Financial regulation, demand for 'safe assets', and monetary conditions

A simple model framework for understanding post-2008 financial realities

By

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Abstract

In the aftermath of the economic and financial shock of 2008-10, the wider policy debate has often turned on why inflation has remained very subdued and interest rates and bond yields historically low despite a marked drop in interest rates and a significant increase in the money base in the US and the euro zone.

In this paper, we try to explain these developments with a simple model which highlights the importance of growing demand for 'safe assets' (government bonds). By its effect on the demand for money, this shift is inherently deflationary. Expansion of the money base is a natural and necessary consequence of inflation-targeting central banks 'doing their job'.

The model framework can also be applied to the Covid-19 shock of 2020-21 and it is shown that in the absence of growing demand of safe assets (and an increase in the supply of government bonds due to fiscal easing), a sharp increase in the money supply will be inflationary.

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Introduction

Since the Great Recession hit in 2008, we have seen massive regulatory changes that have significantly increased the demand for 'safe assets' – particularly in the form of government bonds.

This shift is hugely important for the bond market and should be expected to affect the prices and yields of government bonds and thus interest rates.

However, there has been less discussion of its effect on macroeconomic conditions and particularly the monetary policy implications of increased demand for government bonds.

In this research note, we consider the impact of these regulatory changes on monetary conditions. Our working assumption is that they have taken place in what amounts to a large closed economy (think of the euro zone and the US combined).

The general idea is to identify the mechanism through which regulatory changes impact the demand for safe assets and the general macroeconomy. The discussion is deliberately kept within a standard textbook framework. It is therefore theoretical rather than empirical in nature.

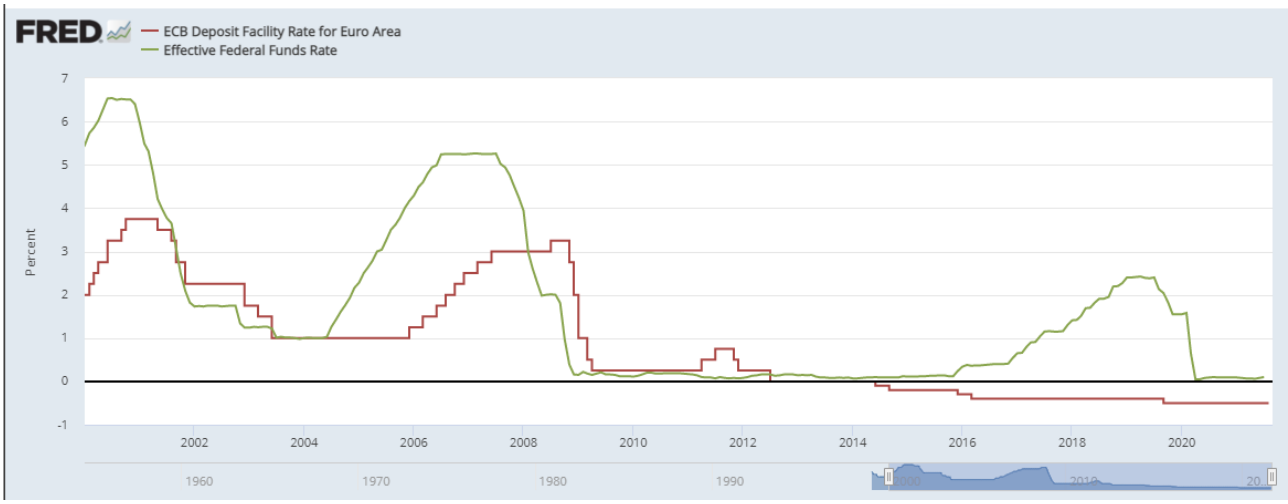
Some post-Great Recession stylised facts

The economic and financial shocks that rocked the global economy and markets in 2008-10 and the period since – at least until the onset of the 'Lockdown crisis' of 2020-21 – caused some major changes in both financial market pricing and in what we would consider the 'steady state' growth rate of key macroeconomic variables both in developed and developing economies.

Here we provide an overview of the most significant stylised facts about the European and the US economy.

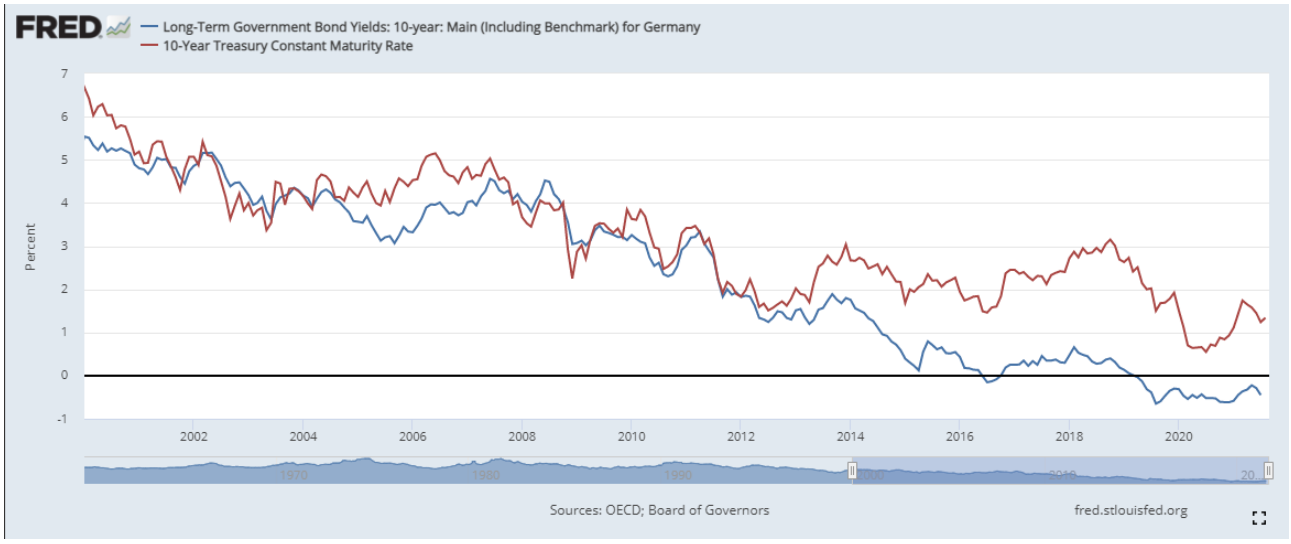
First, in both Europe and the US, we have seen a very sharp drop in real and nominal interest rates compared to the situation before 2008, as illustrated in the graphs below.

The key policy rates of the European Central Bank (ECB) and the Federal Reserve are presented below.



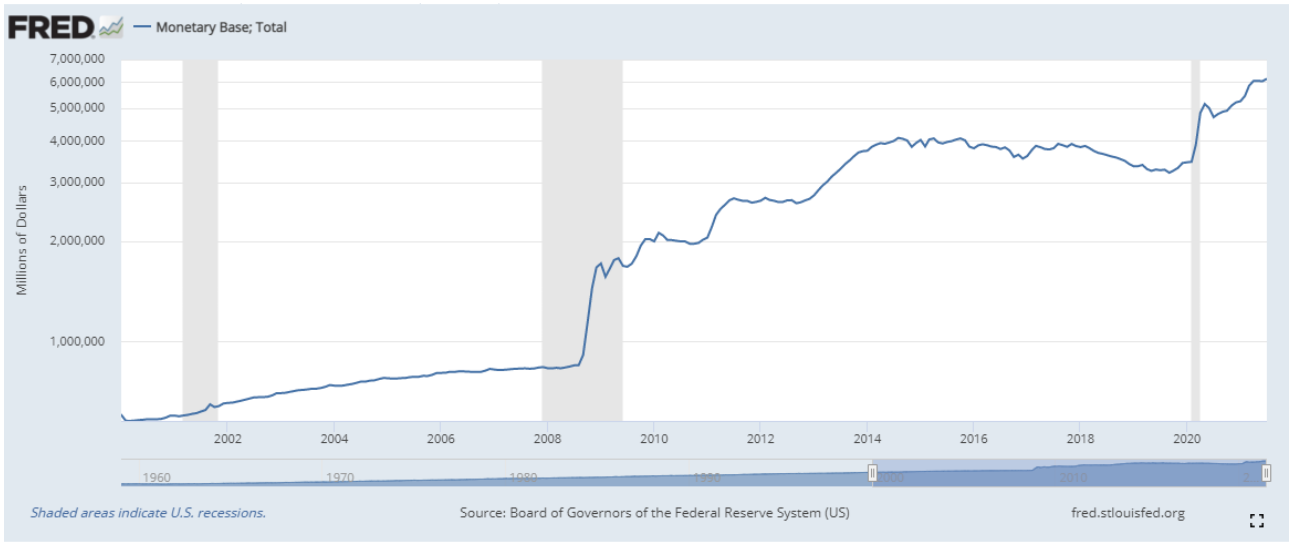
Rates were slashed to essentially zero during and after the Great Recession of 2008-9. Even when the Federal Reserve started increasing interest rates in 2015-16, they did not return to pre-2008 peak levels.

We see the same pattern in government bond yields, as illustrated below with US and German 10-year bond yields.



Again, we see that bond yields have declined sharply since 2007. In Germany, yields even turned negative, where they remain today.

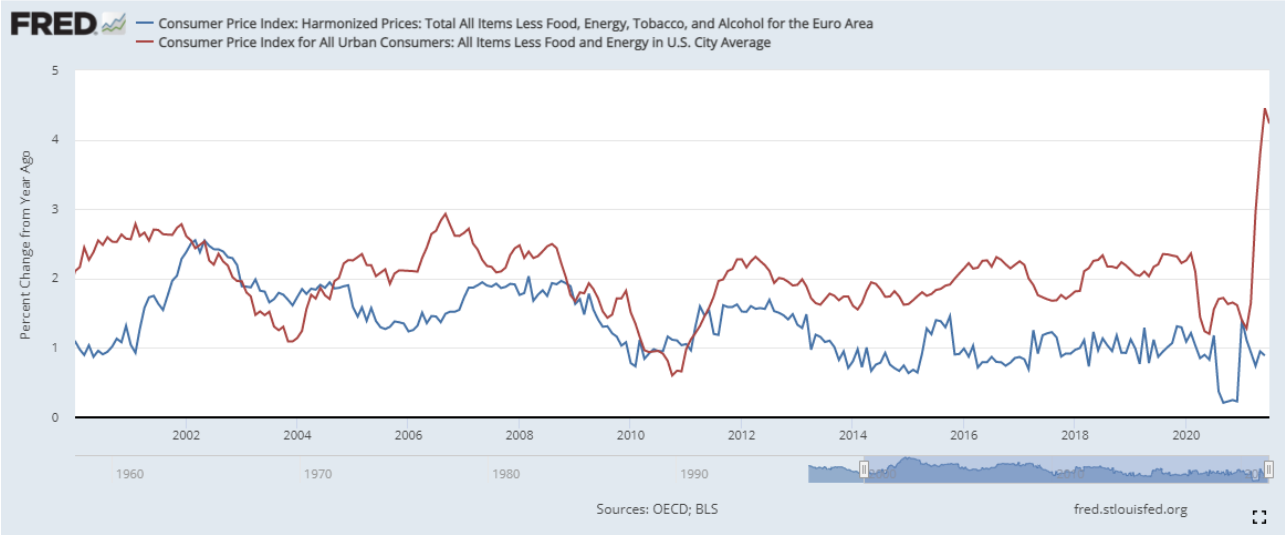
In addition to cutting key policy rates, central banks around the world also responded to the shocks of 2008-10 by significantly increasing their money bases through what has come to be known as *quantitative easing*. This process is illustrated below for the US.



Here we see that the US money base increased sharply in 2008 and the expansion continued at an accelerated pace until 2014-15, when the Federal Reserve initiated a period of so-called 'tapering', first slowing the rate of growth of the money base before reducing it outright in

2018-20. This later period – and what followed after the Covid-19 crisis hit in 2020 – is not the main focus of this paper, however.

Despite the sharp drop in rates and yields and the marked increase in the money base, inflation remained extremely subdued in most of the post-2008 period, as shown in the graph below.



We here look at core inflation in the euro zone and the US. In both areas, inflation has remained around or even below the 2 percent targets set by the ECB and the Federal Reserve[2].

This phenomenon has puzzled some observers and central bankers, since lower rates and yields, combined with an expansion in the money base, normally is considered monetary easing, which should be expected to spur inflation.

However, as we will see below, a simple expansion of a textbook IS/LM model which takes the demand for 'safe assets' into account can explain why inflation has remained subdued despite lower rates and yields and an expanded money base.

[2] The inflation targets set by the ECB and the Federal Reserve are not defined identically and have changed slightly over the past decade; nevertheless, both central banks aim to maintain price stability by ensuring that inflation remains around 2 percent over time.

An altered version of the IS/LM model

The purpose of this paper is to explain in a simple model the stylised facts of the post-2008 economy: low rates and yields, a significant expansion of the money base, *and* low inflation.

We start with a textbook IS/LM model (see for example Mankiw 2019) and see how far that can take us.

The first step is a standard money demand function:

(1) $m=p-\alpha*r$

Where m is the growth rate of money supply, p is inflation, and r is the nominal interest rate; α is a coefficient.

We have assumed away real GDP, which would ordinarily enter the money demand equation, because we are not concerned with any impact on the real economy but only on how monetary conditions and bond market pricing are affected.

Next, we define the money supply as (2):

(2) $m=m^s=m^*$

We assume that money supply growth is fixed at a given rate (m^*) set by the central bank.

The next part of our model reflects the government bond market.

Demand for government bonds is presented as:

(3) $b=\beta*r+s$

Where b is the bond demand, β is a coefficient, and s is the regulatory determined demand for bonds; s is assumed to be exogenous.

Next, we define the equilibrium in the bond market:

$$(4)\ b=b^s$$

Where b^s is a fixed growth rate of bond supply set by the fiscal authorities.

We see that this is a rudimentary version of the standard textbook IS/LM model – or what we more correctly might call an BR/LM model, as we are interested in the relationship between financial regulation (the demand for 'safe assets'), the bond market, and the money market.

Solving the model

The model as constructed can be easily solved, indicating the money market equilibrium:

(2) => (1):

$$(1)'\ m^s= p-\alpha*r \Rightarrow$$
$$(1)''\ p=m^s+ \alpha*r$$

This is the standard textbook result – an increase the money supply will at a given interest rate (price level) increase (decrease) the price level (interest rate level).

Similarly, we find the bond market equilibrium:

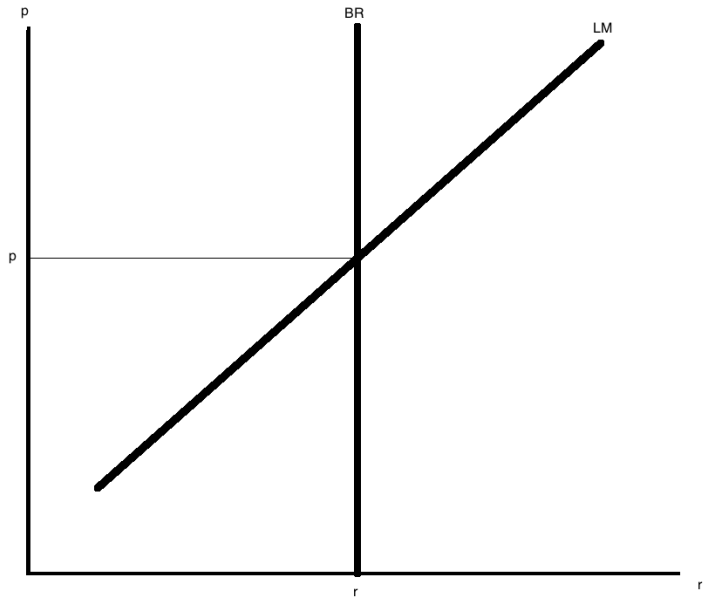
(4) => (3):

$$(3)'\ b^s=\beta*r+s \Rightarrow$$
$$(3)''\ r=(b^s -s)/\beta$$

The impact of a regulatory increase in bond demand

We can now use the model to determine the price level and interest rate level. Notice that contrary to the standard IS/LM model, where we keep the price level fixed, here we allow the price level to change as we are interested in – among other things – how changes in the demand for safe assets (government bonds) influence inflation.

The graph below illustrates the combined equilibrium in the *p-r* space of our simple (BR-LM) model for both the money and the bond markets.

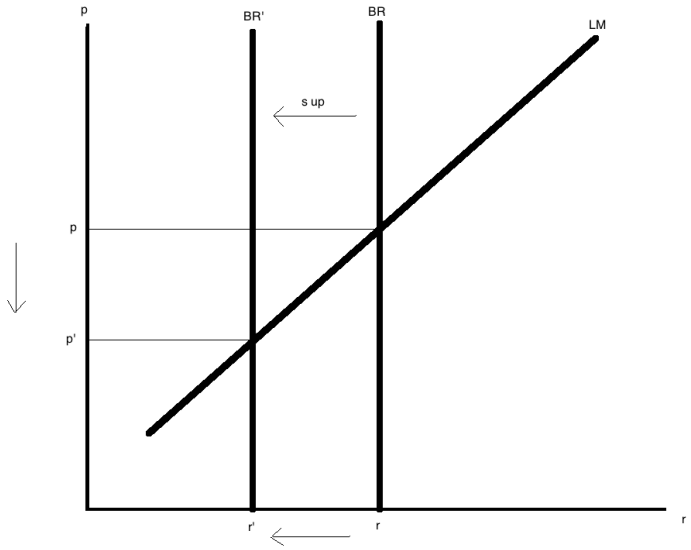


Note the vertical BR curve and the upward-sloping LM curve.

We can now illustrate the impact of a regulatory increase in bond demand through an increase in *s*.

We could think of this as pension funds, banks, and other financial institutions being forced to hold a large stock of bonds in their portfolios.

In our diagram an increase in *s* ('s up') shifts the BR curve to the left. This follows directly from equation (3)'', where higher demand from bonds (an increase in *s*) will cause the interest rate *r* to drop as the supply of bonds (b^s) is assumed to be fixed.



This in turn means that to ensure equilibrium in the money market (the LM curve), the price level (inflation) will have to drop. This happens through the money demand function – for a given money supply, any reduction in the interest rate will cause a drop in price level (inflation) due to an increase in money demand.

As shown, a leftward shift in the BR curves (due to an increase in *s*) will cause both inflation (p) and the interest rate (r) to drop.

What we are observing here is a tightening of monetary conditions (money demand increases relative to the money supply) due to a portfolio rebalancing effect.

When pension funds, banks etc. are forced to hold more bonds, they will also move to increase the demand for money. For a given money supply (or here, for a fixed growth rate for m), this will be deflationary and cause p to drop.

Hence, in this simple set-up, increased bond demand is *deflationary*.

A critical assumption in the model, however, is that the central bank *allows* this to happen. As we will see below, if the central bank has a credible inflation target, the results will be different.

Forced bond demand in a model with credible inflation targeting

'Real-life' central banks like the ECB or the Federal Reserve often officially target inflation.

Our model can be altered to take this into account.

We can think of inflation targeting in our simple model as a situation in which the central bank will always adjust the money supply to hit the inflation target.

In the model, we can reflect this simply by replacing (2) with the following equation:

(2)' $p=p^T$

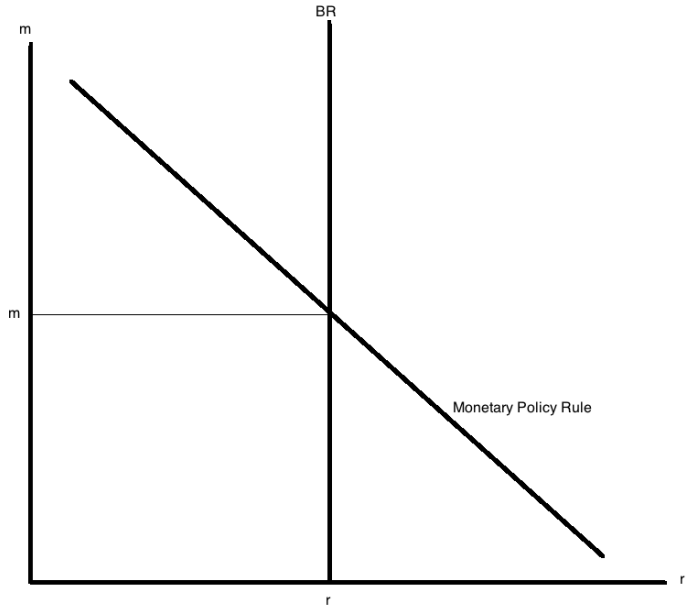
Where p is inflation and p^T is the inflation target. With this change, m is determined by p^T – or m is always set to offset any positive or negative shock that moves p away from p^T.

We can now solve a new money market equilibrium – (2)' => (1)

(1) '' $m=p^T-\alpha*r$

While (1) is a money demand function, (1)'' is essentially the central bank's policy rule under 'perfect' inflation targeting.

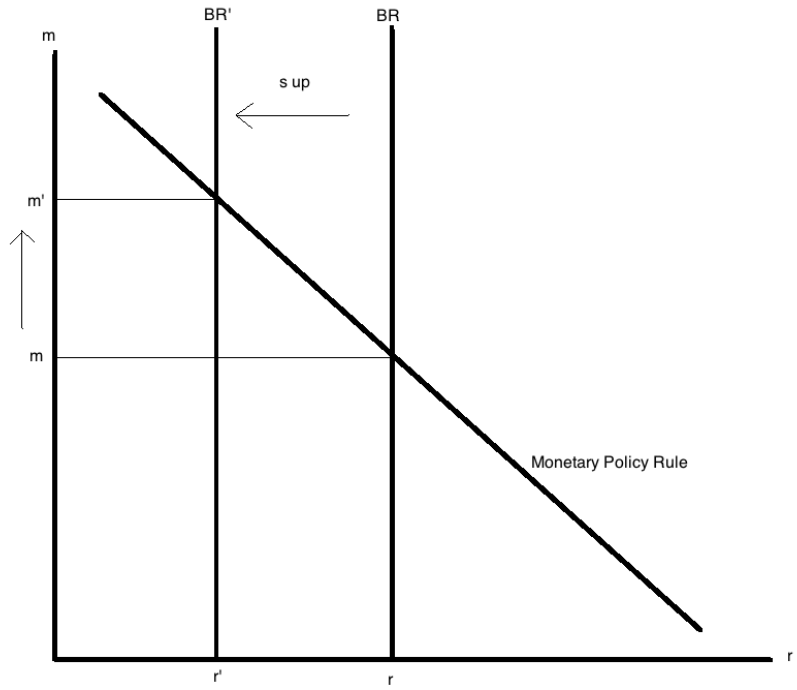
We can now describe an economy under inflation targeting in the graph below.



The graph shows the combination of money supply growth (m) and interest rate (r) which ensures that the inflation target is always met for a given demand and supply of bonds.

Implied monetary policy reaction to increased bond demand under inflation targeting

We can now illustrate in the graph below how monetary policy *needs* to respond to a regulatory driven increase in bond demand to ensure the inflation target is always hit.



The mechanism works as follows.

An increase in bond demand leads to an increase in money demand through a portfolio rebalancing effect. This causes inflation to drop below the inflation target. However, since the central bank is assumed to be a 'perfect' inflation targeter, it will increase money supply growth (m) to fully offset the deflationary impact of higher bond (and money) demand.

The conclusion to be drawn from this simple model is that during periods of increased bond demand – for example due to stricter collateral rules – money supply needs to be increased to curb deflationary pressures.

To put it another way, the natural – and necessary – monetary response to stricter collateral rules is *quantitative easing*.

In this regard, it should be noted that it is not the increase in money supply growth – what Milton Friedman (1969) called a *liquidity effect* – which causes the interest rate to drop.

Rather the causality in our model runs the other way – increased bond demand causes r to drop, resulting in a pick-up in money demand. To offset the deflationary effects of this, the central bank needs to increase money supply growth.

In fact, an increase in money supply growth (as, for example, when the central bank increases its inflation target) will have no impact on the interest rate level in our model, because the BR curve is vertical.

We could of course incorporate into the model a positive correlation between interest rates and inflation expectations (the Fischer equation), and in such a model higher money supply would cause the interest rate to increase.

However, this is not what we want to investigate here. Rather, we want to illustrate the implications for monetary policy and monetary conditions of stricter collateral rules (higher bond demand).

We have shown that in both variations of our model, an increase in bond demand causes interest rates to decline.

However, whether this is deflationary depends entirely on whether the central bank is credibly committed hitting its inflation target.

This feature of the model might help explain why inflation expectations and bond yields in the US have remained subdued since 2008, despite a significant increase in the money base.

Hence, based on the model, we speculate that monetary policy is far from impotent, and that the expansionary impact of the larger US money base has to a large extent been offset by a regulatory increase in the demand for bonds and other 'safe assets'.

Re-cap: Stylised facts and the model framework

The theoretical discussion above appears to explain the stylised facts of the post-2008 economy: subdued inflation, low interest rates and bond yields, and a significant increase in the money base.

As regulatory changes sharply increased the demand for safe assets in the form of government bonds, bond yields were pushed down and a portfolio rebalancing effect spurred the demand for base money.

For a given money supply, this set of developments is deflationary. Inflation targeting central banks like the Federal Reserve and the ECB have had to offset these deflationary effects by increasing the money base.

Obviously, many other factors are in play, but even this simple theoretical model seems to explain quite well what we have experienced since 2008.

The outbreak of the global Covid-19 pandemic, however, caused a marked shift in economic policy around the world.

The model framework discussed in this paper is not designed to explain the impact of the pandemic and the macroeconomic policy response to it on financial markets and the economy. Nonetheless, this policy response offers an opportunity to 'stress-test' the model framework and see whether it might provide some insights into financial and economic developments in 2020-21.

Below, we use the model to discuss those developments, with a focus on the US.

2020: the initial shock

We separate the discussion here into two parts, first considering the initial shock of the Covid-19 pandemic in 2020 and then turning to the policy response from US monetary and fiscal authorities.

Again, it should be stressed that the model framework is not constructed to discuss all aspects of the Covid-19-crisis. Here we focus exclusively on the factors that have been central to our discussion above – the demand for 'safe assets' and the policy response.

While the surge in demand for 'safe assets' after 2008 has largely been driven by regulatory factors, it should not be assumed that such is always the case.

Indeed, what we saw as the pandemic spread globally in March-April 2020 was demand for 'safe assets' triggered not by regulatory changes but rather by growing risk aversion among market participants.

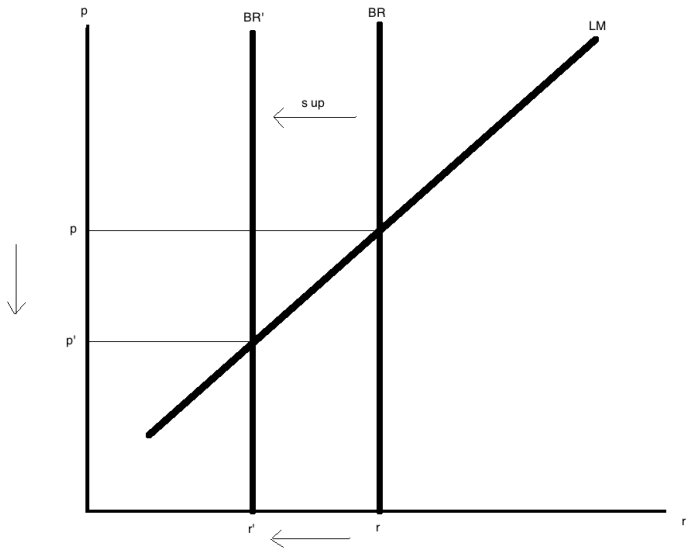
In the model above that can be expressed in equation (3):

$$b=\beta*r+s$$

Where b is the demand for government bonds, which is positively related to the interest rate/bond yield, and shift-variable s is assumed to be determined by financial regulation.

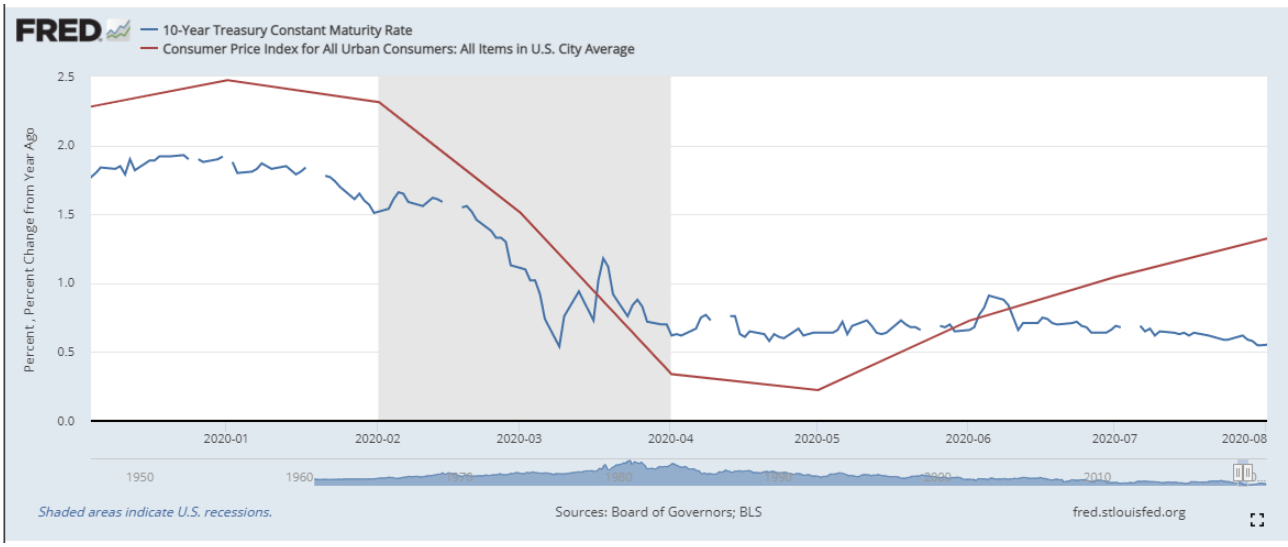
However, we can equally well assume that s is driven by exogenous changes in risk appetite. If investors turn more risk-averse, they will demand more government bonds (s increases).

We can illustrate this behaviour in the graph below.



Greater risk aversion causes the demand for bonds to go up. This is presented in the graph as a leftward shift in the BR curve. For a given monetary supply, this shift will cause both inflation and interest rates to drop as we move along the LM curve.

Market developments in March-April 2020 seem to have followed this pattern, as the graph below illustrates.



Here we see that both US inflation and 10-year US Treasuries dropped sharply as the shock first hit in February-March 2020 and subsequently unfolded in April-May.

The onset of the pandemic was also accompanied by a plunge in economic activity and a sudden spike of unemployment in the US. This is what one would expect in a world with price and wage rigidities, which are not modelled in the framework discussed above.

The main point here, however, is that we can understand the drop in inflation and bond yields as a consequence of the sudden surge in demand for 'safe assets' and thus demand for money, which is deflationary for a given money supply.

2020-21: an aggressive policy response

As discussed above, the appropriate monetary policy response for an inflation-targeting central bank to a deflationary increase in the demand for 'safe assets' is to increase the money base to offset these deflationary effects, thus ensuring that the inflation target (2% in the US and the euro zone) is met.

In our model framework, this would be described as a leftward shift in the LM curve as the money base (m) is increased. The central bank would continue to increase m until inflation returned to the target rate.

This of course is exactly how the Federal Reserve responded to the Covid-19 shock. The process of monetary easing was initiated on 3 March 2020, when the Fed announced that it had lowered *'the target range for the federal funds rate by 1/2 percentage point, to 1 to 1-1/4 percent.'* (Federal Open Market Committee statement, 3 March 2020)

More substantial action was taken in the following weeks, as the Federal Reserve announced a series of measures designed to support the financial system and to increase the money base.

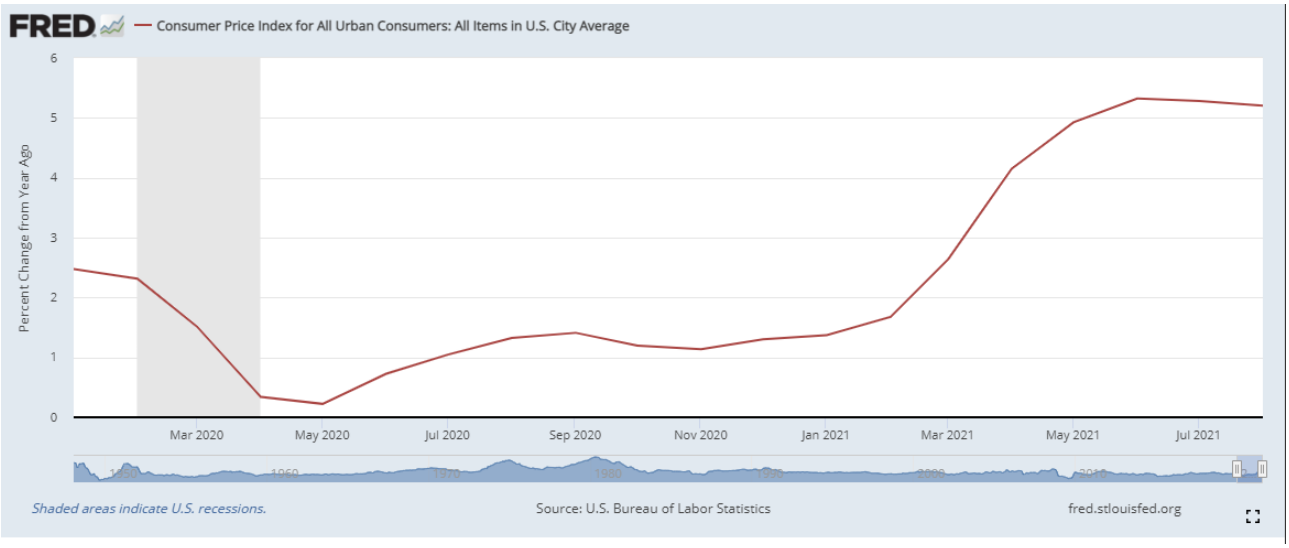
In our model framework, these actions work through two channels: 1) directly, through the expansion of the money base; and 2) through expectations, which can make investors less risk-averse and thus lower the demand for 'safe assets.' In the model, this pushes up m and pulls

down *s* – causing the BR curve to shift rightwards and LM curve leftwards. The result is that inflation moves up again along with bond yields.

How much bond yields will increase depends on the magnitude of the money base expansion and the decline in demand for 'safe assets.' Even so, the impact on inflation is unquestionable.

Did the Fed suspend its inflation target?

The Federal Reserve's aggressive monetary policy easing clearly succeeded in offsetting the deflationary shock. In fact, US inflation not only returned to the Fed's 2 percent inflation target – it significantly overshot it, as the graph below shows.



It is beyond this paper's scope to discuss the future outlook for inflation and monetary policy in the US, but if one follows the course of inflation, particularly in 2021, then it is rather clear that the Federal Reserve de facto has suspended the 2 percent inflation target or at least will tacitly consent to an overshoot for a sustained period.

Had policymakers followed a strict version of what above was called a 'credible inflation target', then the Federal Reserve should have long ago (as of October 2021) started scaling back asset purchases (reduced the growth rate of the money supply *m*).

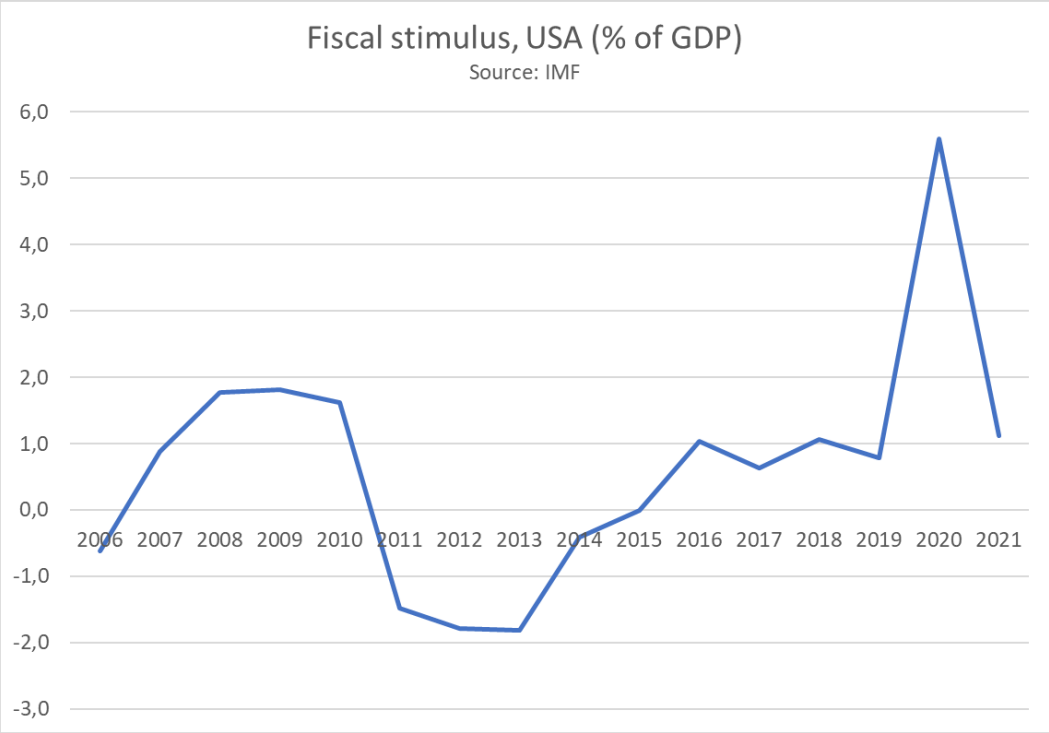
Aggressive fiscal policy easing on top of monetary easing

Instead of scaling back quantitative easing, the Federal Reserve continued monetary expansion well after US inflation (and inflation expectations) breached the 2 percent target.

In addition to this aggressive monetary easing, we have also observed a very substantial relaxation of fiscal policy in the US.

The International Monetary Fund estimates (IMF, July 2021) that the US structural budget deficit more than doubled from 6.1 percent of GDP in 2019 to 12.9 percent in 2021, with most of the increase coming in 2020.

Hence, the total fiscal easing in the US amounted to more than 6 percent of GDP in 2020-21. By comparison, the fiscal stimulus in 2008-10 was only about 5 percent of GDP.



That makes the total fiscal easing in 2020-21 slightly larger than that of 2008-10. It is also notable that the fiscal stimulus was significantly more 'frontloaded', with most of the expansion

coming in 2020. Furthermore, the fiscal easing was undertaken at a time when the structural budget deficit was already substantially larger than it had been prior to 2008.

Of course, the scope and scale of fiscal easing should be discussed not only in terms of the impact on the budget deficit in a given year, but also in terms of whether the fiscal easing is permanent or temporary.

In this regard, there are very strong arguments for seeing the fiscal easing of 2020-21 as a temporary measure. Much of it was done through direct cash transfers from the government to US citizens, to a far greater extent than in 2008-10.

Following the framework discussed above, however, we will ignore such expectational effects and instead view fiscal policy solely through its impact on the supply of 'safe assets' (government bonds).

Hence, within our model framework, such fiscal easing should be seen as increase in the supply of government bonds (b^s).

Such an increase in b^s will have the opposite effect of an increase in the demand for 'safe assets'. If higher demand shifts the BR curve to the left, we can offset this movement by increasing the supply of 'safe assets' through fiscal easing.

Here it should be noted that this effect is not a traditional *Keynesian effect*, where fiscal policy directly affects aggregate demand in the economy, but rather operates through an offsetting effect on interest rates, which lowers the demand for money as interest rates are pushed *up* in response to the initial shock to the demand for 'safe assets'.

Fiscal easing through a portfolio re-balancing effect thus leads to an easing of monetary conditions, as monetary demand drops relative to the supply of money.

How important this effect has been relative to the 'pure' monetary easing effect is hard to say based on a purely theoretical discussion, but it is evident that *both* monetary easing and an

increase in the supply of government bonds will be inflationary, and we have clearly observed a sharp acceleration in inflation, contrary to what we saw in 2008-10.

This would appear to indicate that the combination of fiscal and monetary easing had a much greater inflationary impact than in 2008-10.

While increased financial regulation, among other factors, spurred demand for 'safe assets' in 2008 and the following years, we didn't see a similar deflationary shock in 2020-21. During the latter crisis, the supply of 'safe assets' were ample and this, combined with a more aggressive monetary expansion than in 2008-10, changed the outcome.

The foregoing strongly suggests that monetary policy was not nearly as important as some have argued in the aftermath of the 2008 shock. Rather, the impact of monetary policy should be analysed by taking demand (regulation, risk appetite, demography) and supply (fiscal policy) of 'safe assets' into account.

Conclusion

In this paper, we have tried to outline a theoretical framework for understanding the development of inflation, interest rates and the money base in recent years. Our hope is that this attempt will help explain why a very substantial expansion of the money base (and low interest rates) did not produce a sharp acceleration in inflation.

This paper's main point is that a sharp increase in the demand for 'safe assets' (government bonds) – caused, for example, by demographic trends, growing risk aversion, and stricter financial regulation – will cause interest rates to decline significantly, leading to a sharp increase in the demand for money.

This will be deflationary for a given supply of money. An inflation-targeting central bank – like the Federal Reserve or the ECB – will therefore be forced to expand the money base sharply to offset the deflationary impact of rising demand for 'safe assets' (government bonds).

Hence, in economies with an inflation-targeting central bank, an increase in the demand for 'safe assets' will automatically trigger an expansion of the money base without causing an overshoot of the inflation target.

The model framework is similarly used to discuss the monetary and fiscal response (particularly in the US) to the Covid-19 crisis. It is shown that, contrary to 2008, the pandemic shock of 2020 has not caused a marked and prolonged increase in demand for 'safe assets'. Consequently, the sharp increase in the US money supply in this case *is* inflationary.

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