

Discussion of:
Macroeconomic and Fiscal Consequences Of
Quantitative Easing

by

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Overview ¹

This paper provides a model-based evaluation of Quantitative Easing (QE). It examines the effectiveness of this tool in providing stimulus to the economy under different scenarios. It then explores the implications for fiscal capacity as compared to other stimulus tools. The latter is an increasingly relevant question given the current fiscal position of the U.S. economy.

There are three key punch lines for QE. First, the authors argue that it is most useful in deep recessions where the effective lower bound (ELB) on the short term interest is expected to bind for a considerable period. Second, because it reduces long term rates, it expands fiscal capacity (i.e reduces government debt), especially compared to stimulus from fiscal policy which tends to raise rates. Third, so long as the Treasury provides backing to the central bank, it is not a matter of concern that QE might entail periods of negative returns on the central bank's portfolio. What matters is the impact of QE on the government's consolidated fiscal position, which factors in Treasury backing of the central bank balance sheet.

In what follows I first give an overview of how I think about QE. I will then describe how this paper fits in. Finally, I will present a few comments.

Quantitative Easing

QE is essentially financial intermediation by the central bank. The central bank holds on the asset side of its balance sheet long-term securities such as government bonds and agency debt. It funds these holdings by issuing short-term interest-bearing reserves. The long duration of assets and short duration of liabilities mirrors many private financial intermediaries, particularly investment banks. A key question is what is the advantage the central bank has relative to private financial institutions in performing this kind of intermediation. The answer is the central bank can obtain funds elastically by issuing riskless liabilities that take the form of interest-bearing reserves. This contrasts with private intermediaries who may face borrowing restrictions, which limits their ability to arbitrage returns between long and short term securities.

So how does QE affect the economy? First note that we can express the yield to maturity on a T period long term bond $\bar{r}_{L,t}$ as the sum of two terms: a weighted average of expected short term rates $r_{S,t+i}$ over the life of the bond and the term premium χ_t , which provides compensation for risk.

$$\bar{r}_{L,t} = \mathbb{E} \left\{ \sum_{i=0}^{T-1} \omega_i \cdot r_{S,t+i} \right\} + \chi_t$$

¹Thanks to Mary Zhang for excellent research assistance.

Quantitative easing then reduces long term rates by pushing down term premia.

To see how, in Figure 1 we drill down by examining central bank and private bank balance sheets. The right panel illustrates what we have just discussed: private banks face maturity mismatch: assets are long maturity and liabilities are short. Because fluctuations in short rates affect long term bond prices, these banks are exposed to interest rate risk, commonly known as duration risk. QE effectively involves transferring duration risk from private bank balance sheets to the central bank balance sheet. As the central bank expands its balance sheet by taking on long term bonds funded by reserves, it absorbs more duration risk. Conversely, by exchanging long term bonds for reserves, private banks are reducing their risk exposure. The reduced risk raises the value of long term bonds, leading to an increase in price and hence a decline in the term premium. Long term rates decline as a consequence.

Key to this transmission is that the central bank is better able to absorb duration risk than are private banks. As noted earlier, it is able to fund its asset position by issuing riskless reserves. It is able to do so due to the implicit full backing of the Treasury. Private banks do not have this luxury and as a result typically face frictions in the intermediation process. Note that absent these frictions QE would be neutral, with no effect on bond prices and term premia. QE would simply involve substituting central bank intermediation for private bank intermediation.

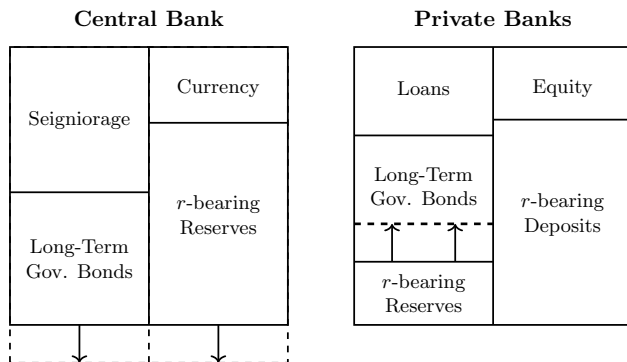


Figure 1: Central Bank and Private Bank Balance Sheets and QE

I next turn to how QE looks in practice. The blue line in Figure 2 is Federal Reserve assets which consist mostly of long term government bonds and agency debt. The red line is interest bearing liabilities which are mainly reserves. The difference between the two lines is currency. There are two main periods where the balance sheet expanded: (i) the Great Financial Crisis and its aftermath, 2008 -14 and (ii) the Pandemic downturn, 2020-21 and after. In each case the Federal Reserve initiated the program by aggressively increasing asset purchases

in response to a meltdown of financial markets. In the wake of the Lehman Brothers collapse which had left deflated security prices, the Bernanke Fed, initiated QE by purchasing roughly a trillion dollars of government bonds and agency mortgage backed securities. While the financial crisis was largely over by mid 2009 the economy remained weak. Conventional monetary policy was off the table with short term interest rates at the ELB. Accordingly, in an effort to stimulate the economy by pushing down long term rates, the Fed engineered a steady increase in its balance sheet. This first phase of QE ended in 2015 and the balance sheet remained stable until the pandemic.

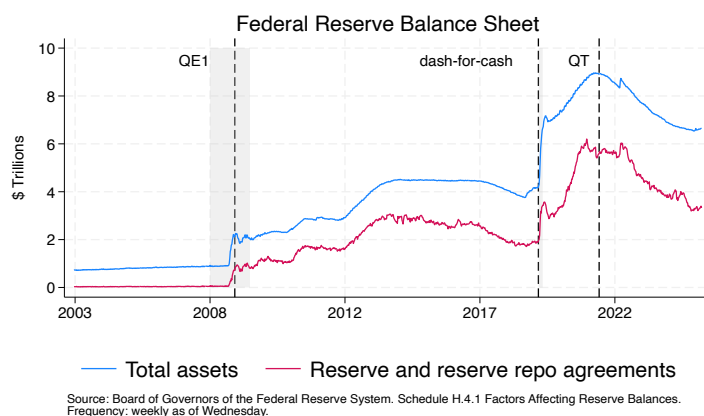


Figure 2: Federal Reserve Balance Sheet Over Time

The pandemic recession featured a similar pattern for QE to what occurred during the GFC, except perhaps even more aggressive. In response to a bond market collapse following the onset of the pandemic, the Fed purchased roughly two trillion in long term securities, double the amount purchased in the start up of QE by the Bernanke Fed. The bond market stabilized in response, but as during the GFC the economy remained weak with the short rate at the ELB. Similarly, the Fed engineered a steady increase in purchases which continued through late 2021. The inflation surge, which began in the spring of 2021 induced the Fed to change course, leading to the third phase of balance sheet policy aimed at slowing inflation. Beginning in late 2021 the Fed began to sell off securities, a policy dubbed quantitative tightening (or QT) with the aim of pushing up term premia and hence long term rates in order to slow inflation. The sell off continued until 2025.

We now turn to our operating hypothesis that QE works by pushing down term premia (and vice versa for QT). In Figure 3 we plot the Fed's balance sheet against the Federal Reserve Bank of New York estimate of the term premium over the sample 1995 to 2025. The blue line is the size of the Fed balance

sheet measured by its asset side and the red line is the term premium. There are several points to note. First, as the theory would suggest, term premia are significantly higher in the sample prior to the onset of QE in December 2008, than in the sample afterwards. The term premia is 1.84 % pre-QE and 0.32 % post, a roughly 150 basis point difference. Second, again as the theory would suggest, the onset of QT in late 2021 led to a steady increase in the term premium, which rose to nearly one percent by the end of the sample. Finally, observe that the premium declined steadily from 2015 to 19 even though the Fed’s balance sheet remained stable. As Haddad et al. (2023) have argued, what matters for the term premium is not only the current Fed balance sheet, but also its expected future path. At this time markets were increasingly accepting of the idea that the Fed would step in to protect the bond market with asset purchases. The net effect was lower perceived risk to the bonds and hence a lower term premium.

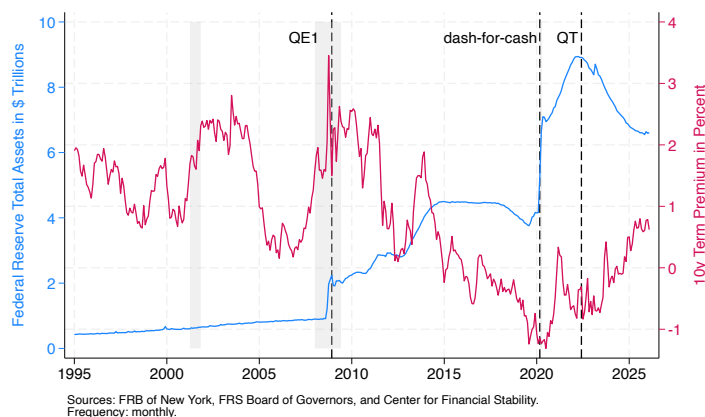


Figure 3: Fed Balance Sheet Assets and Treasury Term Premium (10-Yr)

Average term premium
Pre-QE1: 1.84 % Post-QE1: 0.32 %

The Author’s Analysis

The authors’ goal is to develop a model that is consistent with the kinds of facts presented above. They do not explicitly model the key role of duration risk. Rather the aim is a parsimonious framework that can capture the reduced form relation between QE and term premia. Some of the assumptions are quite strong. But I would describe this as an “ends justify the mean” approach as the model is only a modest departure from the standard DSGE framework and can be reasonably used to analyze QE.

The baseline framework is a New Keynesian model with consumption goods only. There are two important modifications. First, the market for long term bonds is segmented, which matters for QE. Second, there is behavioral discounting of the future as in Gabaix (2020). The net effect is to make forward guidance a less effective way to manipulate long term rates than QE.

The segmented market structure works as follows. Households come in two types. First a fraction are unrestricted, meaning that they can hold both short term and long term bonds. However, they face a cost to holding long term bonds. This cost plays the role of the term premium by introducing a wedge between the returns on short versus long term bonds. The authors assume that the holding cost is increasing in the supply of privately traded long-term bonds. While a little fuzzy on the underlying microeconomics, the net effect is that increase in the supply of long term bonds boosts this wedge “term premium”. As a result, QE, which reduces the supply of privately traded long term bonds reduces the “term premium” and hence the long term bond rate. To motivate why the long term rate affects spending independently of the short term rate, the authors add restricted agents who only hold long term bonds. This is a somewhat unusual assumption, since the evidence suggests that if households are restricted at all, it is more likely to accessing the long term bond market than the short. But given this constraint, movements in the long term rate induced by QE influence spending by the restricted agents which feeds into an impact on the whole economy. While one can debate the details of the authors’ framework, the way the model captures the reduced form transmission of QE is consistent with conventional wisdom.

The authors then proceed to use the model for two types of exercises. The first is to evaluate the effectiveness QE as a stimulus tool under different scenarios. Figure 4 illustrates the case where QE is most effective, a deep and prolonged recession, triggered by a large negative demand shock. The blue line in each panel is the case without QE while the red dashed line is the case where the central bank responds with aggressive asset purchases. Output drops 8 percent after 6 or 7 quarters and does not fully return to trend until nearly thirty quarters out. Inflation displays a similar pattern, with a peak contraction of one and a half percentage points. Importantly, the policy rate remains at the ELB for 20 quarters before finally lifting off.

We now turn to the case with QE. As the economy contracts, the central bank expands its balance sheet by increasing long term bonds by an amount equal to ten percent of GDP, an amount roughly equal to the first phase of QE during the GFC (see Figure 2). This policy moderates the drop in output and inflation by about fifteen percent. It does so by reducing the term premium, as can be seen in the left panel on the bottom row. Note that because the ELB is binding for a considerable period, conventional monetary policy is off the table. By giving the central bank leverage over long term rates, QE provides an alternative stimulus tool in this situation. Further, due to behavioral discounting, QE is a

more effective way to reduce long rates than is forward guidance. In the end, the authors' analysis provides a justification for the Federal Reserve's historical tendency to expand its balance sheet during prolonged periods of weak economy with binding ELB, as illustrated in Figure 2.

The authors then explore the impact of the QE response on fiscal capacity. As the middle panel in the bottom row of Figure 4 shows, after 30 quarters the government debt to GDP ratio is eight percent lower due to the reaction of QE. The reason for this improvement in fiscal capacity depends on both direct and indirect effects, as illustrated in Figure 5. The direct effects include the reduction in interest payment due to the decline in long rates (the purple area) and the rise in central bank profits from expanding its balance sheet. The indirect effects come from rise in tax revenues (including the inflation tax) due to the stabilizing impact of QE on real activity and inflation. The authors find that the direct effects account for roughly a quarter of the improvement in fiscal policy, with the remaining three quarters is due to the indirect effects. Unlike for the indirect effects, the estimates of the direct effects are unlikely to be model dependent, which means we can take the direct effects as a reasonable lower bound estimate of the impact of QE on fiscal capacity. A corollary result is that the impact of QE on fiscal capacity is particularly favorable as compared to stimulus from government expenditures, since latter tends to increase interest rates.

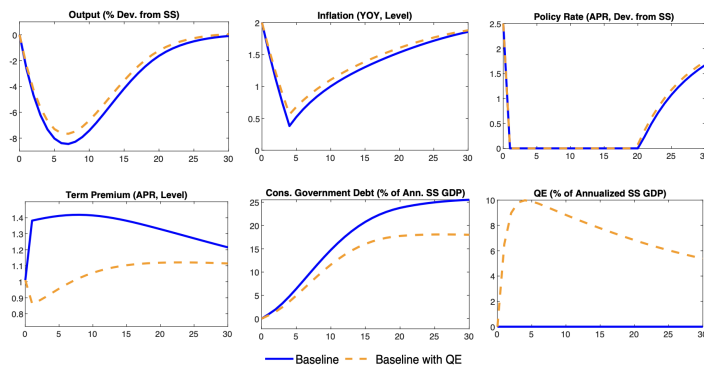


Figure 4: Deep Recession without and with QE

Comments

I now turn to three comments.

Comment 1: As Keynes wrote in the General Theory, "There are many slips from the cup to the lip". In the authors' model QE is a precision tool.

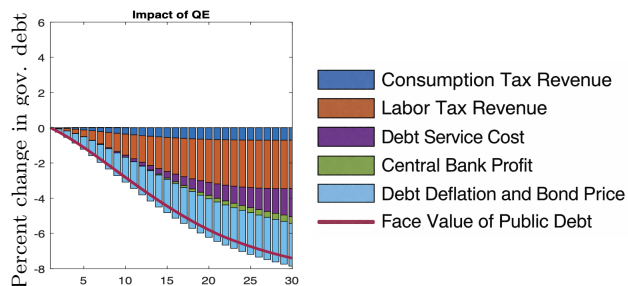


Figure 5: Decomposition of Effects of QE on Government Debt

In reality it's highly imprecise. First the key object in the transmission of QE, the term premium, is difficult to measure. Doing so requires disentangling the expected path of short rates from the risk compensation. In addition, the link between the Fed balance sheet and term premia is highly imprecise. As I have argued it is state dependent, strongest when financial markets are in distress, as both the theory and evidence suggest. Conversely, the smoother financial markets are operating, the weaker the effects of QE on term premia. This noisy impact of QE contrasts with conventional monetary policy which has very tight control over short rates. Third, as I mentioned earlier, the term premium depends not only on current policy but on expected future policy. So disentangling what's going on with term premia is not trivial. Finally, the evidence on the effects of QE is limited. Now, to be clear, there are many event studies showing that QE affects term premia and long rates. No quibble here. But we have very little direct evidence on what the output and inflation effects are which we can use to evaluate our models. This contrasts with the vast evidence from monetary and fiscal shocks which reveals not only short term effects on financial variables but also how output and inflation adjust over time.

So where are we left? In my view QE is most effective in extreme situations. It's not a tool for fine-tuning. So what are these extreme situations? First, financial crises. As we saw earlier, aggressive expansions of balance sheet helped moderate financial crises both during the GFC and the pandemic. Second when the economy is recovering from a deep recession and is expected to be at the ELB for a prolonged period, (a situation that the authors have emphasized as ripe for QE.)

Comment 2: In the current climate of a rapidly increasing government debt, QE can increase the incentive for fiscal dominance, a situation where the central bank bears responsibility for maintaining fiscal capacity, as opposed to the Treasury. By adjusting rates to maintain fiscal capacity, the central bank loses the flexibility to stabilize inflation and real activity. Figure 6 illustrates the fiscal pressure the Federal Reserve is under. The red line is the debt-to-GDP ratio, which has risen from less than 50% in 2003 to currently over 100%.

The blue is the ratio of interest payments on the debt to GDP. Until the pandemic, interest-to-GDP remained at a manageable level of one and a half percent, mainly because interest rates were quite low. But in the last couple of years, following the Fed's raising interest rates to fight inflation in 2022, interest payments have skyrocketed to 3.3% of GDP, a number exceeding military spending. Absent any adjustment, the rapidly increasing interest expenditures will precipitate a rapidly deteriorating fiscal capacity in the form of increasing deficits that raise overall debt levels. Moreover, the temptation for the central bank to restore fiscal capacity is increasing the debt to GDP ratio since a given interest rate reduction will have a larger impact on total interest expenditures as the debt increases. The net cost of lowering rates to maintain fiscal capacity, however, will be higher inflation.

Quantitative tightening creates a similar set of incentive problems. Using QT to fight inflation raises term premia and thus reduces fiscal space which could make the central bank reluctant to use QT in a high debt environment.

So where are we left? The temptation to use QE to push rates down and avoid QT so as to not push rates up could lead to an upward drifting Fed balance sheet. What are the costs? In addition to stimulating inflation, increasing the Fed's footprint in private markets could affect allocation. Finally, the Fed portfolio could get so big that its duration risk could test the Treasury's ability to safeguard the Fed's interest bearing liabilities. Bottom line, it's critical for the Fed to establish independence from the fiscal authority.

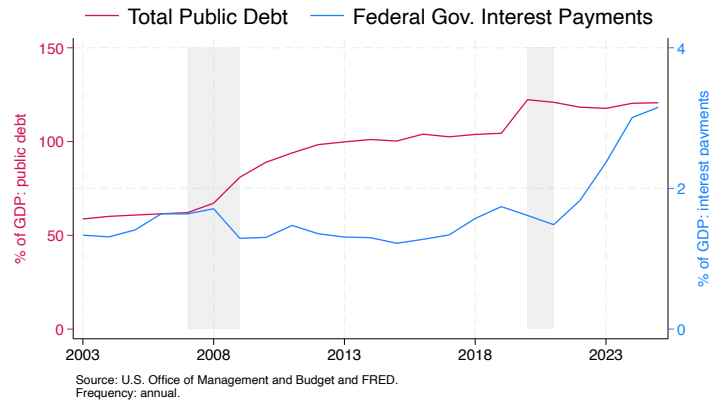


Figure 6: Incentives for Fiscal Dominance

Comment 3: While it is important for the Fed to be independent, QE does require coordination between the fiscal and monetary authorities. As we have discussed, QE works by the central bank shortening the maturity structure

of privately held government bonds in order to drive down term premia and hence long rates. The Treasury, however, also has leverage over the maturity structure. If the central bank reduces long rates by pushing down term premia, the Treasury may be tempted to lengthen the average maturity of its debt to take advantage of relatively lower long term rates. The problem is that by doing so the Treasury will put upward pressure on term premia and long rates, offsetting (at least partially) the central bank's attempt at balance sheet stimulus. As Figure 7 illustrates, there is at least suggestive evidence that the Treasury engages in at least partial offsetting of Fed balance sheet behavior (Greenwood et al. 2014). The red line is debt with maturity greater than a year and the blue line is maturity under a year. Around the two big QE dates there is a surge in longer-term Treasury debt relative to short-term. While the Treasury may not be fully offsetting the Fed balance sheet policies, it is at least pushing in the wrong direction.

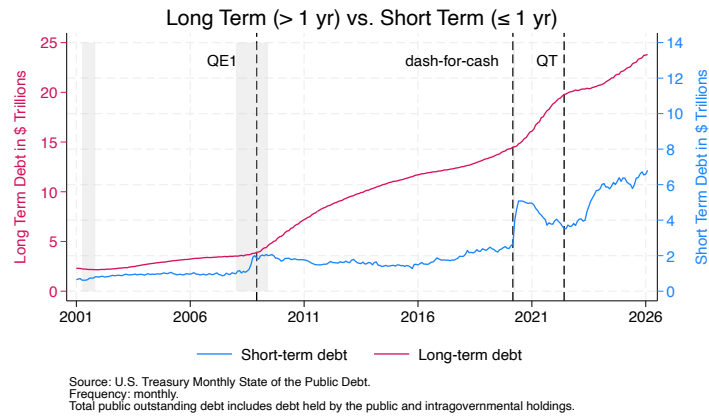


Figure 7: Treasury Debt Management versus Fed QE

Concluding Remarks

This is a very interesting paper on an important topic. Where I am left? QE is effective and powerful in crises, but imprecise, state-dependent, and intertwined with fiscal policy. Understanding these interactions is where future research should focus.

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