

RETHINKING THE MONETARY TRANSMISSION MECHANISM

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In recent decades, the big debate among monetary economists and policymakers was over rules-based monetary regimes versus ones based on discretion. That debate accepted that the various tools and instruments available to monetary policymakers were well known. Implicit in this was the idea that the linkages between the open market operations conducted by a central bank's trading desk, on the one hand, and the objectives of monetary policies, on the other, had been defined and measured and that differing judgments about lags nonetheless fell within a narrow range. According to this view, central banks bought and sold securities with the intention of affecting either interest rates or monetary growth, and these financial measures were linked to economic activity.

The debate on rules versus discretion took as settled an earlier debate about the targets and indicators of monetary policy (Brunner 1969, Saving 1967); this left only the empirical estimates of parameters and lag coefficients to be constantly updated and revised, alongside individual policymakers' personal preferences about tradeoffs among multiple objectives.

The global financial crisis of 2008–09 changed all that. None of what was generally accepted pre-2008 applies to the monetary

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regime of recent years. The thrust of policy actions is no longer gauged by measures on the price axis (interest rates) or the quantity axis (bank reserves and money supply). In the absence of useful, reliable measures of the degree of stimulus or restraint implied by the behavior of any price or quantity measures (indicators), it is not possible to establish appropriate near-term objectives for the central bank's balance sheet or administered interest rates (targets). And without consensus about the relevant targets and indicators of monetary policies, the debate about rules versus discretion is without a useful reference point.

At the end of every meeting of policymakers, a directive or set of instructions must be approved and issued to those responsible for daily and/or weekly implementation. It would not be useful for policymakers simply to issue instructions to achieve some desired range of nominal GDP growth, or some particular rates of inflation and unemployment. Those may be appropriate intermediate or longer-term objectives for policymakers to consider, but translating them into a policy that can be implemented requires some identifiable linkages between what can be controlled—the size and composition of the central bank balance sheet, and administered interest rates charged to borrowing banks or paid on reserve balances—and financial indicators of the stance of policy.

Legacy linkages—the traditional targets of monetary policy actions—stopped working in the aftermath of the global financial crisis. Now, new instruments and techniques are being introduced and tested. But there is no historical track record available to guide policymakers in the formulation and implementation of policies that rely on new tools and instruments. As such, resumption of the rules-versus-discretion debate will be useful again only after a new debate about targets and indicators has been conducted (Belongia and Ireland 2016).

Macroeconomic Policies: Are They Monetary or Fiscal?

It is customary to think about a government's macroeconomic policies as consisting of some actions that are considered *monetary* and other actions that are considered *fiscal*. Of course, governments take all kinds of actions that affect the economy (e.g., regulatory, energy, environmental, agricultural, international trade, and transfer payments), but those viewed as stabilization or countercyclical

policies are generally characterized as either monetary or fiscal. It also is usual for decisionmakers to be seen as either monetary policymakers or fiscal policymakers. The former are typically associated with the decisions of a central bank, while the latter tend to be associated with the national treasury—or ministry of finance—and the national legislature.

Policy actions of either a monetary or fiscal nature will have allocative and redistributive effects, but those are often unintentional and certainly not the primary objectives of policymakers. Instead, the people responsible for formulating and implementing both monetary and fiscal policy actions concentrate primarily on aggregative objectives. Generally, that means they care mostly about how rapidly national output and employment are growing, and how much inflation is occurring. It is well understood that unanticipated accelerations of inflation will have allocative effects. As a result, policymakers most often seek to achieve announced targets for inflation so as to minimize the associated redistribution.

Economics textbooks teach that there can be an optimal mix of monetary and fiscal policy actions, with one set of actions deliberately countering the effects of other actions (Sims 2016). To illustrate intentions gone bad, economists sometimes cite the income surtax that was adopted during the Johnson administration to combat inflationary pressures. Central bank decisionmakers believed that the new taxes constituted a massive dose of fiscal restraint that would turn out to be overkill. Accordingly, the Federal Reserve adopted expansionary policy actions to counter the restrictive fiscal actions. At the time, there was not much dispute about the tax increase being fiscal and being restrictive, and central bank interest rate reductions being monetary and being stimulative.

Yet such distinctions are not always so clear. Increasingly, in recent years, the actions taken by monetary policymakers can more accurately be described as fiscal in nature, while actions taken by fiscal authorities may have monetary components (Saving 2016). For example, if the fiscal authorities adopted a new surtax, the proceeds of which would be sterilized in an account at the central bank (as actually happened in Germany on one occasion), the policy might be called “fiscal” because it involved taxation and was implemented by fiscal authorities. But it would more properly be interpreted as “monetary” because the transmission effects were via contraction of central bank money and the nation’s money supply.

Similarly, actions by monetary policymakers undertaken in a large-scale asset purchase program effectively retire net national debt and reduce the interest expense of the government, and so would be more accurately analyzed as fiscal in nature, even though formulated and implemented by monetary authorities (Greenwood, Hanson, and Stein 2016).

As these two examples illustrate, policy actions that alter the central bank's balance sheet can be taken by either monetary or fiscal decisionmakers, and can be viewed as either fiscal or monetary in nature—regardless of whether those formulating the policies are considered to be fiscal authorities or monetary authorities. Furthermore, the ultimate transmission of monetary and fiscal policy actions involves the consequent actions of both domestic and foreign *private* decisionmakers—and sometimes policy responses of foreign official policymakers. In a world of floating exchange rates, responses to policy decisions and actions can have pronounced effects on a currency's foreign-exchange value, which can enhance or mitigate the intended aggregative effects.

Conventional Monetary Policy

Traditionally, any actions taken by a central bank are referred to as monetary policies (Loneragan 2016). The actions taken usually have been thought to affect the macroeconomy through an interest rate channel or a money supply channel. Both channels are typically thought to involve the spending behavior of households and businesses—lower interest rates make it cheaper to borrow and spend, while more money becomes a “hot potato” that gets spent. The debate among economists was about, first, whether the central bank had more control over relevant interest rates or over the nation's money supply and, second, whether the level of interest rates or the growth of the money supply was more reliably related to spending by households and businesses.

The quantity of money school of thought involved actions to control the central bank balance sheet, estimation of money multipliers to affect the growth of the nation's money supply, and predictions of income velocity in order to influence the pace of total spending in the economy. There were time periods in the United States and other countries when this framework provided reasonably reliable results. However, since 2008 several of the linkages in this framework have

broken down.¹ Massive increases in the size of central bank balance sheets in recent years have been accompanied by corresponding declines in the respective money multipliers with no consequent increases in the growth rates of money supply measures. Furthermore, the pace of growth of measures of the money supply has not been mirrored by growth of total nominal spending, which is to say that the income velocity of money fell.

The alternative—focusing on the setting by policymakers of interest rate targets—involved the creation of a central-bank-provided monetary base as “endogenous” to the financial system. That is, close control over a targeted interbank rate meant that policy actions to add to or to reduce the central bank balance sheet simply reflected the increased or decreased demand for bank reserves on the part of commercial banking companies, which in turn depended on their lending and deposit-creation activities. This framework focused on the incentives for private-sector banks to lend more (or less) that resulted from lower (or higher) interest rates set by the monetary authorities, as well as on the pace of money creation reflected in the supply of and demand for bank loans. According to this view, the growth of the money supply was not under the control of the central bank and did not *cause* faster or slower spending by businesses and households but instead merely mirrored the pace of such spending to the extent that it was financed by bank borrowings (McLeay, Radia, and Thomas 2016).

In recent years, this interest rate channel also has broken down because of the worldwide decline of market-determined interest rates to near-zero or even negative levels. While future increases in interest rates might be viewed by policymakers as a tool for potentially restraining emergent inflation, policy actions to stimulate spending by further interest rate reductions are no longer possible.

Unconventional Monetary Policies

In recent years, numerous major central banks announced objectives of achieving more rapid rates of inflation as strategies for

¹According to Potter (2016), “With such a large amount of reserves, very few banks ever need to borrow reserves to meet their requirements, and interbank trading has almost completely disappeared from the fed funds market. Instead, the market is now predominantly composed of trades between government-sponsored enterprises—specifically, Federal Home Loan Banks—and banks.”

fostering higher standards of living. All of them have failed to achieve their objectives. The wisdom of targeting higher inflation has been, and should continue to be, debated, but the more immediate challenge is to explain why conventional policy tools stopped working and what to do about it. Several developments since the onset of the global financial crisis in 2008 have to be studied and better understood:

- In the United States, Congress authorized the Federal Reserve to pay interest on reserve balances held at the central bank—other central banks already had, or also acquired, such authority.
- The Federal Reserve engaged in “operation twist,” with the objective of achieving lower intermediate and long-term interest rates. That is, Treasury bills with maturities of under one year were sold while longer-maturity Treasury securities were purchased.
- The Federal Reserve, and then other central banks, engaged in large-scale asset purchases (LSAP), more commonly known as quantitative easing, or QE.
- Supervisory/regulatory authorities mandated that at least the largest commercial banking companies should hold significantly larger liquidity balances (as well as equity capital) as a percentage of assets.
- Some central banks imposed negative interest rates on commercial bank reserve balances (Jordan 2016).
- Some central banks contemplated so-called helicopter money—direct central bank financing of government spending—in order to achieve faster monetary creation (Fujikawa and Nakamichi 2016).

Economists are still debating which combinations of these policies and actions contributed to the breakdown of the tools of conventional monetary policies. This debate will no doubt continue long into the future, since there are several crucial issues that need to be resolved before any consensus can begin to emerge.

The most immediate question concerns the level of market-determined interest rates and whether central banks can or should adopt policies that are neutral with respect to prevailing interest rates. One view is that observed interest rates are quite low by historical standards as a consequence of central bank actions and that

rates would rise to more familiar levels if central banks would allow it. The competing hypothesis is that other forces—primarily global demographics—have caused the prevailing low interest rates, and that central banks are powerless to do anything about it (Walker 2016).

The conventional approach for U.S. monetary authorities wishing to “push up” market-determined interest rates was, in the past, to announce an increase in the overnight interbank rate, then sell short-term Treasury bills as necessary in order to contract the supply of bank reserves so that demands on the part of some banks would produce the higher target rate. The idea was that the term-structure effects of a higher target interbank rate would then cause all other interest rates to rise, and thereby realize policymakers’ goal of financial restraint or reduced stimulus. However, by mid-2012 the Federal Reserve portfolio of Treasury bills had been sold as part of “operation twist,” which meant that this conventional tool for targeting a higher interbank rate was no longer available. Furthermore, the enormous quantity of excess reserves produced by QE meant there was no longer a short-term excess demand for reserve balances to bid up that rate.

This reality necessitated the invention of more unconventional policy tools. One was the expansion of a program of reverse-repurchase agreements (RRPs) between Federal Reserve Banks and financial intermediaries. This is simply a collateralized loan *from* a commercial bank or others *to* the central bank. Whereas conventional monetary policy actions might include central bank lending *to* commercial banks in order to expand money growth, the new and unconventional RRP program introduced large-scale borrowings by the central bank *from* the private sector and government entities as a tool for contracting central bank money.

In combination with the newly-introduced policy of payment of interest on reserve balances (IOR), setting both a higher RRP target rate and a higher IOR offered one potential way to achieve a higher target interbank rate. This potential reflected the fact that some holders of balances at Federal Reserve Banks—mainly Federal Home Loan Banks—are not permitted to receive IOR from the Reserve Banks. Consequently, they sell excess cash overnight to domestic and foreign commercial banking companies who are allowed to earn IOR. Whether the resulting higher interbank rate has any effect on anything else is yet to be analyzed and evaluated. The announcement

of an increase in the desired overnight interbank rate may be nothing more than a form of forward guidance to the markets, indicating that policymakers would like to see a generally higher level of interest rates.

The combination of QE, IOR, and mandated liquidity holdings has altered conventional analysis. Without IOR and mandated liquidity holdings, central bank LSAP would have been expected to produce rapid increases in “inside money,” as the commercial banking system increased lending and thereby created new deposits. Prior to 2008, non-interest-earning reserve balances were maintained as close as possible to the regulatory required and contractual levels. Any bank finding that deposit inflows exceeded deposit outflows would seek to make loans or purchase securities to produce some income. With IOR, however, the available yields on loans or securities would need to be sufficient to cover risks and other costs if they are to prove more attractive than the riskless rate offered by the central bank.

Another factor contributing to the large commercial bank holdings of excess reserve balances at Federal Reserve Banks has been the mandated liquidity holdings imposed by home-country supervisors of foreign banking companies operating in the United States and otherwise engaged in U.S. dollar-related transactions (Pozsar 2016). U.S. regulatory required reserves apply only to certain deposits liabilities of some of the banks operating in the United States. Other banks are unbound by such requirements but often hold contractual clearing balances for normal operations. These are counted as excess reserves, even if they are contractual obligations. Similarly, mandated liquidity balances are excess reserves, despite not being voluntary. For these reasons such balances are now reported as “Balances maintained that exceed the top of the penalty-free band.”² Needless to say, the parameters of the demand function for such balances are extremely important to understanding the transmission of expansions and contractions of central bank money to the economy.

Another issue caused by the combination of LSAP and IOR is related to the requirement that Federal Reserve Banks are subject to what is essentially a 100 percent excess profits tax. That is, all the income of the Reserve Banks in excess of operating expenses must be

²The Federal Reserve reports this figure as part of their “Aggregate Reserves of Depository Institutions and the Monetary Base” data, which is available online at www.federalreserve.gov/releases/h3/current.

paid to the U.S. Treasury. Most of the income of the Reserve Banks is interest earned on the holdings of securities—a large share of which are U.S. Treasury notes and bonds. The Treasury incurs an interest expense when payment is made to Reserve Banks (as well as other holders of Treasury securities), and then the Treasury receives back from the Reserve Banks as corporate profits taxes most of what it paid out in the first place. This accounting treatment means that the Treasury's net interest expense on outstanding debt is overstated and that the corporate profits taxes the Treasury receives are similarly overstated. On consolidation of Federal Reserve balance sheets with Treasury monetary accounts, both the net publicly held debt of the Treasury and the net interest expense on the debt would be smaller. In effect, central bank purchases of debt issued by the government amount to a *cancellation* of such debt. In economics, this is referred to as debt monetization. However, because of LSAP and IOR, the interest-bearing deposits at Federal Reserve Banks remain as a form of short-term government debt even after consolidation (Goodhart and Wood 2016, Saving 2016).

To illustrate this, suppose that a bureau of the U.S. Treasury had issued one-week Treasury bills at very low interest rates and that all the proceeds of the sale of such bills had been used to purchase longer-term Treasury notes and bonds in the market. The average maturity (duration) of the Treasury debt would be altered, and the net interest expense would have changed, but the total outstanding debt would not have been affected. Viewed from this perspective, LSAP and IOR are fiscal actions undertaken by the monetary authorities.

It should also be clear that, to the extent that LSAP includes central bank acquisition of mortgage-backed securities (MBS) as well as Treasury securities, such acquisitions should also be considered fiscal actions by monetary authorities (Saving 2016). The net income earned on holdings of MBS is turned over to the Treasury, just like interest earned on Treasury securities. Without IOR and LSAP, the acquisition of private securities (such as MBS) by the central bank would have primarily monetary implications. Monetization of assets added to the portfolio of a central bank would be reflected in a corresponding increase in currency outstanding or bank reserves. Before IOR and LSAP, the bank reserve liabilities of a central bank would then be multiplied into a much larger quantity of deposit liabilities of commercial banks. Money would have been created by

central bank purchases of private securities, just as it was by central bank purchases of government securities. The essential difference is that monetization of government securities reduces the net interest expense of the government, whereas monetization of private securities increases the “other income” of the government. Either way, money creation finances government spending.

With LSAP and IOR, however, the central bank balance sheet is dramatically expanded by the securities purchases and corresponding increase in interest-bearing excess reserve liabilities. As noted above, upon consolidation of the central bank balance sheet with the Treasury monetary accounts, the interest-bearing reserve balances of the central bank remain as a short-term liability, similar to Treasury bills. The government has increased holdings of a longer-term maturity/duration earning asset—MBS—financed by the issuance of a very short-term liability. The government now has term-structure risk that resembles that of any private portfolio manager who buys long-term bonds financed by short-term borrowings. The merits and implications of government ownership of *any* private earning assets are a separate issue from the transmission of fiscal/monetary policy actions on the economy (DiMaggio, Kermani, and Palmer 2016).

Which Targets, Which Indicators?

The discussion above—before LSAP and IOR—reflects the standard textbook framework for the fiat money creation process: open market purchases by the central bank increase central bank money (the monetary base) and lending by commercial banks increases private deposits (via a money multiplier). An alternative view is that the creation of central bank money is a *passive* response of the monetary authorities to commercial bank portfolio management. That is, creation of base money is endogenous in the financial system. This view is explained—and defended—by staff at the Bank of England (McLeay, Radia, and Thomas 2014).

According to this perspective, monetary policymakers make decisions about administered interest rates that are linked to other interest rates faced by prospective borrowers and lenders such as commercial banks. Policy decisions about interest rates are intended to influence the supply of and demand for loanable funds—bankers focus on their net interest margin between costs of borrowed funds

versus loan rates, and bank customers focus on rates of return on investments versus costs of borrowed funds. When loan demand increases and additional bank lending is profitable, additional bank loans outstanding result in greater deposit liabilities of commercial banks, and this process may necessitate the holding of more reserve balances by commercial banks in their accounts at the central bank. To the extent that this occurs, the demand for central bank money is a derived demand from the public's demand for bank loans.

McLeay, Radia, and Thomas do not make clear that commercial banks would satisfy their greater demand for reserve balances at the central bank by selling securities into the portfolio of the central bank in exchange for increased reserve balances credited to their deposit accounts. Thus, asset acquisition by the portfolio managers at the central bank is a passive response to securities offered to them for sale, which makes changes in the provision of central bank money endogenous to market interactions between bankers and their customers. This is a clear rejection of the view that policymakers should target the quantity of central bank money.

McLeay, Radia, and Thomas also offer a description of the money creation process under QE that is different from the more familiar multiplier framework. In their view, because QE occurs as a consequence of interest rates reaching a lower bound, monetary policymakers shift their focus from setting interest rates to the size of their balance sheet. While the multiplier framework involves commercial banks creating money (their deposit liabilities) by increased lending, the alternative described by McLeay, Radia, and Thomas rejects a multiplier effect of deposit creation by commercial banks. Instead, the authors assert that central bank purchases of assets from nonbank financial asset holders—such as pension funds, insurance companies, and so on—are paid for by crediting the sellers' deposit accounts at commercial banks. There is then a one-to-one increase in deposit money resulting from the creation of central bank money, with no subsequent multiplier effects. The quantity of central bank money is now exogenous—a target of policymakers—and the money multiplier is close to unity. Note that this analysis implies a passive increase of reserve balances held by the commercial banks, irrespective of the (assumed) positive IOR paid by the central bank. McLeay, Radia, and Thomas do not address the issue of a regime under which the central bank imposes a negative interest rate (a tax) on commercial bank reserve balances.

This Bank of England hypothesis about money creation under a regime of LSAP is offered only as a description of the process in the United Kingdom and is not necessarily applicable to the QE environment in other countries. As presented, a non-negative IOR would seem to be a necessary condition. Applying the Bank of England analysis to the U.S. monetary system suggests that the additional \$3.7 trillion of central bank money created between September 2008 and September 2014 should have been mirrored in a corresponding \$3.7 trillion increase in the deposit component of M2. The actual increase in U.S. M2 in the six-year period was about \$3.8 trillion. In the subsequent two years (September 2014 to September 2016) the U.S. monetary base is reported to have contracted, while M2 increased by an additional \$1.5 trillion. It is important for this discussion of monetary policy implementation to note that the recent reported decline in the monetary base is *entirely* attributable to increases in two liability components of the central bank balance sheet—the Treasury General Account and Reverse Repurchase agreements. Total central bank assets have not changed.

During that 24-month period, excess reserves declined by \$400 billion, while currency in circulation increased by almost \$200 billion; the decline of excess reserves appears to have been mostly in the deposits owned by foreign banks.

The Bank of England hypothesis about money creation under QE should work in reverse—sales of earning assets held by the central bank to nonbank buyers would involve debiting the commercial bank deposit account of the buyer. The analysis assumes that the commercial bank's holdings of reserve deposits at the central bank would decline by an amount equal to the quantity of earning assets disposed of by the central bank. Implicit in this is that the interest elasticity of demand for reserve balances at the central bank is zero—that is, changes in the quantity of interest-bearing reserve deposits at the central bank are unrelated to the IOR. Clearly, this analysis assumes a non-negative interest rate on the balances held by commercial banks at the central bank.

Empirical validation of the Bank of England hypothesis is not straightforward. The assumed “normal” process of commercial bank lending behavior that determines inside money growth is not suspended when a regime of QE is initiated. That is, deposits at commercial banks may increase or decrease as a result of more or less lending by banks, simultaneous with deposit creation/destruction

associated with asset purchases or sales by monetary policymakers. Presumably, upon cessation of LSAP—not followed by the sale of assets by the central bank—the Bank of England description of the “normal” money-creation process would resume. Thus, changes in the volume of commercial bank loans would be mirrored by changes in deposit money. The clear and important implication is that the growth rates of various measures of the money supply are not directly influenced by policy actions of the central bank. If bank loan demand increases, money growth rates also increase. While the observed acceleration in the growth of the money supply may serve as an indicator of the expansionary stance of the monetary environment, the central bank has no instruments for countering any inflationary effects of excessive money growth.

The Bank of England analysis does not address the situation in which the stock of central bank money changes as a result of non-portfolio factors. For example, the government’s bank account (known in the United States as the U.S. Treasury General Account) is a negative source component of the U.S. monetary base. This means that changes in the government’s checking account balance at the central bank are a factor absorbing reserve balances. Thus, such changes affect reserve balances held by commercial banks in the opposite direction from changes in the General Account balance. In a normal environment, with minimal excess or surplus reserve balances held by commercial banks, central bank open market operations will add to or subtract from central bank money in order to neutralize the effects of changes in the government’s balance (these are known as “defensive” operations). However, in a regime of LSAP and IOR with very large idle reserve balances held by commercial banks, changes in government deposit balances at the central bank are not accompanied by defensive open market operations for the central bank’s asset portfolio. Instead, the quantity of excess reserves (in the case of the United States) changes in the opposite direction to changes in government balances. The Bank of England hypothesis suggests that the money supply should fall or rise by amounts corresponding to increases or decreases in government deposits, reflecting the changes in central bank money available to the banking system. Of course, if households and/or businesses are assumed to obtain commercial bank loans in order to pay taxes to the government, then new deposits are (temporarily) created in the banking system, leaving no net effect on the money supply. The implications of a decline

in the governments' account balance are not so clear. Unless it is assumed that recipients of checks from the government simply pay off loans, the money supply would be expected to increase whenever the government cash balance fell toward zero. Either way, the important point is that Treasury cash management practices are altering monetary conditions quite independently of the decisions of monetary policymakers.

LSAP and IOR have interesting implications for central bank policy actions in the face of currency fluctuations. In the multiplier analysis, central bank technical staff closely monitor changes in currency in circulation and provide estimates of necessary defensive operations so that a reserve-constrained banking system does not experience decreases or increases of reserve availability as a result of outflows or inflows of currency. Mechanically, open market operations are conducted so as to expand or contract central bank money to accommodate the public's preferences for currency versus deposits. However, when the liabilities of the central bank balance sheet include enormous "excess" reserve balances, currency growth can be accommodated without further expansion of central bank assets. One liability of the central bank, currency outstanding, increases and another liability, reserve deposits of commercial banks, decreases. The Bank of England analysis's denial of a multiplier process would suggest that this is the end of the story—the composition of the money supply has changed (more currency, fewer deposits), but the total has not changed. Implicit in that conclusion is that the quantity of reserve balances held at the central bank is unrelated to the IOR rate versus yields available on other earning assets—loans and securities. Whether or not that is valid is an empirical issue.

New Monetary Instruments

The Bank of England description of the money creation process—whether in normal times or during a period of QE—does not address tools such as RRP, as employed by the Federal Reserve System. As explained above, RRP are collateralized borrowings by the central bank from the private sector. Technically, the central bank portfolio managers sell securities and simultaneously enter into an agreement to buy them back a day or a few days later (see Board of Governors 2015). However, instead of reporting a temporary decline in the portfolio of Treasury security holdings, the accounting treatment is

an increase of a liability—reverse repurchase agreements outstanding—that matches a decline of another liability—reserve balances of commercial banks.³ Whether or not the money supply is affected depends on who are the counterparties to the central bank RRP. If they are not banks, the Bank of England analysis suggests that increased RRP outstanding would be mirrored in a corresponding decline in the deposit component of the money supply. Nonbank fund managers acquire one asset—Treasury securities—and pay with another—deposits—so the money supply falls. With LSAP and IOR, the banking system contracts. Reserve balances at the central bank decline by the same amount as deposits. If the counterparties to the Fed RRP are commercial banks, deposits and the money supply do not decline; banks swap one asset (reserves) for another (loans to the central bank).

What is clear as of this writing is that there simply is not enough experience with the use of RRP in a regime of IOR and LSAP to draw any conclusions about their use as a tool for achieving any targets established by monetary policymakers.

Sources and Uses of Central Bank Money

In the original toolkit of monetary policies, the only instrument designed to affect the uses of central bank money was the discretionary administration of minimum reserve requirements. The notion was that, for a given amount of central bank money, policymakers could increase the amount that commercial banks were required to hold idle in their reserve deposits, producing a restrictive impulse on the banking system. That tool fell into disuse and was entirely abolished at most major central banks, leaving only actions

³Although the liability account—outstanding RRP—reduces reserves available to commercial banks in the same way as an increase in the Treasury General Account, it is not obvious that RRP should be treated as a negative source component and subtracted in the computation of the monetary base. An increase in the Treasury's account reduces central bank money available to the private sector. However, an increase in RRP shifts funds from an excess reserves liability of the central bank held in the private sector (earning IOR) to an RRP liability (also earning interest). RRP were created to allow the payment of interest to GSEs (which are not allowed to receive IOR) and domestic and foreign mutual funds (which are not allowed to have accounts at the Federal Reserve Banks). While an increase in RRP does reduce reserves available to commercial banks, with massive excess reserves there are no quantitative implications. Whether or not there are interest rate implications is an unexplored empirical question.

that affected the quantity or composition of sources of central bank money in the mix of policy actions available to decisionmakers. The desperate adoption of QE in the wake of the global financial crisis constituted a massive operation to flood the financial system with new sources of central bank money, in what turned out to be a futile effort to jump-start commercial bank lending for anything and everything that could pass muster with prudential supervisors.

The only other actions taken by U.S. monetary policymakers on the sources of base money was an equally futile “operation twist” conducted in late 2011 and in 2012. The aim of these twist operations was to lengthen the maturity/duration of the central bank’s portfolio of earning assets by selling short-term securities and buying an equal amount of long-term securities. The theory was that such transactions would cause a reduction in other long-term borrowing costs and consequently result in more borrowing and spending by businesses as well as some households. Of course, the simultaneous effect was to shorten the maturity/duration of the government’s net debt held by the private sector. One accounting effect was to increase the net interest income of the central bank, and consequently raise additional “other income” for the government because the central bank would now remit greater surplus income to the Treasury. While this near-term reduction in the net interest expense on the government’s outstanding debt had marginal budgetary effects, it is not clear from the experience that it had any effect on the aggregate economy. Either way, although the decision was taken by monetary authorities, this was a fiscal decision executed through the central bank’s balance sheet, with no clear monetary implications.

The new tools introduced since the global financial crisis operate on the uses side of the central bank balance sheet. After QE ballooned the stock of central bank money to massive size, further actions in that direction—at least in the United States—were not viewed as potentially effective. Congress authorized one new tool, IOR, in the midst of the global financial crisis, and in 2014 policymakers announced their intention to employ RRP as a companion instrument for affecting the composition of liabilities on the central bank balance sheet (see Board of Governors 2015, Frost et al. 2015, and Federal Reserve Bank of New York 2015).

Changes in the IOR rate are intended to set a floor under short-term market interest rates. The idea is that commercial banks would not lend to other borrowers at a rate below that available on riskless

and highly liquid deposits at the central bank. Of course, in a global and highly dollarized world economy, there are many lenders/investors who do not have reserve accounts at the Federal Reserve but nonetheless have reasons to hold low-risk and highly liquid assets denominated in U.S. dollars. Such lenders/investors may be willing to accept yields below the rate paid by the central bank. To supplement IOR, RRP created a way for the Federal Reserve to borrow from both domestic and foreign money market mutual funds, GSEs, and a few other non-commercial bank participants in global financial markets. The stated objective of both IOR and RRP is to influence other interest rates—the “price of credit” channel for transmitting the decisions of policymakers to the real economy.

However, IOR is also intended to create an incentive for commercial banks to hold idle deposits at the central bank rather than make loans or buy securities, which would create deposit money and convert excess reserves into required reserves. RRP affect the portion of central bank money available as commercial bank reserves; funds lent to the central bank via RRP are absorbed as a use of base money and consequently shrink the volume of reserves available to commercial banks. Theoretically, auctions of RRP in sufficient volume could absorb all excess reserve balances, putting commercial banks in a reserve-constrained position similar to the operating environment prior to the global financial crisis.⁴

Whether or not policy decisions to influence the composition of the uses of central bank money with these tools would result in effective monetary impulses is not known. There has been too little experience to draw firm conclusions about their efficacy. However, the fiscal implications are quite clear. Payments to reserve-balance holders reduce the surplus net interest income of the central bank, so less is turned over to the Treasury. That is, higher IOR reduces government revenue and increases budget deficits. Similarly, lenders to the central bank under the RRP program—mostly GSEs and both domestic and foreign money market mutual funds—earn income at the expense of taxpayers. Interest paid by the central bank on RRP (including foreign official accounts) also reduces the residual earnings of the central bank, which are remitted to the Treasury.

⁴Greenwood, Hanson, and Stein (2016) advocate greatly expanded use of RRP as a monetary policy tool and also as a vehicle for satisfying the new and higher mandates to meet liquidity coverage ratios.

The net economic implications for the macroeconomy are ambiguous; higher IOR and rates on RRP are intended to be restrictive impulses. However, for economic analysts who view larger fiscal deficits as expansionary impulses, there is a mitigating or offsetting effect on the stance of fiscal conditions (see Sims 2016).⁵ Because there is no empirical history on which to base policy prescriptions using these tools, neither the administered yields set by policymakers nor the volumes of reserve balances affected can be used as reliable targets or indicators of the thrust of policies on aggregate economic activity.

Potential for Resumed Monetary Control?

The question mark in the subtitle above is deliberate. At present, the decisionmakers on monetary policy have no effective means of influencing either market interest rates or the rate of money creation. Open market operations to increase or decrease the portfolio of earning assets held by the central bank would have no predictable effects on interest rates or on the growth rates of monetary aggregates.⁶ Consequently, policymakers are left with no historically tested and proven tools for influencing macroeconomic activity. In December 2015, U.S. monetary policymakers doubled the IOR rate and announced their desire to see the federal funds rate trade in a higher range. The stated objective was to achieve conditions that would result in generally higher market interest rates. Nevertheless, market-determined interest rates such as the two-year Treasury yield subsequently fell and, as of this writing, remain below the levels that prevailed before the increase in administered rates.

While doubling the IOR rate would result in greater demand for interest-bearing deposits at the central bank, the total volume of such deposits is constrained by the total assets of the central bank and such reserve absorbing factors as currency outstanding and

⁵According to Sims (2016), “Reductions in interest rates can stimulate demand only if they are accompanied by effective fiscal expansion. For example, if interest rates are pushed into negative territory, and the resources extracted from the banking system and savers by the negative rates are simply allowed to feed through the budget into reduced nominal deficits, with no anticipated tax cuts or expenditure increases, the negative rates create deflationary, not inflationary, pressure.”

⁶As of this writing—October 2016—there has been no change in the extension of Federal Reserve credit via open market operations for over two years.

required reserves. This means that higher IOR will have an effect only if it reliably raises other interest rates, and if those higher market interest rates have predictable effects on economic activity. But that has not been the experience so far. It is also significant to observe that the amount of interest-bearing deposits at the central bank held by foreign banking companies has fallen significantly subsequent to the doubling of the yield. Clearly, much more needs to be known about the parameters of the demand for such balances before there can be confidence in the likely effects of changing the administered IOR rate.

In theory, extremely large interest-bearing deposits held by banking companies at the central bank do not preclude effective monetary control. Rather, it is an empirical question about the stability and predictability of the coefficients in the money multipliers. The demand for such highly liquid cash balances is no doubt a function of the own- and cross-price interest elasticities, as well as a number of other factors such as mandates of liquidity balances imposed by home-country supervisors on the largest banking organizations (Hummel 2016). In the standard multiplier framework, the “e-ratio” (total excess reserves as a percentage of total bank deposits) was not only small but also quite stable. Now, however, the comparable ratio has over \$2.5 trillion in the numerator, and there is scant information about the interest elasticities. Moreover, the rules regarding mandatory liquidity balances are only now being phased in, so there is no empirical basis for predicting how the current “e-ratio” would behave as a result of open market operations to expand or contract the central bank’s balance sheet.

Occasionally the suggestion is made that central banks that engaged in LSAP following the global financial crisis can and should shrink asset holdings back toward precrisis levels (Selgin 2016). Of course, that implies that liabilities would shrink simultaneously, eliminating the huge volume of excess reserves. However, for that to occur the supervisory-imposed mandatory liquidity balances would have to be met with assets other than reserve deposits at central banks. To the extent that financial supervisors around the world require that large global banking companies hold highly liquid assets denominated in U.S. dollars in order to meet various contingencies, there must be an *ultimate* source of dollars in a *macro* liquidity crisis. Typically, liquidity is a micro concept—the holder of liquid assets contemplates selling such assets to a counterparty in order to acquire

dollar balances to meet deposit drains or satisfy contractual commitments. However, during a generalized financial crisis such as the one in 2008–09, there are no counterparties on the buy side for such assets. The Federal Reserve unavoidably becomes the buyer of last resort for all the liquid dollar-denominated assets offered for sale.

The objective of regulatory liquidity coverage ratios that are satisfied by deposits at a U.S. Federal Reserve Bank is to eliminate the need for fire sales of short-term marketable instruments in the event of a widespread flight to currency or seizing up of financial markets (such as occurred during the global financial crisis). In terms of strengthening the financial and payments systems, the authorities responsible for financial stability may be achieving their objectives; however, they may also be undermining the ability of those authorities responsible for monetary policy to influence aggregate economic activity.

A Proposal for Restructuring the Fed's Balance Sheet

Shrinking the Federal Reserve's balance sheet could theoretically be accomplished over a period of several years by a combination of asset sales and abandoning the current policy of reinvesting the proceeds of maturing assets. Once the conditions that prevailed before QE were achieved, the formulation and implementation of monetary policy decisions could return to a focus on the asset side of the balance sheet—altering the size and composition of the portfolio of securities held by the Federal Reserve Banks would again be the primary method of influencing monetary aggregates and interest rates. Of course, returning to a pre-LSAP balance sheet would mean that central bank liabilities would no longer satisfy the new Basel III-mandated liquidity coverage ratios.

In the meantime, the Federal Reserve would remain in the current policy purgatory, lacking the policy instruments to achieve predictable influence over either monetary aggregates or market-determined interest rates. However, as an alternative, the United States Congress could authorize the twelve Federal Reserve Banks to create a single, wholly-owned subsidiary for the purpose of transferring government securities and MBS acquired during LSAP (and a corresponding amount of liabilities owned by commercial banks), so as to leave the parent consolidated Reserve Bank balance sheets in an approximate pre-global financial crisis position. The liabilities of the new Fed

subsidiary would earn a market—as opposed to administered—rate of interest. Essentially, the new Fed subsidiary would operate like a specialized mutual fund. The assets would be Treasury securities and MBS. The subsidiary would be funded by auctioning short-term Fed bills, which would be similar to U.S. Treasury bills. Commercial bank holders of Fed bills would be able to post them as collateral for borrowing at a penalty rate from the Fed’s discount window. As a result, Fed bills would be highly liquid and thus would satisfy the supervisory-mandated liquidity coverage ratios. Of course, all of the net income of the subsidiary would continue to be returned to the Treasury.

Congress should also eliminate the Fed’s authority to pay IOR. Instead, reserves should be closely managed by commercial banks, as was the case before the global financial crisis. Furthermore, central bank open market operations would return to defensive and dynamic purchases and sales of short-term Treasury bills, coupled with the use of temporary RPs and RRP’s—and without the large-scale RRP’s that have become part of the new, unconventional monetary tool kit. Implementation of this proposal would require the restoration of a securities portfolio that consisted mainly (or preferably *entirely*) of U.S. Treasury bills.

Conclusion

Because central bank balance sheets ballooned during the LSAP programs that followed the global financial crisis, monetary targets and indicators no longer provide the information they once did to policymakers. Commercial banks are no longer reserve constrained; consequently, daily open market operations to add or drain bank reserves for the purpose of influencing the overnight interbank rate are no longer effective and have been suspended. Growth of the money supply is beyond the control of monetary authorities, and there are no instruments available to counter any inflationary forces that result from excessive money growth.

In the United States, QE ended in 2014 and there have been no further actions to influence assets held by the central bank in the subsequent two years. That is, there has not been a return to pre-crisis open market operations on the asset side of the central bank balance sheet for the purpose of influencing either market interest rates or monetary aggregates. Following the cessation of LSAP, the remaining tools available to policymakers operate on the liability

(uses) side of the central bank balance sheet. The administered interest rate paid on commercial bank deposits at the central bank and the rate paid on and volume of reverse repurchase agreements are intended to influence market-determined short-term interest rates—much as precrisis open market operations on the asset side of the balance sheet were intended to influence the overnight interbank rate (that is, the federal funds rate).

Assets acquired during QE reduce the net interest expense (and budget deficits) of the federal government; these monetary stimulus programs have an associated fiscal restraint component. Meanwhile, the IOR rate, as well as the rate paid to GSEs and mutual funds via RRP, reduces the net interest income of the Federal Reserve and increases the federal budget deficit. These monetary restraint policy actions have a fiscal stimulus component.

Substantial fluctuations in the balance of the Treasury General Account at the Fed—together with central bank collateralized borrowings from GSEs and mutual funds (that is, RRP)—have accounted for most of the fluctuations of central bank money available to the commercial banking system in the past two years. At least a portion of the enormous quantity of excess reserves held in the deposit accounts of commercial banks at the Federal Reserve serves to meet financial supervisors' mandated liquidity coverage ratios. As such, the policy objectives of financial stability may be achieved at the expense of reduced effectiveness of monetary policy instruments.

There is insufficient experience with unconventional monetary policy actions operating on the liability side of the central bank balance sheet to identify effective linkages between alternative policy targets and indicators and the ultimate objectives of monetary policies. Without consensus on reliable targets and indicators for formulation and implementation of monetary policy actions, it is not possible to specify appropriate rules for monetary policymakers to follow and be held accountable for achieving.

Restoration of the pre-QE operating environment could be achieved near term by creating a special purpose Federal Reserve subsidiary tasked with holding the additional Treasuries and MBS acquired during QE. This subsidiary would be financed by market-determined interest-bearing liabilities. IOR on deposits at Federal Reserve Banks would be eliminated, and the assets of those banks would consist entirely of short-term Treasury bills. Open market operations could then, once again, target the overnight interbank rate

or the quantity of bank reserve growth for the purpose of influencing aggregate economic activity.

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