



Monetary policy with interest on reserves



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ABSTRACT

I analyze monetary policy with interest on reserves and a large balance sheet. I show that conventional theories do not determine inflation in this regime, so I base the analysis on the fiscal theory of the price level. I find that monetary policy can peg the nominal rate, and determine expected inflation. With sticky prices, monetary policy can also affect real interest rates and output, though higher interest rates raise output and then inflation. The conventional sign requires a coordinated fiscal–monetary policy contraction. I show how conventional new-Keynesian models also imply strong monetary–fiscal policy coordination to obtain the usual signs. I address theoretical controversies. A concluding section places our current regime in a broader historical context, and opines on how optimal fiscal and monetary policy will evolve in the new regime.

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1. Introduction

During the last few years, the Federal Reserve has made two changes that will fundamentally affect monetary policy, or at least the theory of monetary policy, going forward. First, the Fed now pays interest on reserves. Second, the Fed has amassed a large balance sheet, buying about \$3 trillion of assets, and creating about \$3 trillion of bank reserves in return. Before the crisis, banks only held about \$50 billion of reserves. Required reserves – the amounts banks must hold at the Fed corresponding to deposits – are still only about \$80 billion, so almost all of the \$3 trillion are excess reserves, held voluntarily by banks.

When interest rates rise, the Fed has announced that it will maintain the large balance sheet, and pay market interest rates on reserves. Indeed, the Fed will attempt to control short-term interest rates primarily by changing the rate it pays on abundant reserves, rather than by controlling the quantity of reserves via open market operations. This plan is articulated in Chairman [Bernanke's \(2010\)](#) testimony and most recently reinforced in the July 2014 FOMC minutes ([Federal Reserve, 2014](#)).

The Fed seems still to be deciding how long this new regime will last. While it clearly will not aggressively sell assets to soak up reserves, the Fed may sell off assets gradually. It may also let the balance sheet decline gradually as bonds mature, rather than reinvest maturing bonds to keep the balance sheet large. The Fed is not committed to paying market interest on reserves. Much discussion continues around using the spread between interest on reserves and other rates, and the size of the balance sheet, as policy tools. Some voices want the Fed to return to “normal” quickly, meaning a very small amount of non-interest paying reserves. This paper analyzes an interest-on-reserves regime, in which reserves always pay market

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interest and the balance sheet remains large. That analysis may be helpful in the policy debate, by analyzing whether there is much to fear from the interest-on-reserves regime and thus any strong reason to return to the previous configuration (whether one regards that configuration as “normal” or not).

There are many reasons why a large balance sheet, with interest on reserves, is a desirable state of monetary affairs. Friedman (1969) explained that the optimal quantity of money is obtained when there is no interest-rate spread between money and bonds. In this case, the “shoe-leather costs” of money management disappear. More important, in my view, are the benefits for financial stability. \$3 trillion of interest-paying reserves represent \$3 trillion of narrow-banking deposits, and \$3 trillion of the most liquid asset one could want on a bank balance sheet (Cochrane, 2014.).

However, interest on reserves and a large balance sheet, together with the spread of interest-paying electronic money, deeply challenge standard monetary policy analysis. We will continue to be satiated in liquidity. Reserves and short-term treasuries are and will remain essentially perfect substitutes at the margin. Reserve demand becomes indeterminate – banks are indifferent to holding another dollar of reserves and another dollar less short-term treasuries.

Standard answers to fundamental questions such as how the Fed controls real and nominal interest rates, what are the channels by which monetary policy affects the economy and the banking system, and how or whether inflation is determined, all fall apart in this regime.

The standard story says that to tighten, the Fed sells treasuries in exchange for reserves. A lower supply of reserves forces banks to work down a reserve demand curve, bidding up the interest rate. With the reserve requirement binding, banks must reduce lending and deposit creation via the money multiplier. Depending on your tastes, a lending channel and Phillips curve then reduce employment and prices, or less money supply and $MV=PY$ do the same.

In the interest-on-reserves regime, however, there need be no open market operations, and reserve requirements will not come within \$3 trillion of binding. Bank lending and money creation will continue to be completely unaffected by the quantity of reserves.

Not everyone believed this story already – banks had so much funding by non-reservable sources, non-bank credit markets and the shadow-banking system were so large, that the \$50 billion of reserves remaining were essentially meaningless. But now we do not have to argue about that point – the story simply cannot apply any more.

We must face monetary policy with no monetary frictions. Interest-paying reserves are just overnight government debt, held entirely as an asset with no additional liquidity value, which incidentally can be transferred electronically at low cost to make transactions.

Standard theory predicts that inflation is not even determined in an interest on reserves regime. Sargent and Wallace (1985) is a classic example (see also the excellent and wide-ranging Sargent, 2011). Yet, we have several years of experience in the US, and more in other countries, suggesting that inflation is quite stable with fixed interest-rate targets and the same interest on reserves and Treasuries.

In this context, I revisit classic questions. What can monetary policy do, when we are satiated in liquidity? What can monetary policy not do? How will inflation be determined? How should an effective monetary policy work?

I adopt a model with no monetary frictions at all, and the fiscal theory of the price level. Not only does this theory determine the price level without monetary frictions, it is, I will argue, the only existing theory that can do so.

The name “fiscal theory” seems to imply that monetary policy is ineffective. I find quite the opposite: monetary policy *can* set the nominal interest rate and *can* determine expected inflation. The price level remains determinate even with completely fixed (no Taylor-rule responses needed) interest-rate targets. With long-term debt, monetary policy can determine the nominal term structure of interest rates. Furthermore, rearrangements of the maturity structure of government debt, reminiscent of QE operations, can create some inflation today in exchange for less inflation in the future.

I then add pricing frictions, so that monetary policy can have real effects. One contribution of the paper is to study a model with fiscal-theoretic price determination and sticky prices. I find that an inflationary reduction in expected future surpluses reduces real interest rates and increases output. These are signs conventionally attributed to monetary policy, and the opposite of what one might expect for fiscal policy. But they make sense: if the price level cannot adjust, the real value of one-period government debt cannot change. Hence, if expected surpluses decline, their discount rate, the real interest rate, must decline, and this decline raises output growth.

More importantly, I find that monetary policy with sticky prices can also affect output and the real rate of interest. I also find that monetary policy which desires to stabilize prices should raise and lower the interest rate target one-for-one with changes in the underlying real rate of interest, a standard optimal-policy result. However, I find Fisherian responses: an interest rate rise increase raises real interest rates, but raises consumption and output, before raising inflation.

Why do we think otherwise? I argue that events in real-world experience combine monetary and fiscal shocks, as both monetary and fiscal authorities respond to shocks. Combining monetary and fiscal policies, in a coordinated monetary–fiscal tightening, produces responses like those we seem to see in historical experience.

Comparing these results to a standard new-Keynesian model, I find the “monetary policy shock” in the latter also implicitly assumes a coordinated contractionary fiscal policy. Without that fiscal policy change, the standard new-Keynesian model also has the Fisherian result that interest rate rises cause more, not less, inflation.

I find that ties between fiscal and monetary policy are and will remain more important than conventionally acknowledged. For example, the presence of a large stock of outstanding Treasury debt, of relatively short maturity, means that interest rate changes will have large impacts on the Federal budget. The mark-to-market losses on the Fed's portfolio, which monetary analysts have worried about, are tiny in comparison. Fiscal considerations will limit monetary policy in ways that the Federal Reserve is barely thinking about at all.

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