A Monetarist View of Policy Renormalization

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ECONOMIC POLICIES FOR THE 21ST CENTURY

Monetarist Principles for Policy Analysis and Evaluation

Monetarism emphasizes the central bank's critical role in stabilizing the aggregate price level. Monetarism stresses, as well, that the central bank maintains its control over the price level using its power to manage the monetary base and, through that channel, its ability influence the growth rate of the broader monetary aggregates.

The speed with which monetary policy actions that affect the base and broad money have their full impact on prices depends on whether those actions are anticipated or unanticipated and, in the latter case, how rapidly expectations adjust. Expectations matter, as well, in determining the extent to which policy actions work to change other variables, including aggregate output and interest rates, in the short run, before impacting fully on prices. Finally, the details of the underlying procedures through which the central bank manages the monetary base can affect the timing of monetary policy's effects on interest rates, output, and inflation.

These basic principles can help us anticipate the likely effects of the Federal Reserve's efforts to renormalize its interest rate and balance sheet policies. These principles can also help us judge whether the overall tightening of monetary conditions brought about by these policies is proceeding at an appropriate pace: neither too fast nor too slow, but just right to bring inflation back to the Fed's 2 percent target while prolonging the ongoing economic expansion. Let's see how!

Two Paths Towards Policy Renormalization

The Federal Reserve is now 20 months into what has been, and will most likely continue to be, a gradual but sustained phase of monetary policy tightening. Since December 2015, the Federal Open Market Committee has raised its federal funds rate target in four steps by a total of 100 basis points: from an initial range between 0 and 0.25 percent to its current level between 1 and 1.25 percent. Soon – perhaps even later this month – the Fed's campaign to renormalize its policies will open along a second front, as the central bank begins a slow but deliberate process of reducing the size of its balance sheet by allowing some of its bond holdings to mature without reinvestment.

The FOMC's statements on "Policy Normalization Principles and Plans," make clear that progress along these dual paths towards tighter policy will occur on largely separate timetables.[1] Balance sheet asset run-off will follow a pre-determined schedule, designed to minimize market disruptions. Further upward adjustments to the federal funds rate, meanwhile, will be dictated by changing economic conditions, especially the pace with which inflation continues to move back towards the 2 percent target.

This two-track approach has the distinct advantage of working, automatically, to scale back the Fed's outsized role in credit markets, returning long-term interest rates to

[1] See https://www.federalreserve.gov/monetarypolicy/policy-normalization.htm.

levels that will more efficiently equilibrate the supply of and demand for loanable funds. By extending its massive asset-purchase programs to include government agency mortgage-backed securities in addition to U.S. Treasury bonds, the Fed has used its balance sheet not only to perform its traditional central banking role of stabilizing prices through appropriate rates of money creation, but also to play a new role of channeling credit specifically to the mortgage market, in much the same way that a private depository institution will expand its own balance sheet by accepting new deposits and making new mortgage loans. The difference is that private financial institutions are driven by the profit motive to raise and allocate funds in ways that usually promote economic efficiency. Governmental efforts to allocate credit, by contrast, lead more often than not to distortions and inefficiencies – exactly like those that have plagued the housing markets for years. The sooner the Fed gives up its extra role, by normalizing the overall size of its balance sheet, working off its holdings of MBS and returning to its traditional "Treasuries only" policies, the better it will be for the real estate markets, the financial system, the U.S. economy, and the Fed itself.

In judging the appropriate pace for removing policy accommodation, however, it is useful to recognize that *both* balance sheet reduction and interest rate increases have important implications for nominal quantities, including bank reserves and the broader monetary aggregates, and that these separate paths towards tightening reunite in determining the overall stance of monetary policy. The easiest way to see this is to note that the more complicated sets of transactions involving the Fed, the Treasury, the banking system, and the non-bank pubic associated with both balance sheet run-off and federal funds rate increases net out to be the same as those involved in traditional, central bank open market operations.

Balance Sheet Policy and Open Market Operations

Suppose, first, that the Fed decides not to reinvest a maturing bond that is presently on its balance sheet. To keep the analysis simple, let the bond have face value of $1000. Of course, the actual dollar values involved in these transactions will be much larger, but capturing this aspect of reality merely involves multiplying all of the numbers in this example by the same, very large, positive constant.

Initially, this policy decision leads to a decline of $1000 in government bond holdings on the asset side of the Fed's balance sheet, and a corresponding $1000 decline in the U.S. Treasury's deposits at the Fed on the liability side. The T-account shows that there is no change in the monetary base – currency plus bank reserves – because of this initial set of transactions.

Federal Reserve

Assets		Liabilities	
Government Bonds	−$1000	Treasury Deposits	−$1000

The U.S. Treasury, however, still needs to issue a new $1000 bond to replace the funds it paid to the Fed. If this newly-issued bond is purchased by a private bank, the Fed will move $1000 from the bank's reserve account to the Treasury's account at the Fed. If the new bond is purchased, instead, by a member of the non-bank public, $1000 in funds will be withdrawn from the purchaser's bank account and credited to the Treasury's account at the Fed; in this case, the purchaser's bank loses $1000 in reserves because of the deposit outflow. Either way, the T-account now appears as

Federal Reserve

Assets		Liabilities	
Government Bonds	−$1000	Reserves	−$1000

indicating that the effects of balance sheet reduction are identical to that of a more traditional, $1000 open market sale of bonds by the Fed to the non-bank public. Yes, the size of the Fed's balance sheet is reduced. But, more specifically, the dollar volume of reserves supplied to the banking system is reduced as well. Balance sheet normalization, just like traditional monetary policy actions, will result in a slowdown in broad money growth and, from there, a decline in the aggregate price level compared to where it would be if the Fed continued to reinvest the proceeds from all maturing assets instead.

Interest Rate Policy and Open Market Operations

Since October 2008, the Federal Reserve has been paying interest to banks on their holdings of reserves. More recently, it has also been paying interest to various non-bank financial institutions by issuing a new class of liabilities – reverse repurchase

agreements – to these institutions as well. Although Federal Reserve officials describe themselves as targeting the federal funds rate by adjusting the rates paid on reserves and RRPs, these adjustments also have implications for items on the Fed's balance sheet; once again, the changes coincide with those brought about by traditional, open market operations.

To see these implications most clearly, it is helpful to simplify the analysis by treating the RRP program as a trick the Fed has found to work around the inconvenient fact that federal legislation grants it authority to pay interest only on reserves held by banks. Because some non-bank institutions, chiefly government-sponsored agencies, also hold deposits at the Fed but are not eligible under law to receive interest on them, the Fed's ability to pay interest on bank reserves fails to place a fully effective floor under the federal funds rate. By augmenting its interest on reserves policy by issuing RRPs to non-banks, the Fed insures that no financial institution, bank or non-bank, will ever find it advantageous to lend funds out overnight at a rate that falls below the lesser of its two deposit rates: on reserves and RRPs.

In practice, the Fed has set the rate on RRPs slightly below the interest rate on reserves. The federal funds rate, therefore, typically trades somewhere in between the higher interest rate on reserves and the lower interest rate on RRPs. But this strategy should not be mistaken for a true "corridor system," which uses interest on reserves, as the rate below which no bank is willing to lend funds, to place a lower bound on the funds rate and the discount rate, as the rate above which no bank would be willing to borrow funds, to place an upper bond on the federal funds rate. Instead, the present system appears as a just-less-than-perfectly functioning floor system, in which the interest rates on reserves and RRPs work jointly to place a lower bound on the funds rate.[2] The following analysis takes this perspective, and refers for simplicity to the "interest rate on reserves" to mean the combination of the interest rate on reserves and the interest rate on RRPs that the Fed uses now to enforce the federal funds rate floor.

To appreciate how the Fed's new floor system works, as Fed policy always does, to bring about changes in reserves that generate changes in broad money and the price level, it is helpful to begin by considering how federal funds rate targeting was implemented more traditionally, before the days of interest on reserves. Figure 1 illustrates this. In the graph from each panel, the quantity of reserves gets measured along the horizontal axis and the federal funds rate gets measured along the vertical axis. The demand curve for reserves, introduced in panel (a), slopes downward, since as the federal funds rate increases, banks that typically borrow reserves find that the cost of doing so has increased and banks that typically lend reserves find that the

[2] For more detail on these points, see Marvin Goodfriend, "The Fed Should Fix the Interest on Reserves Floor," Shadow Open Market Committee Position Paper, 20 March 2015. Available at http://shadowfed.org/wp-content/uploads/2015/03/GoodfriendSOMC-March2015.pdf.

benefits of doing so are enhanced; all banks, therefore, move to hold fewer dollars of reserves.

The notation, $DR(FFR,RR=0,P_0)$, used to label the demand curve in panel (a) makes clear that while this demand curve describes a relationship between banks' desired holdings of reserves and the federal funds rate FFR, this relationship also depends on the fact that the interest rate RR paid on reserves equals zero. Moreover, because reserves are denominated in units of dollars, this relationship also depends on the aggregate price level P_0. In other words, a change in the federal funds rate leads to *a movement along* the downward-sloping demand curve, whereas a change in either the interest rate paid on reserves or the aggregate price level results in *a shift in the horizontal position of* the same demand curve.

Panel (a) of figure 1 therefore shows that with RR=0 and with the price level P_0 taken as fixed in the short run, the Federal Reserve hits its target FFR_0 for the federal funds rate by conducting open market operations that leave QR_0 dollars in reserves to circulate among banks in the system. Panel (b) then shows that if the Fed wants to raise its federal funds rate target from FFR_0 to FFR_1, it must conduct an open market sale of bonds that decreases the supply of reserves from QR_0 to QR_1. In this way, the Federal Reserve's ability to manage the short-term interest rate depends on its ability and willingness to control the supply of bank reserves as well.

But while, in the short run, the price level P_0 can reasonably be taken as fixed, over time the contraction in reserves supply required to engineer the increase in the federal funds rate will lead to a contraction in broader measures of the money supply and, from there, to a reduction in the price level from P_0 to some lower value P_1. In panel (c) of figure 1, this decline in the price level is shown as shifting the demand curve for reserves to the left: at the lower price level, banks will demand liquidity services provided by fewer dollars in reserves or, put another way, will seek to restore their previous *real* stock of reserves by holding a smaller *nominal* stock of reserves. The graph reveals that this leftward shift in the reserves demand curve puts downward pressure on the funds rate itself.

Faced with this downward pressure, the Fed has two choices. It can maintain the higher funds rate target FFR_1 for longer by conducting additional open market operations that drain still more reserves from the banking system and ultimately cause the price level to decline further. Or, as shown in the graph, it can allow the funds rate to return to its initial level FFR_0. Although many Federal Reserve officials and outside observers see monetary policy working chiefly through these interest rate movements, the graphs in figure 1 show that the same policy maneuvers can be viewed from a monetarist perspective. From this alternative viewpoint, a one-time contraction in the supply of reserves from QR_0 to QR_1 leads to a transitory increase in interest rates, but a permanent decrease in the price level.

Figure 2 then shows how these effects and their timing change when the Fed pays interest on reserves. In panel (a), the payment of interest on reserves at the positive rate RR_0 puts a floor under the federal funds rate; under the interpretation, suggested above, of RR_0 as the lesser of the two interest rates on reserves and RRPs, this works exactly as described by Federal Reserve officials today. For if the federal funds rate did fall below RR_0, any individual bank could profit by borrowing reserves from another bank and depositing them at the Fed; this excess demand for reserves then would then push the funds rate back to RR_0. If there is a satiation point beyond which banks will carry no more reserves, then the demand curve in panel (a) terminates when the funds rate falls to RR_0; if, instead, banks become willing to hold arbitrarily large stocks of reserves when the opportunity cost of doing so falls to zero, then the demand curve flattens out and follows the horizontal dotted line when the funds rate reaches RR_0. Of course, these observations simply generalize those that could have been made when describing panel (a) of figure 1 for the case without interest on reserves; there, the lower bound for the federal funds rate equals zero, since no bank will lend reserves at a negative rate when those funds can be held without cost either as vault cash or as deposits at the Fed.

When, as in panel (a) of figure 2, the Federal Reserve's target FFR_0 lies slightly above the interest rate RR_0 paid on reserves, the Fed must still conduct open market operations to make the quantity of reserves supplied, QR_2, equal to the quantity demanded. But, with interest on reserves, the level of reserves QR_2 required to support the funds rate target FFR_0 in figure 2, panel (a), will be larger – perhaps much larger – than the level of reserves QR_0 required to support the same funds rate target shown in figure 1, panel (a). This is simply because the opportunity cost to banks of holding reserves, measured by the difference between the funds rate and the interest rate on reserves, is correspondingly smaller when RR_0 is positive than when it is zero. And it is for this reason that the Fed's new policy of paying interest on reserves will allow it to target the federal funds rate at levels similar to those prevailing before the financial crisis of 2007-08 even as the equilibrium quantity of reserves held by the banking system remains, in the long run, considerably larger in the future than it was in pre-crisis days.

Panel (b) of figure 2 then shows how the Fed can, in the short run, engineer an increase in the federal funds rate target from FFR_0 to FFR_1 by raising the interest rate its pays on reserves from RR_0 to RR_1. Strikingly, under these new procedures that, in particular, maintain a constant narrow spread between the federal funds rate and the interest rate on reserves, the Fed brings about the desired increase in the federal funds rate by shifting the *demand* curve for reserves to right through the increase in RR instead of by shifting the supply curve for reserves to the left as it did before. This rightward shift in the demand curve occurs because, with the higher rate of interest paid on reserves, banks demand more dollars in reserves *at any given value for the federal funds rate*. Initially, therefore, it is true: no open market operation appears necessary to tighten monetary policy by managing interest rates!

The analysis so far, however, holds the price level fixed at its initial level P_0. Panel (c) of figure 2 shows what happens as the short run turns into the intermediate and long run, that is, as tighter monetary policy as measured by the higher funds rate begins to put downward pressure on the aggregate price level. Now, the fall in the price level from P_0 to P_1 shifts the demand curve for reserves back to the left: as before, with lower prices, banks demand fewer dollars in reserves. The graph in panel (c) implies that this leftward shift in the reserves demand curve puts downward pressure on interest rates and upward pressure on the price level. To actually bring about the lower level of prices that, presumably, was the goal of the monetary tightening in the first place, the Fed must now conduct – guess what? – an open market operation, reducing the quantity of reserves supplied to the banking system, as shown in panel (d) of figure 2, from QR_2 to QR_3.

Thereafter, the Fed again has two options. It can continue to maintain the higher level of interest rates, by contracting reserves supply and lowering the price level still further. Or, as shown in panel (e), it can bring interest rates back down to their initial levels: FFR_0 for the funds rate and RR_0 for the interest rate on reserves.

Thus, while the Fed's newly-obtained ability to pay interest on reserves does allow it to tighten monetary policy by raising its federal funds rate target in the short run without any immediate open market operation, the long-run effects of this monetary policy tightening turn out to be the same with interest on reserves in figure 2 as they were in figure 1 without. From a monetarist perspective, the open market operation that leads to a contraction in the dollar volume of reserves supplied is still necessary for bringing about a permanent reduction in the price level. Broad monetary aggregates will decline, while interest rates return to their initial level, after this policy tightening.[3]

Aggregating the Effects of Balance Sheet and Interest Rate Policies

As just shown, both of the strategies – balance sheet reduction implemented through the run-off of maturing assets and interest rate increases implemented by raising the interest rates paid on reserves and RRPs – ultimately bring about changes to the Fed's balance sheet that coincide exactly with those triggered by conventional open market sales of government bonds. In both cases, therefore, the resulting decline in the supply of bank reserves will lead, through traditional channels, to reductions in broader measures of the money supply, which then make it easy to aggregate, on an "apples-to-apples" basis, the combined effects of these strategies on the overall stance of monetary

[3] These same effects of a monetary policy tightening, with their complex timing pattern, appear when the central bank pays interest on reserves in a fully-specified, New Keynesian, dynamic, stochastic, general equilibrium model. For details, see Peter N. Ireland, "The Macroeconomic Effects of Interest on Reserves," *Macroeconomic Dynamics* 18 (September 2014): 1271-1312. Also available at http://irelandp.com/pubs/reserves.pdf.

policy. Even though the FOMC no longer designs or implements its strategies with direct reference to the broad monetary aggregates, these quantity-theoretic measures of monetary policy still provide useful information about whether the moves towards tighter policy are proceeding, in total, at a place that is too fast, too slow, or just right to achieve the Fed's dual objectives for maintaining price stability and maximum sustainable output and employment. Monitoring the monetary aggregates, in other words, can serves as a "cross check" against when the Fed is doing – and this cross check may prove especially useful, given than neither large-scale balance sheet reduction nor interest rate management through a floor system has ever been used before during a U.S. monetary policy tightening cycle.

To illustrate how the cross-check works, panel (a) of figure 3 plots year-over-year growth rates of the Divisia M2 monetary aggregate constructed at the Center for Financial Stability. Divisia M2 includes the same set of assets as the Federal Reserve's official "simple-sum" M2 aggregate, but combines those assets according to economic aggregation principles that weight each component according to the volume of monetary services is provides, an approach that is identical, conceptually, to the way that a macroeconomic aggregate like real GDP gives greater weight to goods that are more valuable to consumers as reflected in the higher prices at which they sell.[4] The graphs shows that broad money growth has slowed noticeably since 2012 but has fluctuated in a relatively narrow range around 6 percent since then.

With stable velocity, of course, 6 percent money growth would be more than sufficient to generate 2 percent inflation even with rates of real economic growth much higher than those actually experienced during the sluggish and uneven recovery and expansion. As shown in panel (b) of figure 3, however, Divisia M2 velocity has followed a downward trend, consistently since the onset of the financial crisis. A skillful and detailed study by Richard Anderson, Michael Bordo, and John Duca shows that this same downward trend appears in the velocity of simple-sum M2, and attributes it to the combined effects of falling interest rates and flight-to-quality dynamics during and immediately after the financial crisis of 2007-08 as well as to the impact of Dodd-Frank legislation, which worked to shift funds out of the shadow banking sector and back into traditional banks that obtain much of their funding by issuing the components in M2.[5]

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[4] For details on the theory and logic behind Divisia monetary aggregation, and a review of evidence pointing to the enhanced predictive power of the Divisia aggregates compared to the Fed's official measures, see William A. Barnett, *Getting It Wrong: How Faulty Monetary Statistics Undermine the Fed, the Financial System, and the Economy*, Cambridge: MIT Press, 2012.

[5] See Richard G. Anderson, Michael Bordo, and John V. Duca, "Money and Velocity During Financial Crises: From the Great Depression to the Great Recession," *Journal of Economic Dynamics and Control* 81 (August 2017): 32-49. Also available at http://www.hoover.org/research/money-and-velocity-during-financial-crises-great-depression-great-recession.

Despite rising interest rates and declining measures of risk and volatility across many financial markets, however, this downward trend in velocity has continued, unabated, through the present, indicating that lingering risk aversion continues to elevate the public's demand for safe and highly liquid assets. Thus, panel (a) of figure 4 shows that nominal GDP growth, which averaged 5.2 percent annually from 1990 through 2007, continues to fluctuate around the much lower average of 3.7 percent that has prevailed since 2010. The remaining two panels of figure 4 break this shortfall in nominal spending growth into components due to slower real growth and inflation. The difference turns out to be evenly split, with average real GDP growth falling from 2.9 percent from 1990 through 2007 to 2.1 percent since 2010, and average GDP price inflation falling from 2.3 percent from 1990 through 2007 to 1.6 percent since 2010.

The persistent shortfall in inflation, which continues to run noticeably below the Fed's 2 percent long-run target, highlights that risks during the tightening cycle remain double-sided. A reversal in velocity's downward trend, brought about by further easing of financial conditions reflecting changes in sentiment or regulatory policy will, absent a corresponding deceleration of broad money growth, lead to an unwelcome overshoot of inflation above target. On the other hand, a marked slowdown in money growth brought about by the combination of balance sheet reduction and higher interest rates, without a corresponding reversal of velocity's persistent downward trend, will push inflation further below target and risk choking off what continues to be a frustratingly slow and uneven economic expansion. Either way, signals from a quantity-theoretical approach that monitors the monetary aggregates and their velocities can be useful in making sure that Fed policy remains on track.

Persistently slow real GDP growth, on the other hand, must be due at least in part to factors well beyond the Fed's influence or control. Federal Reserve Chair Janet Yellen emphasized this important point in a speech from earlier this year:[6]

> Monetary policy cannot, for instance, generate technological breakthroughs or affect demographic factors that would boost real GDP growth over the longer run or address the root causes of income inequality. And monetary policy cannot improve the productivity of American workers. Fiscal and regulatory policies – which are of course the responsibility of the Administration and the Congress – are best suited to address such adverse structural trends.

Chair Yellen is right. The very best thing that could happen for American families and businesses right now would be for Congress and the President to work together to

[6] Janet L. Yellen, "From Adding Accommodation to Scaling It Back," Speech to the Executives' Club of Chicago, 3 March 2017. Available at https://www.federalreserve.gov/newsevents/speech/yellen20170303a.htm.

make the tax and regulatory code fairer and more efficient. There is no reason why the U.S. economy can't return to rates of real economic growth approaching the 3 percent average experienced in decades past. The opportunity to catch up, after years of slow investment, means, in fact, that even modest reforms could yield a sustained period of much faster growth in wages, incomes, and jobs. It's time for our elected representatives to set petty politics aside and make this happen!

References

Board of Governors of the Federal Reserve System "FOMC Communications related to Policy Normalization," Federal Reserve. https://www.federalreserve.gov/monetarypolicy/policy-normalization.htm.

Janet L. Yellen, "From Adding Accommodation to Scaling It Back," Speech to the Executives' Club of Chicago, 3 March 2017. Available at https://www.federalreserve.gov/newsevents/speech/yellen20170303a.htm.

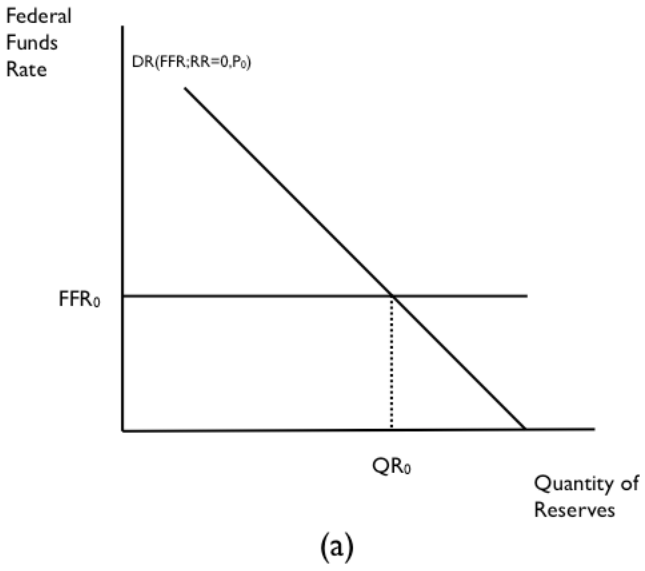
Marvin Goodfriend, "The Fed Should Fix the Interest on Reserves Floor," Shadow Open Market Committee Position Paper, 20 March 2015. http://shadowfed.org/wp-content/uploads/2015/03/GoodfriendSOMC-March2015.pdf.

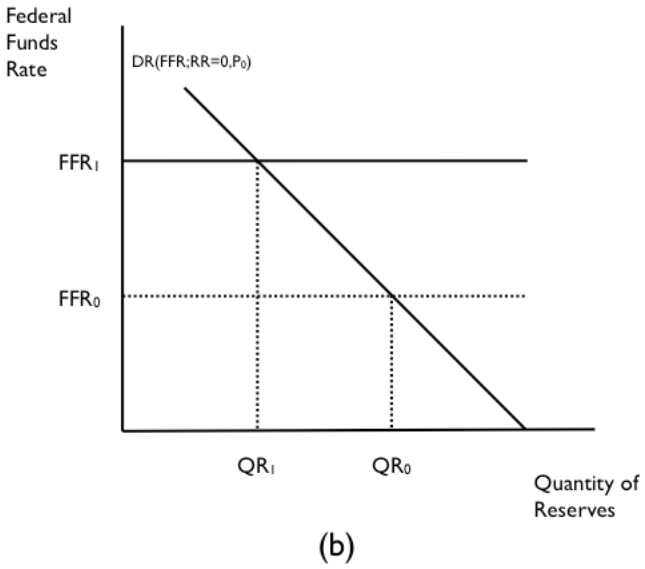
Peter N. Ireland, "The Macroeconomic Effects of Interest on Reserves," *Macroeconomic Dynamics* 18 (September 2014): 1271-1312. http://irelandp.com/pubs/reserves.pdf.

Richard G. Anderson, Michael Bordo, and John V. Duca, "Money and Velocity During Financial Crises: From the Great Depression to the Great Recession," *Journal of Economic Dynamics and Control* 81 (August 2017): 32-49. Also available at http://www.hoover.org/research/money-and-velocity-during-financial-crises-great-depression-great-recession.

William A. Barnett, *Getting It Wrong: How Faulty Monetary Statistics Undermine the Fed, the Financial System, and the Economy*, Cambridge: MIT Press, 2012.

Figure 1. Federal Funds Rate Targeting without Interest on Reserves





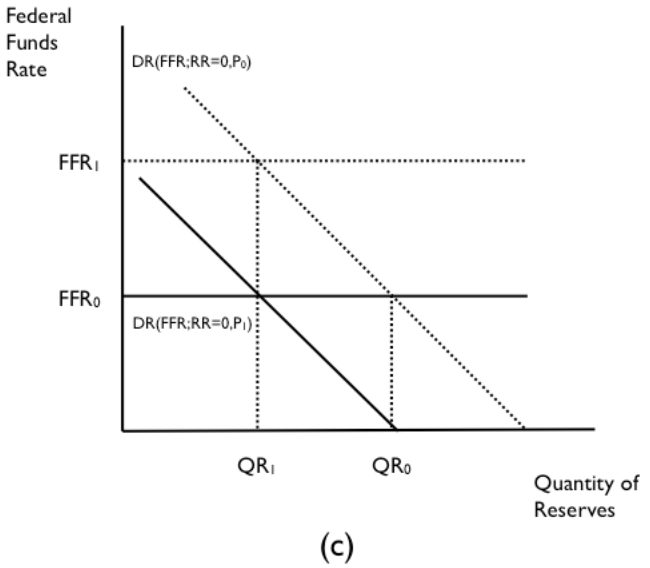
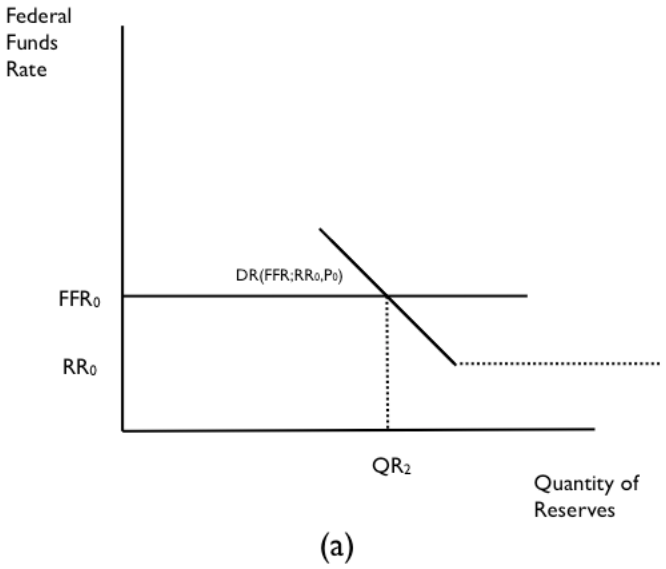
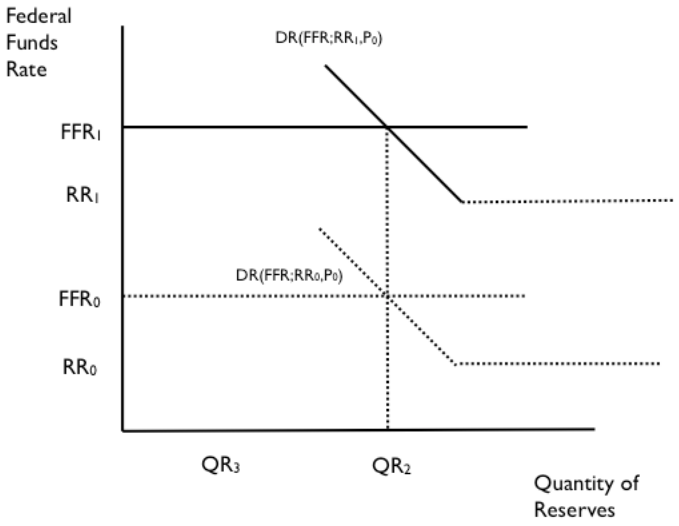
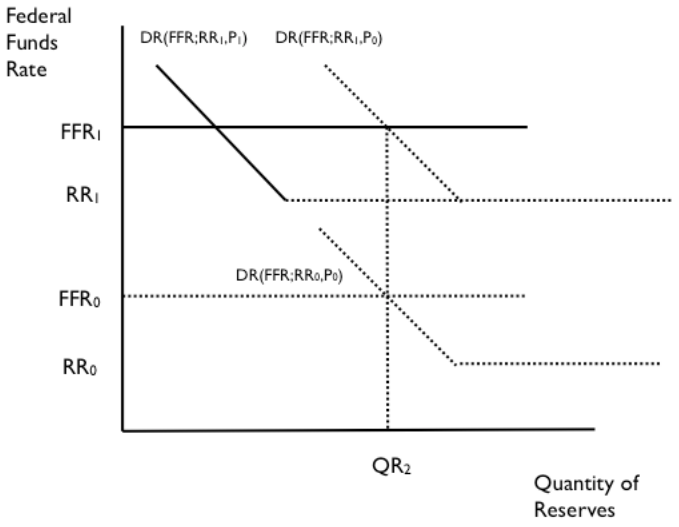


Figure 2. Federal Funds Rate Targeting with Interest on Reserves

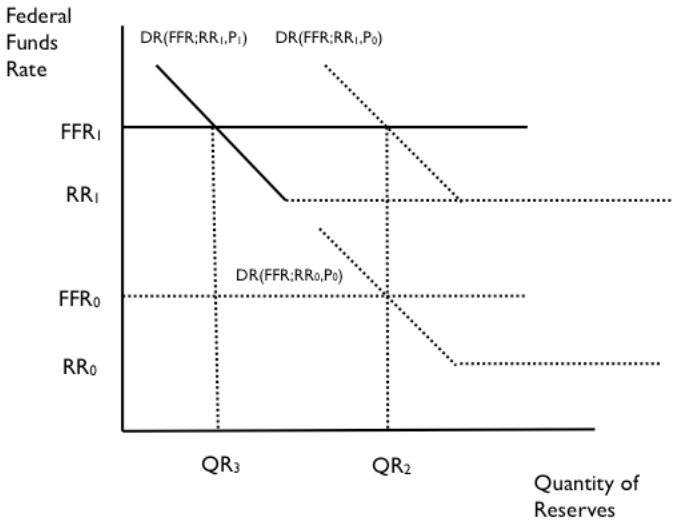



Federal
Funds
Rate
DR(FFR;RR1,P0)
FFR1
RR1
DR(FFR;RR0,P0)
FFR0
RR0
QR3
QR2
Quantity of
Reserves

(b)


Federal
Funds
Rate
DR(FFR;RR1,P1)
DR(FFR;RR1,P0)
FFR1
RR1
DR(FFR;RR0,P0)
FFR0
RR0
QR2
Quantity of
Reserves

(c)


Federal Funds Rate
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DR(FFR;RR1,P0)
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DR(FFR;RR0,P0)
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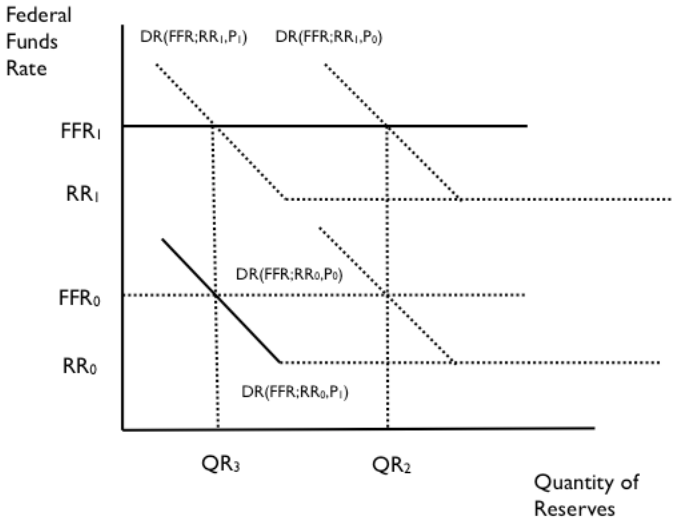
QR3
QR2
Quantity of Reserves

(d)


Federal Funds Rate
DR(FFR;RR1,P1)
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FFR1
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QR3
QR2
Quantity of Reserves

(e)

Figure 3. Divisia M2 Growth and Velocity.

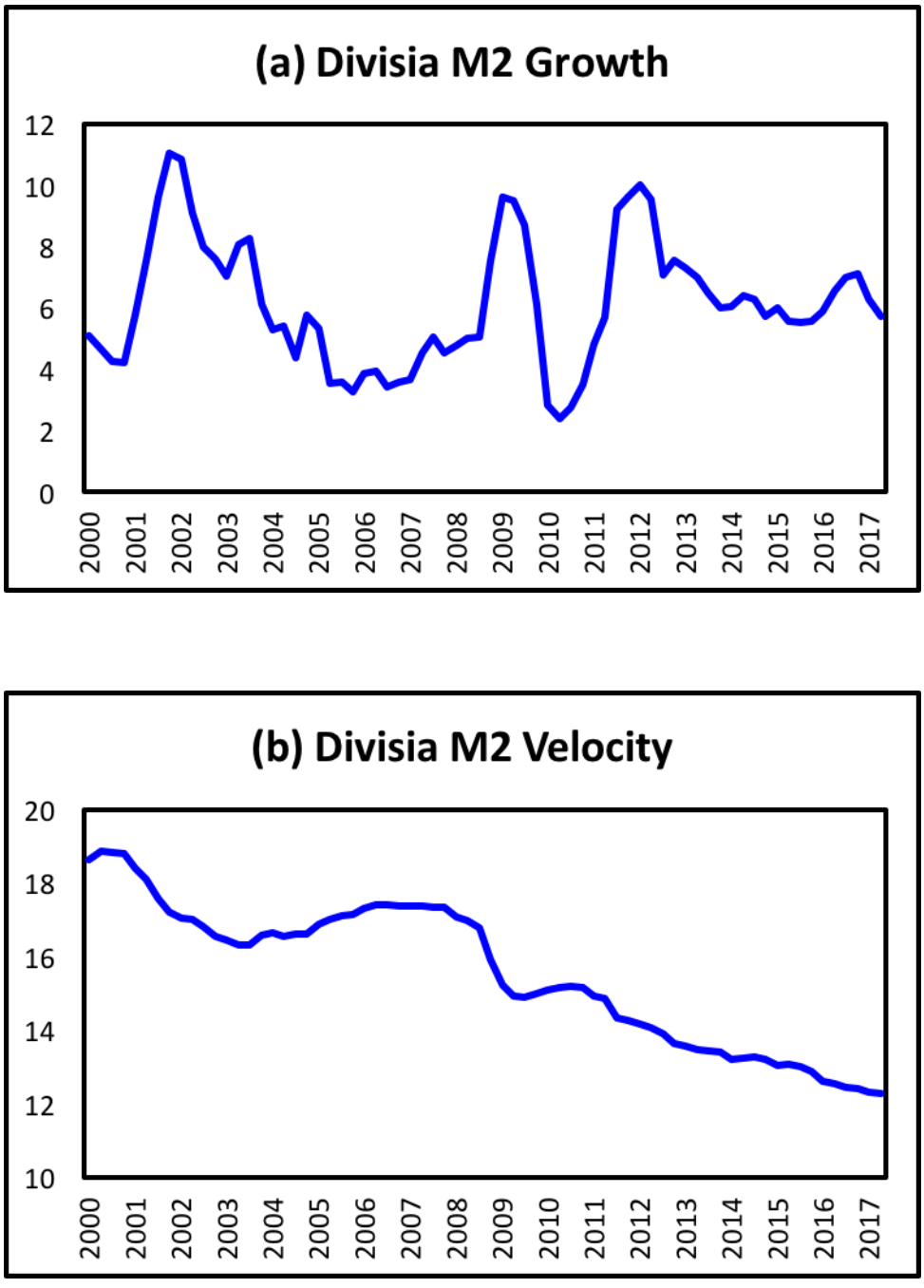
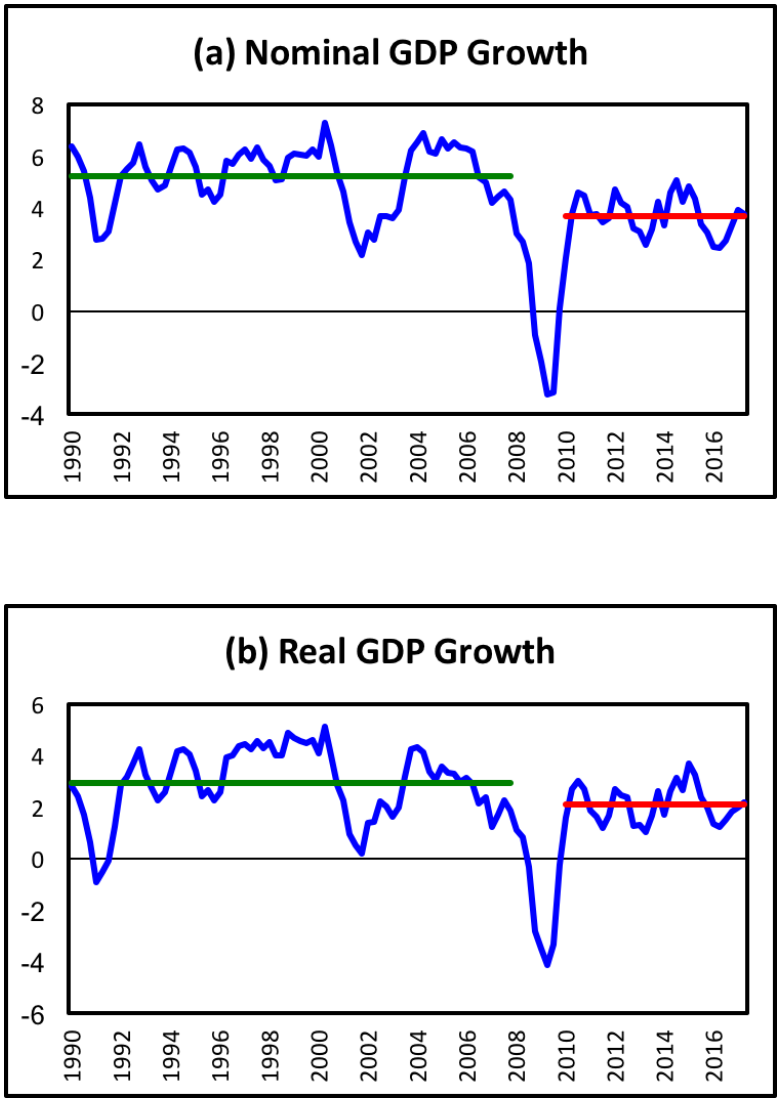
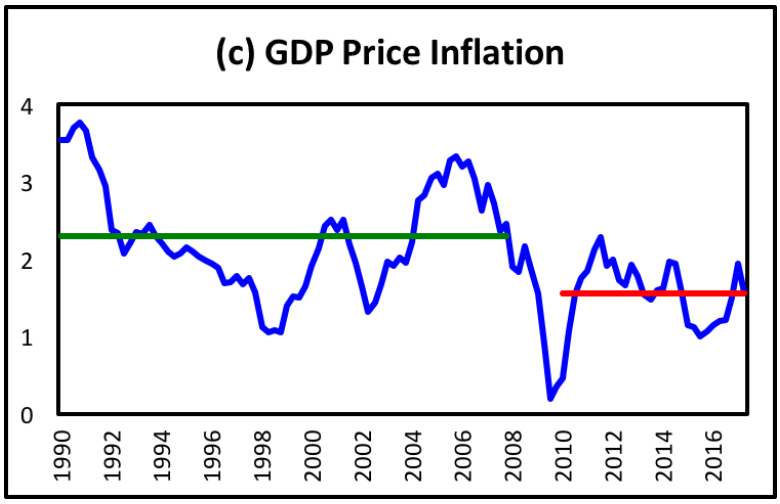


Figure 4. Nominal GDP, real GDP, and GDP price inflation.





Notes. Green lines show annual average for 1990:1 through 2007:4; red lines show annual averages for 2010:1 through 2017:2.