. The union then faces a trade-off between insurance and incentives: risk sharing between member-states improves insurance, but worsens the incentives of member states for good economic policy, since other member-states share the cost of bad policy choices.

7 Will the $g - r$ change signs?

The final issue I want to address is the prospects for the future evolution of the insurance premium $g - r$. This question is of critical importance for the design of fiscal policy guidelines for the years to come. The interest rate r has risen by 2.5% since the start of the war in the Ukraine for essentially all maturities, see Figure 6. This has strongly reduced the magnitude of the insurance premium $g - r$. If the insurance premium has indeed gone down permanently or if it has even changed signs, fiscal policy should be less expansionary than previously thought. At the same time, the increase in inflation has boosted the nominal growth rate g, making a sign reversal unlikely at short notice. However, when we believe that an increase in interest rates is an effective instrument for taming inflation (and we have no reason to believe not) and to extent that we trust central banks to stick to the inflation target of 2% and to apply the Taylor rule, we can expect g to revert to about 3% (1% real growth + 2% inflation) in a couple of years from now. Then the question becomes what the evolution of r will be in the longer run. We provide a couple of arguments, both for why the current r might be an adequate forecast for its future value and for why one might expect some decline when inflation is back under control.

Ignoring differences in supply and demand for safe assets of various maturity discussed in Section 5, which may cause either a downward or an upward slope of the yield curve, the yield curve has predictive power on the expected evolution of the interest rate. To see this, suppose the market expects interest rates to fall in a couple of years, then buying long maturity bonds is attractive to preserve the current high rates. The equilibrium yield curve must be downwards sloping, so that the market preference for long term maturity bonds is offset by the lower interest rate for these maturities. The other way around, if the market expect interest rates to rise, the yield curve will be upward sloped, so that the preference for short maturity bonds is offset by the low rate for these

[3] Again, a proper model of this mechanism is involved, requiring a similar continuous time model with Ornstein Uhlenbeck processes as discussed in footnote 2. Default adds a further complication to this model as it adds a jump process to the model.

maturities. Currently, the yield curve is flat, suggesting that market expect interest rates to remain more or less the same.

Adding the differences in supply and demand for safe assets of various maturity might change this conclusion. Before the start of QE in 2012 the interest rate of long maturity bonds was 3% above that of zero maturity bonds, see Figure 6. The introduction of QE flattened the yield curve, see e.g. the curve for 2021. The outburst of inflation at the start of the war in the Ukraine led the ECB to stop its QE policy. One would expect that the yield curve would have rotated back to its pre-QE yield differential of 3% for long maturity bonds vis-à-vis zero maturity bonds. This did not happen, suggesting that capital markets expect the interest rate to fall, so that investors want to buy long maturity bonds even though the old 3% yield differential has not returned.

Next, suppose that long term *r* has indeed gone up and that central banks will indeed succeed in bringing inflation back to its 2% target. Then, one may wonder what forces have caused this sudden increase in Wicksell's natural rate since 2021. Demography is a long run force that has not changed overnight. In Japan, where belly of the demographic vase has moved well beyond the retirement age, the era of excessively size of cohorts around that age with large pension savings might gradually fade away. This is clearly not yet the case, however, in the Eurozone, let alone in China. Hence, demography cannot explain the rise in the natural rate. The same holds for the IT revolution. The market capitalisation of the big four in IT still stretches ones imagination. Two factors might explain some increase in the natural rate: fiscal policy, and related to that, higher defence spending related to the war in the Ukraine. The EU has tried to offset any negative effects on current consumption by generous compensation for consumers. To the extent that this compensation will be permanent, this raises public deficits and may therefore explain the increase in *r*.

A final issue is the credibility of central banks' inflation target. There has been an ongoing discussion on the adequacy of the 2% inflation target that central banks currently use, see for this debate e.g. Teulings & Baldwin (2015). The past decade has shown that with a 2% inflation target, central banks might run into the ZLB problem of not being able to reduce the interest sufficiently to keep inflation at its targeted level. Counterintuitively, a rise of the inflation target might make it easier for central banks to keep the inflation at its targeted level, because the equilibrium nominal interest rate (which is Wicksell's natural rate + the inflation target) is further above the ZLB.

There are strong arguments both pro and contra an increase of the inflation target, see the Blanchard & Summers (2023) debate for a discussion of the arguments. On the one hand, the arguments for a higher inflation target than the current 2% are convincing. It makes the ZLB less binding, while the effect of a higher inflation target on the uncertainty about future inflation is small for this low level of inflation, see Barro (1995). On the other hand, a change of the inflation target during a struggle of central banks to get inflation back under control will inevitably undermine central banks' credibility regarding their commitment to any inflation target at all. What helps to overcome this entirely valid argument against changing the target is that the arguments for raising the target have been raised long before the outburst of inflation in 2022. Blanchard has therefore argued that central banks should keep silent on a potential change in the target until inflation expectations are well below 3% in order to retain their credibility and should only then announce a change of the target.

Whatever the outcome of this debate on the future inflation target, its forward shadow might affect expectations on capital markets. Allowing for some risk premium about this uncertainty about central banks' future inflation target, this might have raised interest rates for long maturity bonds by 1% above the level that they would otherwise have had. All in all, this suggests that the Wicksell's natural rate has gone up 2.5% (compare the yield curves for 2021 and 2023 in Figure 6) – 1% (an expected upward

revision of the inflation target) = 1.5%. Since $g - r$ was 3% before the Covid pandemic hit the world economy, one may expect it to fall to 1.5%. However, one should be cautious: prediction is hard, in particular where it regards the future.

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