



BANK OF ENGLAND

Speech

Government debt and inflation

Speech given by

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Good afternoon. Thank you for asking me to speak to you today. This is an important and innovative time for central banks, across their many functions, and it's vital we learn from our own and others' research on the big questions. The Bank of England launched its new Agenda for Research¹ yesterday and Andy Haldane will I'm sure want to tell you more about it in the panel following this talk.

The topic I've chosen today certainly isn't a new one. In fact, it's almost as old as economics itself. I want to talk about "monetary finance" – what it is (and what it is not), what it's worth and when it's been used in the past.

Old it may be, but there's been quite a bit of talk about this topic very recently. In the face of the global pandemic governments have taken significant fiscal actions to maintain incomes and preserve economic capacity. At the same time, central banks have aggressively eased monetary policy. Because these things have occurred alongside each other some commentators have suggested that central banks are engaged in "monetary finance" of government deficits.

However, one of the points I want to make today is that the coincidence in time of easier monetary policy and a higher government deficit doesn't really tell you anything about this question. That's because both are naturally cyclical, especially when the central bank is targeting inflation. Economic slowdowns push up the government's deficit. Because they'd otherwise depress inflation they also tend to result in easier monetary policy. Depending on how persistent the downturn is expected to be – and, because capital markets are global, on how widespread it is – you might even expect to see lower longer-term bond yields as well, even as the government is obliged to sell more debt and even without any extension of QE. There is nothing intrinsic in the nature of these transactions, or in the co-movement of these various economic series, that constitutes "monetary finance".

What really lies behind that term is instead an institutional question: who is doing what and why? Is monetary policy controlled by an independent authority, using its tools solely in pursuit of a fixed nominal objective? Or is there "fiscal dominance" over the central bank, which is then forced to subordinate its own objectives to those of the fiscal authority?

Because they naturally respond to the economic cycle, looking at the instruments of policy on their own (fiscal and monetary measures) doesn't really help you that much in distinguishing one situation from the other. A better method might simply be to look directly at the institutional arrangements themselves (are monetary and fiscal policies determined by independent agencies? how is that independence safeguarded?). As this is ultimately a question of ends rather than means, a better measure still is the behaviour of objectives of policy. If inflation rises materially above its target, and if it tends to do so in particular when the public finances are under strain, that may be evidence of "fiscal dominance". If, on the

¹ See <https://www.bankofengland.co.uk/research/bank-of-england-agenda-for-research>.

other hand, easier monetary policy is necessary simply to stabilise inflation, and succeeds in doing so, it's hard to see how it can qualify as "monetary finance", no matter how the fiscal balance is behaving².

That's not to say the fiscal position is wholly irrelevant because higher inflation may help – if only to a degree, and at a wider economic cost – in easing fiscal constraints. Very high levels of debt could therefore test those institutional arrangements. If its debt was so onerous that the government could not or would not finance it by conventional non-inflationary means, and if the independence of the central bank were sufficiently fragile, inflation could come to be viewed as just another tax, rather than something to be stabilised in its own right. In extremis, when the credibility of the macroeconomic framework is entirely lost, inflation expectations – indeed inflation itself – would be determined solely by the fiscal position. Even a notionally independent central bank could do nothing to affect it. Purchases of government debt by the central bank, for example, would do nothing to depress their yields. (Indeed, if they served only to reinforce the central bank's subservience, thereby pushing up expectations of future inflation, QE could actually raise bond yields. Put another way, the policy can only work as intended to the extent the framework is credible – if it's generally accepted that deficits are controlled by conventional fiscal measures and monetary policy is devoted to a fixed nominal objective.) There is also the potential, in this extreme situation, of a positive feedback between inflation expectations and inflation itself, and an associated risk of hyperinflationary spirals. When inflation expectations rise, the expected cost of holding zero-interest money goes up as well. Reluctant to hold on for very long to the paper the government is using to fund itself, people spend it straightaway, feeding the inflation and confirming those prior expectations.

Whether inflation is actually an efficient tax – whether the economic harm it causes is worth the fiscal benefit – is far from clear. Certainly an extra bout of inflation that's fully anticipated, and that therefore raises nominal interest rates and bond yields in advance, does very little to improve the government's financial position, and even less now than in the past. That's because the public sector has almost nothing in the way of zero-interest liabilities.

If higher inflation and nominal growth pushed up the demand for physical cash the government might make a little more from that source. (The economic value of cash is higher than the cost of producing it. The difference, known as "seigniorage", is a source of revenue for the public sector³). But the sums involved are

² On their own, the instruments of policy are not a reliable way to discern whether there's "monetary finance" of the government. But they may be more informative alongside other information. For example, if the central bank is easing policy in the face of clear inflationary pressure that might suggest it's putting weight on some other objective: the joint behaviour of instrument and target can be informative. It might also tell you something if the central bank eased policy and, at the same time, the authorities introduced restrictions to limit or prevent people from selling the government's debt. That way, the central bank might be able to reduce borrowing costs for the government alone – i.e. to raise the price of its debt – but avoid the inflationary consequences of an economy-wide easing in monetary conditions (so-called "financial repression"). But those restrictions would have to be material (they'd need to cover international capital flows as well, for example) to prevent people selling domestic government debt in favour of other assets. At least in developed economies, and with today's open capital markets, such restrictions no longer exist. I'll touch on this point again in the first section of the talk.

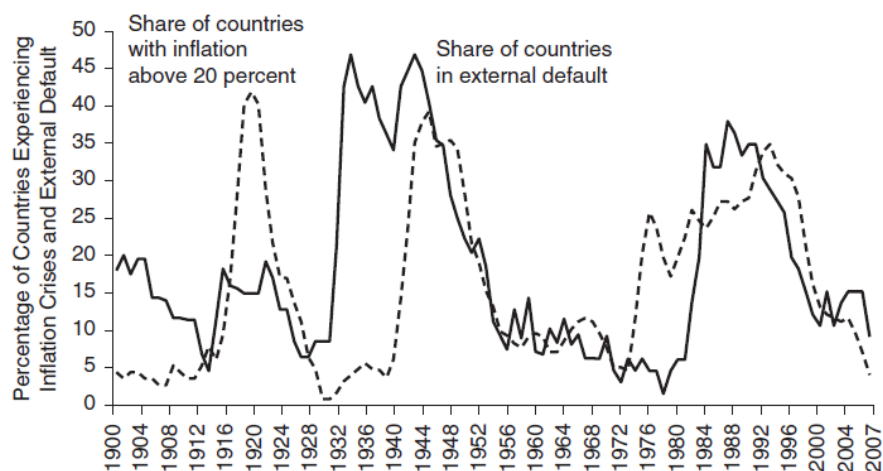
³ The term "seigniorage", which derives from the French word "seigneur" or "lord" (the state having the monopoly right to issue currency), is used a bit loosely. The most common usage is the one I've described here (the revenue from issuing new currency). Sometimes people have also used the term for the effects of inflation on existing liabilities, something we'll look at later in the talk, or the overall revenue of the central bank. Buiter (2007) defines these different concepts in detail. Reis (2019) gives a very clear exposition of all the means by which a central bank could affect the fiscal position. My colleagues on the MPC have also discussed this relationship (Bailey (2020), Vlieghe (2020)).

tiny: from today's starting point an extra percentage point of growth in the stock of banknotes would bring in less than one thousandth of what the government spends every year.

As for the "money" created by QE – reserve deposits held by commercial banks at the central bank – there's a very important difference between this and the "money" in simple textbook accounts of inflation: those reserves pay interest. If QE had been financed by the zero-interest money of the textbook, and if inflation subsequently went up, the real value of the public sector's liabilities would decline, even if nominal interest rates and bond yields had risen in anticipation. Some portion of the public sector's interest-bearing liabilities would've been replaced with a "money" that bears none.

When reserves pay interest that's no longer the case. This is why it's not strictly correct to say that QE "monetises" the government's debt. The policy is more accurately seen as a maturity swap, in which one (longer-term) interest-bearing liability of the state is replaced with another, shorter-term version of the same. As we'll see, the shortening of their average maturity reduces the scope for inflation to reduce the real value of the public sector's liabilities.

Chart 1: Rapid inflations are often fiscal events



From "This Time Is Different: Eight Centuries of Financial Folly" by Carmen M. Reinhart and Kenneth S. Rogoff. Copyright © 2009 by Princeton University Press. Reprinted by permission of the publisher.

Whatever the fiscal consequences of higher inflation today, and whatever they were in the past, it's clear there are many examples in economic history of unsustainable fiscal positions leading to a wholesale loss of monetary control. Weimar Germany in the 1920s is one well-known example. Post-revolutionary France, in the 1790s, is another. There are more recent instances in some emerging economies. Hyperinflations of this sort are essentially fiscal events. Chart 1, taken from the well-known book about financial crises by Reinhart and Rogoff⁴, shows that waves of formal defaults on governments' debts have broadly coincided with waves of rapid inflation.

Nor do you have to go to such extremes, or away from these shores, to find episodes in which the nominal anchor has been abandoned (if only for a time) in the face of big increases in government spending. Britain

⁴ Reinhart and Rogoff (2009)

suspended the gold standard during the Napoleonic wars and again at the onset of the First World War. Prices rose significantly, particularly during WWI, and yields on government debt did so as well.

But the relationship between debt and inflation isn't a simple one, nor is it readily apparent in the long-term UK data.

For example, if there was "monetary finance" during these two episodes it's not something that endured because, in both cases, Britain restored the original price of gold after those wars had ended. If rising price levels had conferred any fiscal benefit while they were being fought, that was then reversed, via deflation, once peace was established. Any long-lasting reduction in government debt had to be achieved by running a tighter fiscal policy.

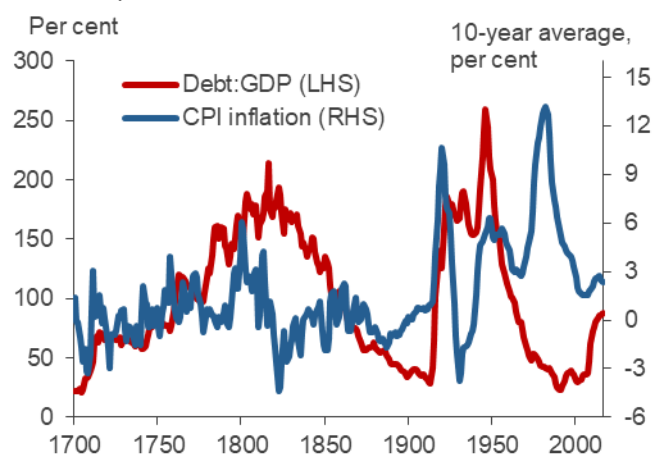
And although inflation also rose during the Second World War, and was much more persistent afterwards – with monetary policy in the hands of the government many argue this does count as a period of "fiscal dominance" over, or at least "fiscal influence" on, that policy – it was at least brought down, and contained to a degree⁵, by the fixed exchange rate of the Bretton Woods system. Only in the late 1960s and 1970s, once Bretton Woods broke down and by which time government debt ratios were already much lower, did inflation really take off.

Finally, to tick off one more relevant episode, we all know that the financial crisis of 2008-09 was followed by rapid and material rises in public-sector indebtedness. Yet despite this, and despite large-scale monetary easing as that rise was occurring, inflation remained close to target. Indeed, for much of the post-crisis period many developed country central banks have found themselves battling rates of inflation that are too low, not too high.

All in all, taking the past three centuries as a whole, the correlation between public-sector indebtedness and inflation – whether that's measured contemporaneously or after the event – is zero (Chart 2).

I think we can draw a few lessons from this.

Chart 2: But in British history there is no correlation between public-sector debt and inflation



Sources: Thomas and Dimsdale (2017), Mitchell (1988), Feinstein (1991), Crafts and Mills (1994), Feinstein (1998), O'Donoghue et al (2004), ONS and Bank calculations.

⁵ I say "to a degree" because the constraint wasn't fully binding. Sterling was devalued in 1967, even before Bretton Woods started to break down.

First, the fiscal position is not, on its own, a reliable predictor of inflation. The prevailing institutional arrangements, and in particular the integrity of the monetary regime, matter at least as much. It's hard to say whether the UK government's concern about its financial position was in any sense a cause of the inflation of the 1970s and early 1980s. There were probably many contributing factors. But it's surely at least as relevant that there was no fixed nominal anchor guiding monetary policy and no independent authority setting it.

Also relevant is the cause of the increase in government debt. In wartime, debt goes up because the government is spending significant sums on actual goods and services, thereby putting significant pressure on economic resources. It buys more stuff and employs more people. All else equal, this is inflationary. It often requires real interest rates to rise, in order to "crowd out" spending by the private sector and its demand for those same resources. After the financial crisis, by contrast, debt rose not because government spending on goods and services went up but because, in the face of a sharp downturn in private-sector demand, tax receipts collapsed. The downturn in aggregate demand, actual and expected, depressed the appropriate level of real interest rates and bond yields. All else equal – for a given setting of monetary policy – it was also disinflationary.

Qualitatively, at least, the same thing is going on right now. Public sector debt has risen significantly, across the developed world, in response to the pandemic. But, as was the case after the financial crisis, this has not been caused by any material rise in governments' spending on goods and services, or their direct demand for underlying economic resources. It's because tax receipts have fallen sharply and, more materially, because governments have compensated people for the impact of mandated lockdowns. Private and aggregate demand have fallen, below the economy's supply capacity – despite these huge transfer programmes, rates of unemployment and wider measures of spare capacity are rising. And it's in response to these disinflationary pressures that independent central banks everywhere, including in the UK, have eased monetary policy.

Anyhow, having set out at some length the points I want to make, I hope I can be reasonably concise in the body of this talk. I'll cover first the cyclicity of interest rates under inflation targeting. Via some very simple simulations I'll then look briefly at the impact of inflation on the public finances, focusing in particular on the effect of paying interest on central bank reserves. After an equally brief canter through some of the relevant bits of UK history there's a short concluding section.

How interest rates and bond yields respond to shifts in demand

Concerns about "monetary finance" have arisen because policy has been eased at the same time the government's deficit has gone up. The main problem with this argument is that the monetary stance and the fiscal balance are both cyclical – they tend to rise in upswings and fall in downturns. You'd therefore expect

them to be correlated this way. In fact, in the UK data, short-term interest rates have become more tightly correlated with economic growth since inflation targeting was introduced.

Since the financial crisis, with policy interest rates pressed up against the effective lower bound, QE has instead become the marginal instrument of policy for many central banks. With much less of a track record to go on, it's harder to demonstrate as clearly the cyclical behaviour of asset purchases (though the direction of the correlation – QE tends to happen when growth is weak – is clear enough). Nor is the pro-cyclicality of bond yields as evident as it is for short-term interest rates.

Nevertheless, if an economic downturn were sufficiently widespread, and expected to persist for some time, it's quite possible that expected future interest rates (and therefore bond yields) would decline of their own accord, even without the assistance of QE and even if one of the consequences of the downturn was also a rise in public-sector borrowing. There is no correlation either, in the long-term UK data, between long-term bond yields and levels of government debt.

That's not to say that QE has no effect on monetary conditions. At least for a time, and like a reduction in the policy rate, it helps to reduce the real cost of borrowing, for the private as well as the public sector. But it's important to understand that policy is only one of many influences on those costs. A "model" of bond yields that has them responding only to public-sector debt issuance, with or without purchases by the central bank, performs very poorly in the data. One cannot conclude from a coincidence of higher government borrowing on the one hand and lower interest rates on the other (whether short or longer-term) that monetary policy is doing anything other than what it should do. As I said in the introduction, the acid test is ultimately the behaviour of inflation itself.

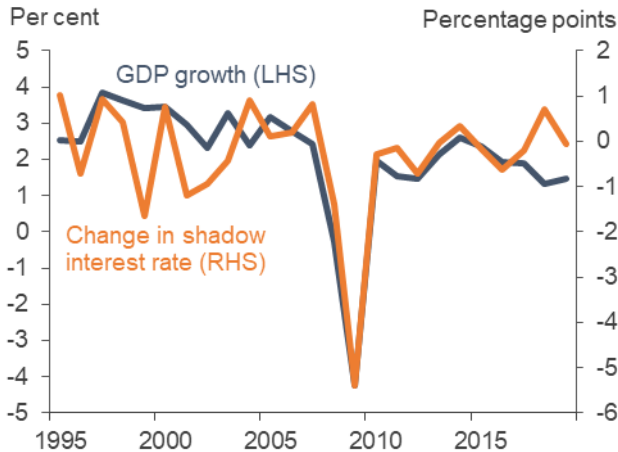
Anyhow, let's have a look at some of the numbers, starting with short-term policy changes. Charts 3a and 3b get across clearly the correlation with economic activity under inflation targeting. For the post-crisis period they both make some attempt to include shifts in QE, via a translation into the equivalent change in Bank Rate. The first plots changes in the resulting shadow rate (as developed by De Rezende and Ristinemi (2020)) against the growth of GDP. Chart 3b uses slightly different measures for the same things – the average policy vote on the MPC and a survey measure of growth⁶ – but the conclusion is the same. Policy is tightened when growth is strong and loosened when it's weak. It's no surprise to find that the government balance is similarly cyclical (3c) – or, therefore, that it's also well correlated with the behaviour of monetary policy.

Furthermore, the responsiveness of policy rates to economic growth seems to be necessary to stabilise inflation. Certainly inflation has been very stable under inflation targeting (more stable, in fact, than in any 25-year period in the 800-year history of the estimated UK series). And you have to go back all the way to

⁶ A weighted average of the composite PMI and (to cover the distribution sector) the headline balance from the CBI distributive trades survey.

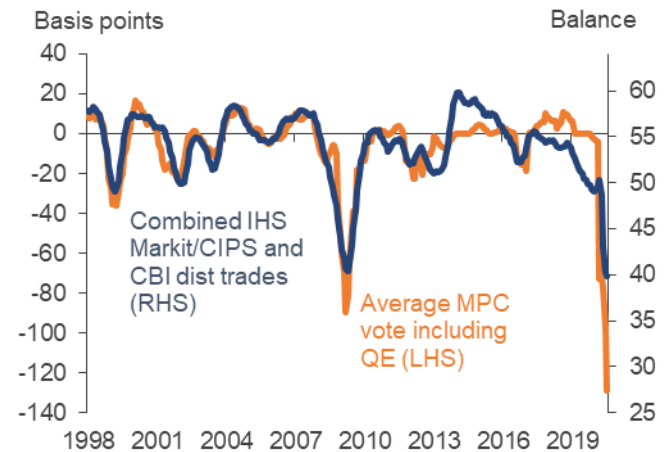
the pre-WWI classical gold standard, the last time the UK had something akin to a “target” for domestic prices⁷, to find a period when short-term interest rates were reasonably well correlated with economic growth – or in which inflation was well controlled (Chart 4).

Chart 3a: Monetary policy and economic activity correlated under inflation targeting



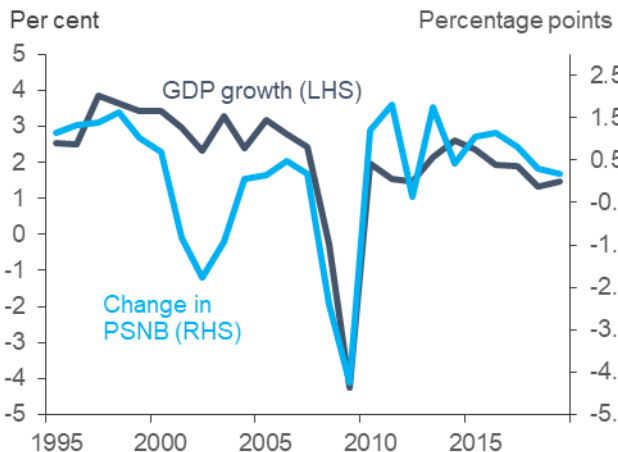
Sources: De Rezende and Ristinemi (2020), ONS and Bank calculations.

Chart 3b: Also apparent using MPC votes and survey measure of growth



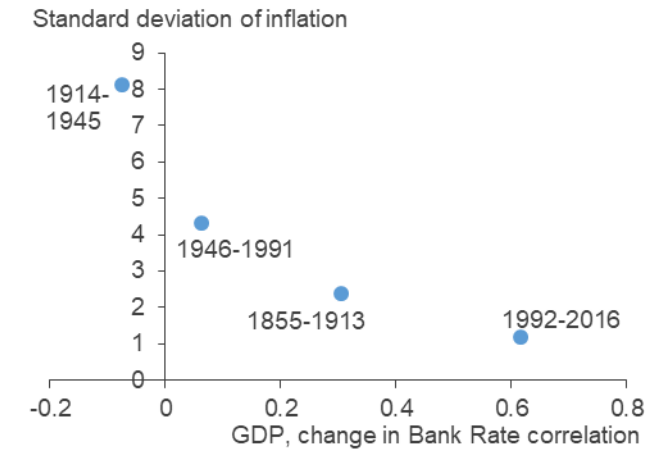
6-month averages, combined IHS Markit/CIPS and CBI distributive trades lagged one month. Sources: ONS, IHS Markit/CIPS, CBI, Bank of England and Bank calculations.

Chart 3c: Government balance also cyclical



Sources: ONS and Bank calculations.

Chart 4: When the monetary regime is stable policy rates are more responsive to economic growth and inflation is less volatile



Based on GDP growth and inflation smoothed over 2-year periods, and Bank Rate changes over 2 years. Sources: Thomas and Dimsdale (2017), Feinstein (1991), O’Donoghue et al (2004), ONS and Bank calculations.

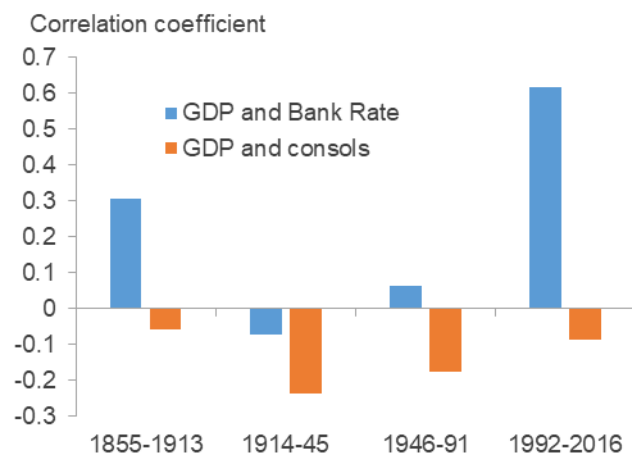
In the interim, and especially during and between the two world wars, the correlation between interest rates and economic growth was lower and the volatility of inflation higher. This is as you’d expect. To stabilise

⁷ With the nominal price of the metal fixed, the effective target for the price of goods and services in a gold standard regime is the inverse of its real equilibrium price. A rise in the supply of metal, from new discoveries for example, leads to inflation in the CPI (allowing the real price of gold to fall). If demand for gold rises (for example because of strong economic growth more generally), without any increase in the supply, the CPI tends to fall. Subject to these variations, a gold standard amounts to a target for the level of the CPI.

inflation the monetary authority needs to lean against the cycle, at least when it's driven by swings in demand⁸.

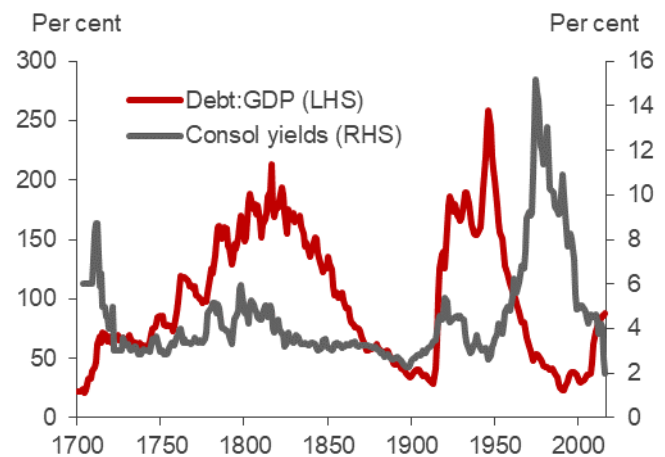
If the link between short-term interest rates and economic growth is reasonably clear, at least during stable monetary regimes, the cyclical nature of longer-term bond yields is less so. In the data they're essentially acyclical (none of the orange bars in Chart 5 is statistically distinguishable from zero). Nor is there any empirical correlation between bond yields and the level of government debt (Chart 6).

Chart 5: No significant correlation between economic growth and changes in long-term bond yields



Based on GDP growth smoothed over 2-year periods, and changes in Bank Rate and consols / long-term government bond yields over 2 years. Sources: Thomas and Dimsdale (2017), Klovland (1994), Capie and Webber (1985), ONS, DMO, Bank of England, and Bank calculations.

Chart 6: No relationship in long-term UK data between level and cost of government debt



Sources: Thomas and Dimsdale (2017), Capie and Webber (1985), Neal (1990), Klovland (1994), Odlyzko (2014), ONS, DMO and Bank of England.

I don't think we should be terribly surprised by this. As far as the link with economic growth is concerned, we should remember that bonds are long-term assets. Their yields will therefore depend more on expectations about how the economy behaves over the future than on what's happening to growth right now. There may have been specific instances, when such things can be isolated in the data, in which positive demand shocks pushed up bond yields. Using the same pre-WWI British data, Barro (1987) finds that wartime spending by the government was associated with higher long-term interest rates. He attributes this not to the effect on the fiscal position but to the direct pressure of the extra spending on economic resources: in order to keep aggregate demand in line with supply real interest rates, including those at longer maturities, needed to go up to "crowd out" private spending. In general, however, swings in demand will tend to have less impact on forward rates – and therefore on longer-term bond yields – than on current, spot interest rates.

⁸ For more on the countercyclical impact of monetary policy, see for example Christiano et al (1999), Boivin et al (2010) and Ramey (2016).

In addition, capital markets are now very open and the UK a far smaller part of the world economy than it once was. So at least as far as real bond yields are concerned, it's the future of the global economy that matters more than that of the UK specifically. Changes in real bond yields are tightly correlated across developed economies (Chart 7); news about the world economy has a greater impact on gilt yields than news about the UK specifically⁹.

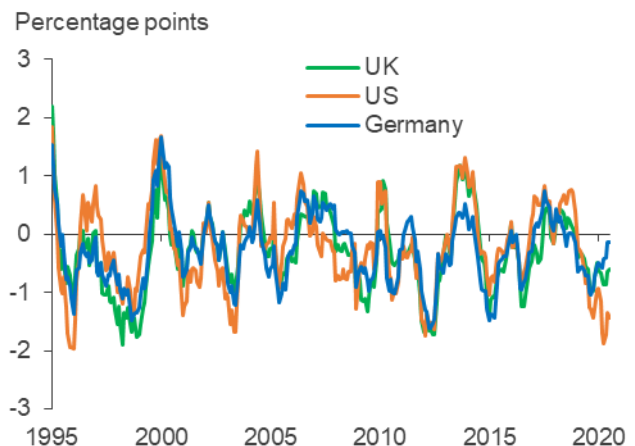
The fact that international capital markets are now very open – and that the UK is now only a small part of the world economy – also has a bearing on the effect of changes in public-sector debt. When the UK government borrows money it's tapping a global market for savings, not just a domestic one. And from the perspective of a relatively small, single borrower – certainly one who's still judged to be creditworthy – a greater demand for credit needn't have any impact on what is essentially a global price.

This doesn't mean a country's fiscal position never matters at all. Just as for an individual household or company, a government's creditworthiness can affect the risk premium it's charged for new borrowing. If there's a concern that high levels of debt might result in some sort of default – whether directly or in the form of a sudden burst of inflation – you'd expect to see that reflected in some sort of extra margin on its bond yields¹⁰.

But that's a long way from saying that any variation in public-sector debt will have a measurable impact on its price. It's further still from the claim that such an effect should be the dominant (let alone the only) influence on yields. Clearly, that's not what the data tell you.

Before closing this section I should make one other point. I'm taking it as given here that monetary policy does actually have some effect on demand and inflation (all else equal), through all the channels we know about. I mention this only because some of the commentary claims not so much that QE is potentially fuelling too much inflation, and helping governments that way, but that it's doing so by artificially depressing the cost of new debt issuance in a manner that does not (somehow) have any impact on inflation.

Chart 7: Global factors much more important determinant of changes in gilt yields than domestic events



12-month changes in 10-year yields. Sources: UK line – Bloomberg Finance L.P, TradeWeb and Bank calculations, US and German lines – Bloomberg Finance L.P. and Bank calculations.

⁹ Broadbent (2014). Note that, while the impact of QE is arguably detectable in Chart 7 – the launch in 2009, for example, in the UK and the US, and again this year – it's not as if bond yields are (or were) otherwise static. They moved around just as much beforehand, generally downwards over this period and especially so during global downturns. They might reasonably have been expected to do so in response to the pandemic, even without QE. Nor are these changes well correlated with fiscal news. As I said earlier, a model of bond yields that has them responding only to government debt and/or QE performs poorly in the data. For more on what's depressed long-term "neutral" interest rates, see for example, Vlieghe (2018), Broadbent (2014) and the August 2018 *Inflation Report*.

¹⁰ If the perceived risk were that the authorities would try to "inflate away" the debt, it would be priced into conventional bonds alone (and therefore into the "breakeven" spread between the yields on conventional and indexed debt); if people worried about formal default yields on both would be affected.

For what it's worth, as a matter of terminology, I think this would more accurately be described as "financial repression" than "monetary finance". Either way, I don't really see how it's possible to do this, not least because of the open, global capital markets in which all borrowers, public and private alike, now operate.

If the claim is that even variations in the financial conditions facing the private sector have no bearing on inflation, one wonders how monetary authorities (including the MPC) are able to control it to begin with. It's surely not a coincidence that inflation has been stable only when there's been a stable regime for monetary policy. That wouldn't be possible unless policy routinely had an effect on it. Chart 4 is informative in this respect.

Financial repression might be more feasible if it were possible to depress the yield on government debt alone (i.e. to raise its price), leaving untouched financial conditions facing the private sector. But if that artificial gap were to endure for any length of time it would require quantitative restrictions of some kind, to prevent people selling domestic government debt for some other (relatively under-priced) asset. And because holders of UK assets live abroad as well as at home, those restrictions would have to cover international capital markets as well¹¹.

Yet we know such restrictions don't exist. We know that central bank policies do affect financial conditions facing the private sector, not just the public sector. And we know that monetary policy makers can, and do, thereby affect inflation. Indeed, in the longer run, it's all they can affect and – barring the sorts of restraints necessary for financial repression – the only enduring means by which they can have an impact on the real value of public-sector debt. We'll now have a look at how that works.

What higher inflation does to the public sector's liabilities: a simple simulation

As I said in the introduction, levels of government debt that are ultimately unaffordable – that the government cannot (or will not) finance through conventional fiscal measures – can in extremis present a threat to the stability of inflation. That's because inflation – above all surprise inflation – can reduce the burden of that debt. What I want to do here is use a simple, stylised simulation to gauge the scale of this effect.

I'm interested only in the pure effect of higher inflation. So the simulation assumes that all the real determinants of indebtedness – the path of real GDP, real (ex ante) bond yields and the government's primary deficit (relative to GDP) – are all fixed. This is unrealistic. In the short term generating the higher inflation would probably require a period of lower real interest rates (if only a brief one, relative to the timescales involved). Going the other way, very rapid inflations have been bad for real output growth and they've also tended to push up the real cost of public-sector debt thereafter, via a higher risk premium. For those reasons, and even from the narrow perspective of the government finances alone, I think these

¹¹ Giovannini and de Melo (1993).

simulations should be seen as relatively optimistic, at least over the longer term. But they do at least give us some sort of handle on the marginal effects of higher inflation.

As a starting point, we should begin by recognising that if the extra inflation is fully anticipated it will have very little impact on the public finances. That's because investing institutions, which care about real returns, could then take account of it in the price they're prepared to pay for the debt. If everyone knew in advance that inflation was about to rise permanently by (say) 1% point you'd expect nominal yields to be 1% point higher, across the curve, than they otherwise would've been. In real terms, the government wouldn't pay any less for its debt – the newly sold debt, at least – even after the inflation arrives. The real value of the principle declines by an extra one per cent a year. But the interest payments – the coupons – are also a percentage point higher.

For holders of a long-term bond, however, it's quite a tall order to expect any inflation over the course of its life to be “fully anticipated”. It would require them to know years in advance – potentially many years – that it's coming. In the UK, the government's conventional debt has a relatively long average maturity: close to two fifths of it was sold more than a decade ago. So in principle, if this were ever the aim of policy makers, there'd seem to be quite a bit of scope to spring “surprise” inflations (a surprise in the sense that it wasn't foreseen when the bonds were originally sold) and reduce the real value of existing debt without any compensating rise in coupon payments.

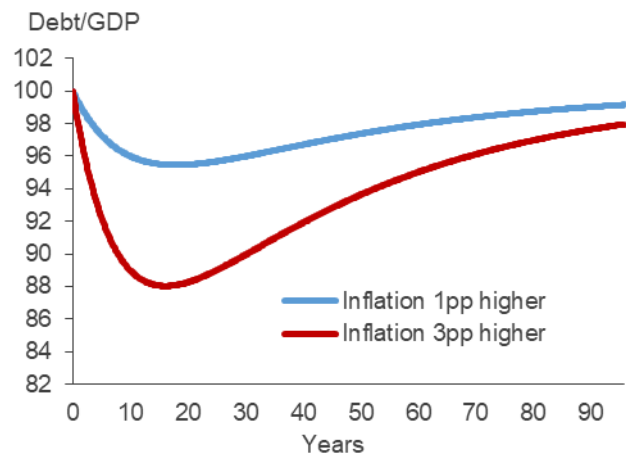
However, as we'll see, you need relatively sizeable increases in inflation to make much of an impression on the debt. Though the dynamics are extremely drawn out, the effect is ultimately temporary, as even long-term debt needs eventually to be refinanced¹². And central bank asset purchases have made it harder: because it reduces the maturity of its interest-bearing liabilities, QE actually makes the public sector's consolidated balance sheet less susceptible to any given rise in inflation.

¹² Note that this relies critically on trend GDP growth (let's call it g) being higher than the risk-free real interest rate (r). Over time, and as long as inflation is on average in line with prior expectations, the change in the ratio of debt to GDP (b) is given by $(r - g)b - d$, where d is the primary deficit. This is stable – for given d it tends over time to revert to a steady state level ($b^* = (g-r)/d$) – only if the term multiplying b is negative, i.e. $g > r$. With risk-free real interest rates comfortably below zero in developed economies this condition seems to be fulfilled at the moment, though that's not always been the case. When $r > g$ the debt ratio is no longer stable – unless d changes accordingly, small changes in r or g would put b on an unstable path. For more on the implications of $g > r$ see Blanchard (2019) and Mehrotra and Sergeyev (2019).

The blue line in Chart 8 depicts the results of a stylised experiment in which inflation rises permanently, and without any warning, by 1 percentage point (from 2% to 3%). There's a corresponding rise in inflation expectations, and therefore nominal interest rates and bond yields as well, but only at the time inflation itself goes up. To any existing bondholder the extra inflation therefore comes as a surprise and the real value of that existing debt starts to fall, without any compensating rise in nominal coupons.

Conventional debt is assumed to mature at a constant rate, such that half of it has to be refinanced over a 12-year period. The starting level of the debt:GDP ratio is indexed at 100. The simulation assumes that a quarter of the debt is indexed, the remaining three quarters made up of conventional bonds¹³.

Chart 8: Surprise inflations can reduce public sector debt though when $g > r$ the effect is ultimately temporary



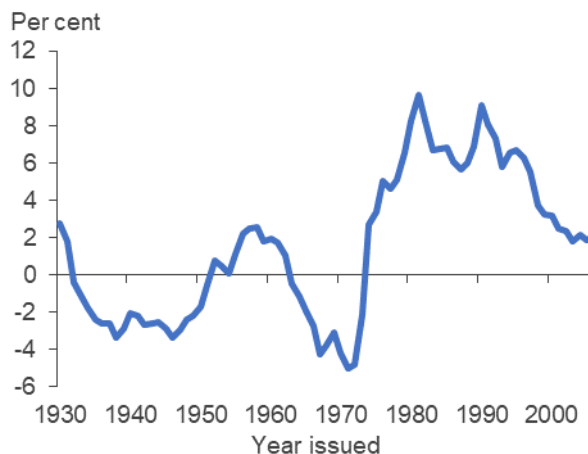
With an extra percentage point of inflation the real value of existing conventional debt is initially eaten up at that same rate. Over time, however, maturing lower-yielding debt has to be refinanced at the higher cost and the rate of decline slows. So although after 18 years the price level is almost 20% higher than it would have been, the real value of conventional debt is down by less than 7%. With indexed debt unaffected the peak decline in the aggregate debt:GDP ratio, which comes at around that 18-year point, is just under 5%. Thereafter, as the share of the original debt continues to decline, the higher cost of newer debt starts to dominate and the debt ratio starts very gradually to climb back to its original level.

Clearly larger rises in inflation would produce a bigger effect. But because more rapid inflation means the share of the original, pre-inflation debt also declines at a faster rate the effect isn't quite one-for-one. The red line simulates an increase in inflation from 2% to 5%, three times the rise in the blue line. The peak effect on the debt:GDP ratio is 12%, quite a bit less than three times the effect of a 1%-point rise.

¹³ Using the same terminology but allowing for a surprise and persistent increase in inflation, from π to $\pi + \Delta\pi$, the rate of change of the debt:GDP ratio becomes $\dot{b} = d - (g - r)b - \Delta\pi b_0 e^{-(\alpha + g + \pi + \Delta\pi)t}$. The last term is the impact of the surprise inflation. That impact decays with the ratio of old debt to nominal GDP (so at a rate α plus nominal growth). We assume that the debt ratio was stable to begin with. This requires $g > r$ and $d = (g - r)b_0$, implying $\dot{b} = (g - r)(b_0 - b) - \Delta\pi b_0 e^{-(\alpha + g + \pi + \Delta\pi)t}$. If some fraction μ of the starting level of debt b_0 is owned by a QE fund, and backed by interest-paying reserves, the last term is just multiplied by $(1 - \mu)$. For the graphs we use $g = 1.5\%$, $r = -1\%$, $\pi = 2\%$ and $\alpha = 6\%$ (implying it takes 12 years for half the existing stock of debt to mature). The simulations allowing for QE use $\mu = 0.4$. The blue and red lines use $\Delta\pi = 1\%$ and 3% points respectively.

That's not to say inflation can't or hasn't in the past had material effects on government debt. In the 1970s, when inflation was far higher than anyone had anticipated at the start of the decade, these effects were sizeable. In 1970 the ten-year gilt yield was 8½%. So someone who'd bought such a bond, if he'd planned to hold it to maturity and reinvest the coupons along the way, might have expected to earn a cumulative return of close to 130%, more than doubling his money in nominal terms over the following decade. We don't know what inflation expectations were at the time. But if (say) people anticipated a similar rate of inflation as over the previous five years (it averaged 4% in the second half of the 1960s) they might still have expected a cumulative real return of over 50%.

Chart 9: Gilts sold in 60s and early 70s suffered large losses in real terms; ex post, returns in 1980s much higher



Ex post returns on 10-year/ medium-term government bonds. Sources: Thomas and Dimsdale (2017), Annual abstract of statistics 1947, O'Donoghue et al (2004), ONS, Bank of England and Bank calculations.

As it was, prices rose 13% a year in the 1970s, the highest rate over any 10-year period in British history, and the cumulative real return on the bond was *minus* 35% (Chart 9). This is what surprise inflation can do. It acts as a capital levy on investors in government debt.

It can also prove extremely disruptive to the wider economy, of course. Rapid inflations produce large, arbitrary reallocations across the whole economy, not just between the public and private sector as a whole. They pollute price signals and make it harder to plan and invest. And even if one's only concern were with the public finances, they can also lead to uncertainty about future inflation and, because of that, add an inflation "risk premium" to the cost of the government's future (non-indexed) debt issuance.

By 1980, after a decade of extremely high and volatile inflation, the yield on newly-issued ten-year gilts had risen to 14%. Presumably, most of this represented direct compensation for the inflation that investors had come to expect. But part of it may also have been an additional premium to compensate for its sheer unpredictability. What we do know is that inflation gradually came down, albeit in fits and starts, and that the ex post real return on a 10-year gilt bought in 1981 was around plus 150%, nearly 10% a year. In terms of these simple simulations, a risk premium on the cost of future issuance would eventually push the blue and red lines in Chart 8 above their starting point.

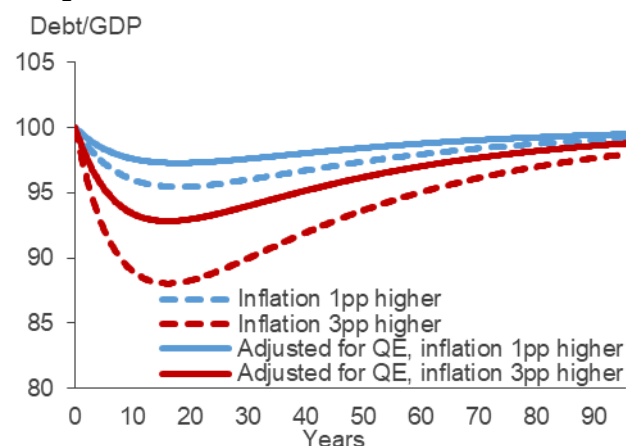
Finally, even Chart 8 overstates materially the impact of inflation when there are sizeable QE programmes in place. A significant part of the stock of conventional gilts (two-fifths of it) is now owned by the Bank of England's Asset Purchase Facility (APF), the vehicle through which QE is conducted. The APF is indemnified by the government, and the income from it – whether positive or negative – gets transferred to

(and from) the Treasury. And the matching liability on the APF balance sheet isn't zero-interest money but interest-bearing reserves. So a rise in the official interest rate directly and immediately increases the cost of the QE fund¹⁴.

In these simulations the rise in nominal interest rates, in response to the rise in actual and expected inflation, is itself immediate. It's impossible to "inflate away" zero-maturity reserves – as the "tax base" for surprise inflation, it's the longer-term conventional debt in the hands of the private sector that counts. So the impact of the extra inflation would be scaled down by the relative size of the QE fund. If 40% of the conventional debt is in the central banks, and funded by interest-bearing reserves, the impact of higher inflation is also reduced by 40% (Chart 10).

A permanent increase of 1% point in the rate of inflation would, at its peak, reduce the real value of the public sector's liabilities by just under 3%, a 3%-point rise by a little over 7%. In the grand scheme of things, and even if there were no increase in the inflation risk premium in response, these are not large numbers¹⁵.

Chart 10: QE reduces the maturity of the private sector's claim on the state and with it the fiscal returns to higher inflation



What's going on here is straightforward enough. QE doesn't involve "printing money", at least in the sense that people normally understand the word (i.e. something that doesn't bear any interest). It replaces one, longer-term interest-bearing liability of the state held by the private sector (gilts) with another, much shorter-term instrument (reserves) that also bears interest. It therefore reduces the average maturity of the public sector's liabilities, and with it the scope for "surprise" inflation to eat into their real value. Since the 1970s the combined effects of indexed debt issuance, and latterly QE, have materially reduced the fiscal returns to higher inflation.

Some history: credible monetary regime matters more for inflation than government debt

The absence of any clear target for monetary policy made the inflation of the 1970s more likely but, because the event was more spread out, its underlying causes harder to identify. There were probably several. Fiscal difficulties may have been one of them and, as we've seen, rapid inflation clearly had material effects on the real value of government debt (even if there was a subsequent price to pay).

¹⁴ See McLaren and Smith (2013) for further information on the impact of interest rate changes on the cash transfers between the APF and HMT.

¹⁵ See also Reis (2019) and Fukunaga et al. (2019) on the fiscal effects of higher inflation.

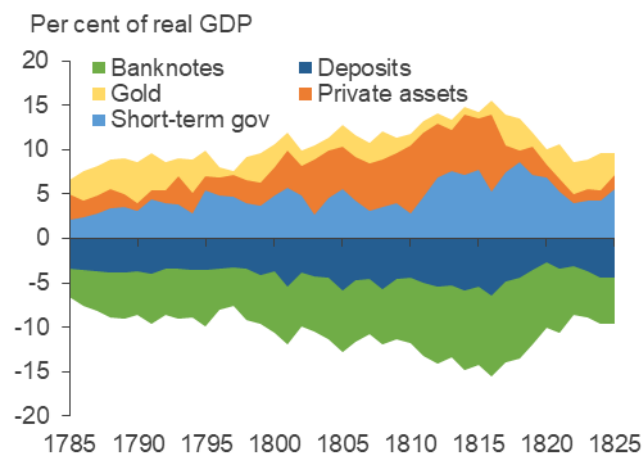
On the other hand, the documents of the time make it clear that the government's opposition to the sorts of rises in interest rates that would've controlled inflation stemmed from more than a parochial concern with its own finances¹⁶. Nor did some in government believe such rises to be necessary to begin with (inflation was often blamed on an unlucky sequence of cost shocks¹⁷).

What's certainly clear, looking at the longer run of history, is that there's no simple measure of the fiscal position – the ratio of government debt to annual GDP, for example – beyond which inflation is bound to pick up. In 1970 public-sector debt was 60% of GDP, the lowest it had been since the eve of the First World War. Yet what followed was the most rapid inflation, over any 10-year period, in British history.

Going much further back in time, government debt was higher than this in every year of the half-century before the French revolution in 1789 – higher still relative to the general level of taxation – yet the gold standard remained intact and inflation quiescent. Throughout, people were free to convert Bank of England notes into gold at a fixed price.

In the 1790s, when war against the new French republic began, two things changed. One was the scale of the resulting rise in government spending. In the space of five years (1792-97) it almost tripled, and Pitt's government tapped not just financial markets but the resources of the Bank of England to finance it¹⁸. Second, fears of French invasion led to a steady increase in the desire to hold gold over paper notes and a further drain from the Bank's holdings (Chart 11¹⁹). When in late February 1797 a small French force actually landed in Wales the government immediately took to the decision to suspend convertibility and with it the gold standard.

Chart 11: The Bank of England's balance sheet during the Napoleonic wars



Sources: Thomas and Dimsdale (2017) and Bank calculations.

This was a seismic event in British financial history and was vigorously debated, and in many quarters vigorously opposed, throughout the long Napoleonic wars²⁰. Several early economists – notably

¹⁶ Kynaston (2017), Chapter 15.

¹⁷ I discussed the role of beliefs about how inflation was determined in a talk earlier this year (Broadbent (2020)).

¹⁸ The Bank took only a fraction of new government debt – less than £3m compared with an increase in the total of over £100m – but it was enough to deplete its gold reserves significantly, by around a quarter, during the first four years of the war. Most of the growth in the Bank of England's assets, in those years and throughout the Napoleonic wars, reflected higher "discounting" (i.e. buying) of private-sector securities.

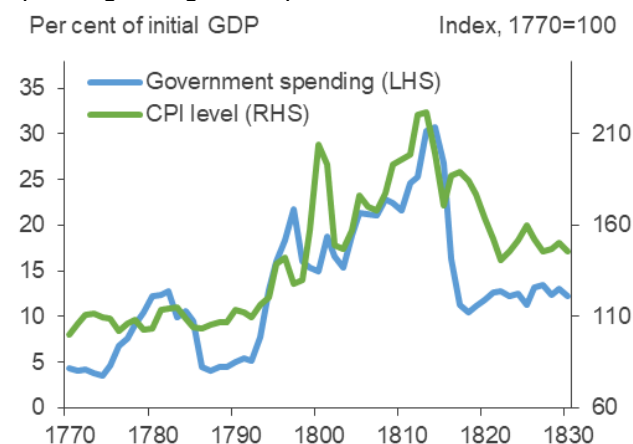
¹⁹ Chart 11 excludes long-term government debt holdings from the assets and central bank equity from the liabilities. These matched each other almost pound for pound and were both constant through the wars.

²⁰ The political reaction was immediate. It was Sheridan, Irish playwright and Whig MP, who only a month after suspension described the Bank as an "old lady" who'd "fallen into bad company...at the St James's end of town" and been "seduced" by the "young gentleman" Pitt. Gillray's famous cartoon memorialised the description and the nickname "Old Lady" stuck.

David Ricardo – blamed the subsequent rise in prices squarely on the suspension and the growth of unbacked banknotes and called for an immediate restoration of convertibility.

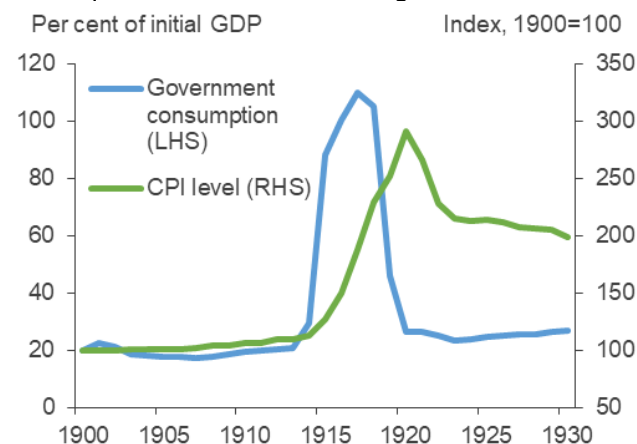
Yet, in some ways, one might be surprised that prices didn't rise further (inflation averaged 2% between 1792 and 1815). One reason was that, despite the criticism, the Bank did not, by and large, abuse its new-found discretion²¹. It ran what might be described as an accommodative policy, allowing prices to rise and fall with government spending and the general level of demand, but not an outright expansionary one (Chart 12a). Another is that, while the timing was a matter of fierce debate, the belief that convertibility would be reinstated at some point, and at the original price, was widespread (it was eventually restored in 1821). Inflation expectations were therefore kept under control and this limited both inflation itself – people were willing to hold the new banknotes, forestalling the unwelcome dynamics of very rapid inflations – and the cost of government debt. The yield on new long-term debt rose to 6% immediately after suspension. But it subsequently fell back and averaged less than 5% through the rest of the conflict. Even in its temporary absence the monetary regime mattered²².

Chart 12a: The CPI rose and fell with government spending during the Napoleonic wars



Real central government expenditure less interest payments, per cent of initial real GDP. Sources: Thomas and Dimsdale (2017), Mitchell (1988), Feinstein (1998) and Bank calculations.

Chart 12b: Scale of government spending, rise and subsequent decline of CPI all larger in WW1



Real government consumption, per cent of initial real GDP. Sources: Thomas and Dimsdale (2017), Mitchell (1988), Feinstein (1991), Sefton and Weale (1995), O'Donoghue et al (2004), ONS and Bank calculations.

The First World War – at the outbreak of which the UK again suspended the gold standard – was, by comparison with the Napoleonic conflicts, a far more costly exercise. Between 1914 and 1918 the ratio of government spending to GDP, excluding interest payments, was an astonishing 36 percentage points higher – most of

²¹ There was certainly no shortage of criticism. When parliament decided in 1811 to delay the restoration of convertibility until after the war had ended Ricardo was withering: "I trust the day is not far distant when we shall look back with astonishment at the delusion to which we have so long been subject, in allowing a company of merchants [i.e. the Bank of England], notoriously ignorant of the most obvious principles of political economy, to regulate at their will, the value of the property of a great portion of the community". In defence of the modern company, I feel bound to point out that it is now state-owned, employs no "merchants" but has plenty of well-trained economists. Ricardo would also be satisfied, one would hope, that "the value of the property of a great portion of the community", which I will take to be the CPI, is no longer regulated "at will" but at the behest of parliament in the form of a 2% target for inflation.

²² Thanks to over-issue of the new "assignat" France had suffered from a hyperinflation in the years after the revolution. When the new government came back to the market, in the mid-1790s, it was charged over 60% for new debt. Determined efforts to restore the link credibly to gold allowed that yield to fall significantly but it remained well above the cost of British government debt throughout the war (for the contrast with the credibility of British policy see Bordo and White (1991), Bordo and Kydland (1995) and Chada and Newby (2013).

the economy was given over to the war effort – and it ran a deficit of over 20% of GDP (versus an average of 5% from 1792-1815). Under pressure from this scale of spending inflation averaged 16% (versus 2%).

As a result, the deflation required to return to gold, in 1925, was far larger and more economically painful than it had been a century earlier²³. As such, it's not clear that the prior belief in such a return was as firm as it had been the first time round²⁴. Nonetheless, even a partial belief in such a policy would have limited the cost of government borrowing in the interim. Long-term bond yields were higher than the 3% average of the pre-war decade but again remained below 5%. It may also have prevented an even worse outcome for inflation itself (by ensuring newly printed money was willingly held).

In the 1970s, with no nominal anchor either in place or expected to remain so, the restraining force on inflation expectations was largely absent. So after the end of the Bretton Woods regime, and even though government indebtedness was lower than it had been for decades, inflation itself became harder to control and yields on new borrowing rose precipitously. The series for long-term yields on government debt goes back almost as far as the founding of the Bank of England in 1694. In that long history the highest ever ex ante yield was in 1974, when newly issued 10-year gilts promised a return of 14% a year in nominal terms. In real terms, the highest ever realised (“ex post”) return was the near-10% annual rate on debt sold in 1981.

Some of these comparisons are set out in Charts 13a and b. I think that, even from this very cursory look at these particular episodes, a few conclusions can be drawn.

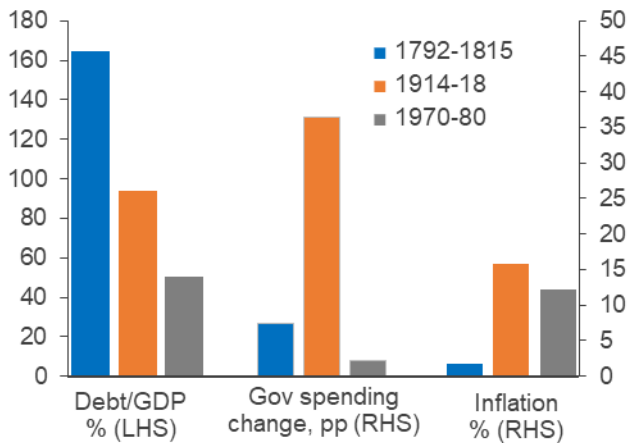
One is that, if inflation is allowed to vary, one important influence on it is likely to be the scale of government demand – and aggregate demand more generally – for the economy's resources. There is, of course, a huge body of evidence on the same (Phillips curve) point, but the fact that inflation was so much more rapid in WWI than in the Napoleonic wars surely owes something to the far greater levels of government demand for economic resources.

Second, if the scale of government (and more fundamentally aggregate) demand matters for inflation, its existing debt seems less relevant, or at least is far from enough to tell you about subsequent inflation. Across these three episodes, the level of government debt was at its highest during the Napoleonic wars, when inflation was lowest. During the inflation of the 1970s, debt was significantly lower than during both wars.

²³ In an effort to control debt levels incurred during the war, the British government ran huge primary surpluses during the 1920s, averaging 7% of GDP, with all the social and industrial unrest that entailed. Yet ratios of government debt to GDP didn't fall, remaining at over 160% of GDP throughout that decade. Just as rapid inflations can eat up debt so deflations can increase it. The short-lived reinstatement of the gold standard (it was then abandoned for good in 1931) was heavily criticised at the time by Keynes.

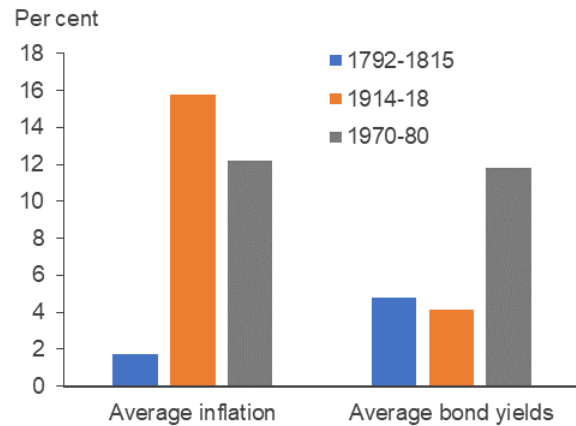
²⁴ The question was only formally considered – and a return to the pre-war parity recommended – by the Cunliffe Committee in 1918.

Chart 13a: To the extent fiscal variables matter for inflation government demand more important than debt



Average debt/GDP; changes in central government expenditure less interest payments over nominal GDP; and average inflation. Sources: Thomas and Dimsdale (2017), Mitchell (1988), Feinstein (1998), O'Donoghue et al (2004), ONS and Bank calculations.

Chart 13b: Debt higher in wars than in 1970s but residual monetary credibility may have contained inflation, bond yields



Average bond yields based on consols/ long-term bonds. Sources: Thomas and Dimsdale (2017), Capie and Webber (1985), Neal (1990), Klovland (1994), Feinstein (1998), O'Donoghue et al (2004), ONS, DMO, and Bank calculations.

Third, and instead, what matters more – not just for inflation itself but the cost of government debt as well – is the prevailing regime for monetary policy. The two can clearly interact: the monetary regime was abandoned in those wars partly because of the pressures from higher spending, and it was that de-linking from gold that allowed prices to rise in the first place. Equally, it was precisely because of the visibility and prominence of that measure, and the belief that it was likely to be temporary, that both the subsequent inflation and the rise in the cost of new government borrowing were contained to the degree they were.

Conclusion

Aggressive monetary easing by central banks, occurring as it has alongside very large government deficits, has raised fears in some quarters about “monetary finance”. These are misplaced.

Certainly there’s nothing about the coincidence of the two in time that, in and of itself, constitutes monetary finance. If the rise in government debt is caused by a weak economy, something that would otherwise depress inflation, easing policy is exactly what an independent, inflation-targeting monetary authority should be doing. Theory tells you that, to stabilise inflation, policy needs to lean against swings in demand and UK history bears that out.

It’s true that, if only for a while, easier money policy reduces the real cost of borrowing, for public and private sectors alike. That’s how it’s meant to work. The reduction in the cost of borrowing for the private sector stimulates demand and inflation. The reduction in the cost of borrowing for the public sector is an additional effect of monetary policy to which the government can choose to respond with changes in spending and

taxes, or not, depending on its fiscal objectives. And the central bank will take into account the impact of those changes, if any, on aggregate demand and inflation.

This is not to deny the many other connections between monetary policy and government debt or the many occurrences of “fiscal dominance”, in various countries, over the past. If accompanied by restrictions on capital flows, the monetary authority might be able to depress borrowing costs preferentially for the fiscal authority, avoiding the inflationary consequences of an economy-wide easing in monetary conditions (“financial repression”). Depending on the share of non-indexed debt, and the maturity structure of the public sector’s overall liabilities, rapid inflations can themselves reduce the real burden of government debt. This has almost always come at a much wider economic cost and, whatever it’s done to the government’s existing debt, has usually been followed by an increase in the real cost of new borrowing. Even from the narrow perspective of the public finances they’ve rarely ended well. Nevertheless, there have been many episodes of very rapid inflations and they’ve often (though not invariably) been the result of immense strain on the public finances.

This in turn has often been the result of wars and the same is true in British history specifically. Having stuck to it uninterrupted during the preceding decades Britain came off the gold standard during the Napoleonic wars and again at the onset of the First World War. Matching large rises in government spending and debt the general level of prices also went up (these things were all far more extreme in WWI). That inflation didn’t get wholly out of control may have reflected confidence in a return to gold after those wars had ended. That confidence would also have tempered the rise in bond yields.

Conversely, the rapid inflation of the 1970s and early 1980s occurred when public-sector debt was much lower than during those two episodes but when there was no stable anchor for monetary policy. That inflation was followed by a material rise in the real cost of newly issued debt, at least on an ex post basis. This suggests that the presence of, and credibility in, a fixed nominal target for monetary policy are more important than the government’s fiscal position alone, not only for the behaviour of inflation but for longer-term bond yields as well.

The pandemic differs from these episodes in important ways. Unlike the wars there has been no material rise in government spending on goods and services. Aggregate demand has fallen and spare capacity is rising. All else equal this will depress inflation. In this respect the cause of the current rise in government debt has more in common with the 2008 financial crisis than with what occurs in wartime. And unlike the 1970s and 80s – indeed as a result of that experience – there is now a stable monetary regime in place.

As it happens, it would now be significantly harder to “inflate away” the public sector’s liabilities than in the past. Thanks to a combination of indexed gilt issuance and (somewhat ironically) QE, the relevant “tax base” – non-indexed, longer-term debt in the hands of the private sector – is much lower than in the 1970s and

80s. But the most important guarantee of price stability is a stable regime governing monetary policy and macroeconomic policy more generally.

For policy to be effective that regime has to be credible. Indeed, without such credibility – without confidence that fiscal outcomes are a matter for fiscal policy, with monetary policy assigned to controlling a nominal objective – it's not clear that QE would even work in the first place. And that credibility relies in part on the monetary authority being held to account. It's crucial that the MPC should have to explain why its actions are necessary for meeting the inflation target, and nothing besides, during this episode as in any other.

For our part, one important gauge of that credibility is expected inflation in financial markets. Were there a serious concern that inflation would drift away from target, whether because of higher levels of debt or for any other reason, you'd expect to see it reflected in higher "breakeven rates" in gilts markets (i.e. the difference in the yields on conventional and indexed debt). Thus far that has not happened (Chart 14).

Come what may, the MPC will respond to economic events as they unfold to ensure, in line with our remit, that the stability of inflation is maintained.

Thank you.

Chart 14: Financial-market measures of inflation expectations have been stable



Sources: Bloomberg Finance L.P, TradeWeb and Bank calculations.

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