

**Finance and Economics Discussion Series
Divisions of Research & Statistics and Monetary Affairs
Federal Reserve Board, Washington, D.C.**

Friedman's Monetary Economics in Practice

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2011-26

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Federal Reserve Board
April 13, 2011

Abstract

This paper views the policy response to the recent financial crisis from the perspective of Milton Friedman's monetary economics. Five major aspects of the policy response are: 1) discount window lending has been provided broadly to the financial system, at rates low relative to the market rates prevailing pre-crisis; 2) the Federal Reserve's holdings of government securities have been adjusted with the aim of putting downward pressure on the path of several important interest rates relative to the path of short-term rates; 3) deposit insurance has been extended, helping to insulate the money stock from credit market disruption; 4) the commercial banking system has received assistance via a recapitalization program, while existing equity holders have borne losses; and 5) an interest-on-reserves system has been introduced. These five elements of the policy response are in keeping with those that would arise from Friedman's framework, while a number of the five depart appreciably from other prominent benchmarks (such as the Bagehot-Thornton prescription for discount rate policy, and New Keynesian approaches to stabilization policy). One notable part of the policy response, the TALF initiative, draws largely on frameworks other than Friedman's. But, in important respects, the overall monetary and financial policy response to the crisis can be viewed as Friedman's monetary economics in practice.

Key Words: Milton Friedman, financial crisis, monetary aggregates, credit.

JEL Classification: E41; E43; E51; E52.

* Email: Edward.Nelson@frb.gov. I am indebted to James Bullard, Stephen Cecchetti, Charles Goodhart, Jeffrey Hallman, Douglas Irwin, Elizabeth Klee, David López-Salido, Jaime Marquez, Hugh Rockoff, George Tavlas, and seminar participants at the Federal Reserve Board for comments on an earlier version of this paper. In addition, for help in obtaining information used in this paper, I am grateful to Kathleen Easterbrook, Ozer Karagedikli, Annette Miller, Kavita Patel, Tara Sinclair, and the libraries of the Federal Reserve Board and the Federal Reserve Bank of St. Louis. I thank Andrew Giffin for research assistance. The views expressed in this paper are those of the author alone and do not necessarily reflect the views of the Board of Governors of the Federal Reserve System or its staff.

1. Introduction

Among the actions that have been taken by U.S. policymakers in reaction to the financial turmoil of recent years are the following:

1. Discount window lending has been provided broadly to the financial system, at rates low relative to the market rates prevailing pre-crisis.
2. The Federal Reserve's holdings of government securities have been adjusted with the aim of creating downward pressure on the path of several important interest rates relative to the path of short-term rates.
3. Deposit insurance has been broadened, helping contain the effect on the money stock of credit market disruption.
4. The commercial banking system has received assistance in the form of a recapitalization program, while existing equity holders have borne losses.
5. An interest-on-reserves system has been introduced.

Several monetary policy specialists have compared items on this list to the policy measures recommended in the literature on the appropriate monetary and financial policy response to a financial crisis. For example, Madigan (2009) and Kohn (2009) liken the Federal Reserve's discount window actions (item 1 above) to those recommended by the Bagehot-Thornton principles for the lender of last resort; and Kohn (2009) and Walsh (2009) compare other aspects of the monetary policy response to that recommended by the New Keynesian literature on optimal monetary policy. These analyses do highlight similarities between the policy response and that recommended in the literature used for comparison. But they also bring out major differences. For example, the generous provision of liquidity to the commercial banking system does meet aspects of the Bagehot-Thornton stipulations concerning a central bank's response to an emergency. But the Federal Reserve did not provide liquidity at an interest rate that was high relative to pre-crisis rates; in addition, in responding to the crisis, it widened its conception of the institutions and collateral eligible for the discount window. Another difference emerges from the fact that U.S. monetary policymakers, while following to some extent the New Keynesian economics stress on "forward guidance," have explicitly ruled out a period of deliberately higher inflation (Kohn 2009, Bernanke 2010a). Moreover, the Federal Reserve's efforts to put

downward pressure on long-term rates through large-scale asset purchases depend on a transmission channel which those working in the New Keynesian tradition deny exists (see Eggertsson and Woodford, 2003; Walsh, 2009).

An underappreciated aspect of the policy response is its consistency on many dimensions with the framework for financial and monetary policy suggested by Milton Friedman's body of work. In particular, ideas advanced in Friedman's writings can account for the deviations of the policy response from those implied by the Bagehot-Thornton and New Keynesian benchmarks. In fact, *all* five elements of the policy response laid out above are responses consistent with Friedman's framework.

This paper provides a systematic treatment of the policy response to the financial crisis from the perspective of Milton Friedman's monetary economics. In carrying out this exercise, one must face the complicating factor that, as Bernanke (2004, p. 5) observes, "Friedman's monetary framework has been so influential that, in its broad outlines at least, it has nearly become identical with modern monetary theory and practice." It is worth emphasizing, therefore, that the purpose of the present paper is to discuss Friedman's monetary framework with *particular* reference to his analysis of financial crises. In so doing, I aim to show that certain aspects of Friedman's framework are consistent with recent monetary policy practice, yet *do not* coincide with the majority view underlying "modern monetary theory." In particular, the manner in which key monetary and financial policy responses have departed from leading benchmarks in the monetary policy and banking literature can be understood by considering Friedman's own departures from those benchmarks. I will concentrate on bringing out lesser-known aspects of Friedman's monetary economics that provide a conceptual framework through which recent policy actions can be understood. Several elements of the policy response are either explicitly along lines that Friedman recommended, or are actions that have the practical effect of satisfying criteria that he laid out.

The question of whether recent policy actions can be reconciled with Friedman's positions has gained prominence, with one account describing Friedman as having cast a "shadow" over a recent meeting of policymakers with academic specialists on monetary policy (Chan, 2010). But detailed, documented discussion of this issue has been largely absent. For example, Wessel's (2010) comparison of the policy response with Friedman's views uses a small sample of Friedman statements from 1992 onward, as well as interviews with others. The present paper, on the other hand, provides a systematic treatment, and uses a far greater base of material—thus permitting greater confidence in the conclusions reached regarding Friedman's positions.

To be sure, no one should have the effrontery to claim to *know* what Friedman, who died in November 2006, would have prescribed had he been alive to witness events since August 2007. But Friedman's vast quantity of writings and public statements on monetary and financial matters does yield extensive information about his views on issues that have come up in recent years.

I do not attribute all of the policy response to Friedman's ideas. Indeed, one notable part of the policy response—namely, the Term Asset-Backed Securities Loan Facility (TALF)—draws largely on frameworks other than Friedman's. In addition, of course, there are cases where the policy actions undertaken bear similarities to Friedman's recommendations, but where other economists from different schools made similar recommendations. For these cases, I bring out comparisons that indicate in what respects the response resembles Friedman's recommendations most closely and in what respects the response owes more to the work of other authors. Consequently, although the focus in this paper is on Friedman's work, I will note instances where other contributors to the monetary policy literature filled in gaps which Friedman left. In addition, in those instances where the policy response is harder to reconcile with Friedman's conceptual framework, I will discuss what literature likely informed those policies. Thus, one aim of the present paper is to bring out some of the doctrinal origins of post-2007 policy measures. In so doing, I aim to contribute to the discussion of the connections between the recent policy responses and those suggested in the existing research literature on monetary policy, in a way that complements discussions of this topic provided by Kohn (2009), Madigan (2009), and Walsh (2009).

This paper proceeds as follows. Section 2 discusses the conceptual framework underlying Friedman's policy recommendations. Section 3 considers Friedman's analysis of monetary actions undertaken in conditions of a zero short-term nominal interest rate. Section 4 contemplates operations in long-term government securities. Section 5 discusses the lender of last resort function and central bank transactions involving risky private assets. Section 6 looks at other measures that bolster the money stock in the face of credit market disruption. Section 7 considers assistance to the banking system, while Section 8 discusses interest on reserves. In Section 9, I turn to a policy response—i.e., TALF—that is clearly motivated by frameworks other than Friedman's. I also discuss how the Federal Reserve's rejection of an inflation objective can be understood in terms of arguments that Friedman advanced. Some concluding remarks appear in Section 10. An appendix provides information on the source material, as well as a sketch of some key aspects of Friedman's view of the monetary transmission mechanism.

2. The source of Friedman's policy recommendations

In this section, I discuss the conceptual framework underlying Friedman's view of financial and monetary matters. I focus on his views on money and credit (Section 2.1). It is only in this light that one can then consider some of the policy recommendations with which Friedman is associated (Section 2.2).

2.1 Money vs. credit in Friedman's analysis

"The banking system is a subject which is rather mysterious, and it is hard to understand. Yet the economists would agree that it is vitally important to the behavior of the economy."

—Milton Friedman, NBC Radio, February 1949¹

Friedman (1964, p. 263) judged that a central theme of the Friedman-Schwartz *Monetary History* was the need to distinguish the concepts of money and credit. He would later conclude, however, that his writings had not brought this theme to the fore sufficiently.² Indeed, although references to the money-vs.-credit issue abound in Friedman's writings, it is hard to point to a systematic account of his views on the matter. But ascertaining those views is central to considering the recent financial crisis using Friedman's analytical framework. A synthesized account of Friedman's views is therefore necessary. To this end, this section sketches Friedman's position on monetary policy and the credit market. I will assume a positive short-term nominal interest rate, leaving to subsequent sections the complications raised by the zero lower bound on the short-term rate.

The first point to be made is that money and total credit (i.e., bank and nonbank credit) are in general not connected. Friedman's position was that there was no necessary relationship between the two (Friedman, 1972a, p. 929). In the United States and many other countries, a large fraction of the volume of government securities outstanding (i.e., of credit to the government sector) is held by the nonbank private sector.³ Moreover, particularly for the United States, much of the provision of credit to the private sector takes place outside the commercial banking system.⁴ It is true that, for the commercial banking system as whole, deposit creation

¹ As quoted in NBC (1949, page 20).

² See his comments in Mayer (1978, p. 7, fn. 17).

³ Non-U.S. governments hold a substantial share of U.S. public debt. In analyses of U.S. money and credit, they can be treated as part of the nonbank private sector.

⁴ See, for example, Adrian and Shin (2009), especially Figure 1 and their accompanying discussion.

typically comes as a by-product of credit creation.⁵ Even so, an increase in bank deposits does not imply that total credit in the economy has gone up; bank deposits can rise for a given volume of total credit. For example, banks can expand by intermediating a greater share of an economy's given volume of total credit. Furthermore, the relationship between commercial bank credit creation and deposit creation exhibits considerable slippage. Banks' ability to finance (or "fund") their loans and investments through nondeposit liabilities (where these "liabilities" include equity capital) creates leeway in the connection between deposits and bank credit.

Friedman (1972b, p. 192) gave as an example of factors that drove wedges between money and credit the existence of a large corporate bond market and a substantial nonbank mortgage lending market. At the time that Friedman wrote, savings and loan institutions and mutual savings banks were leading housing lenders whose deposit liabilities were excluded from Friedman's definition of M2 as well as from the official Federal Reserve definition. The official redefinition of M2 in 1980, which Friedman accepted, brought many of the liabilities of S&L's and mutual savings banks into the definitions of M2 deposits. Nevertheless, parallel developments occurring since the early 1970s have actually made Friedman's characterization of mortgage lending as primarily nonbank credit even more compelling than it was in 1972. In particular, increases since the 1970s in housing loan activity by the agencies (Fannie Mae and Freddie Mac), as well as in commercial banks' off-balance-sheet mortgage securitization, have reconfirmed mortgage lending as an important source of divergences between money and credit.⁶ It should also be recalled that Friedman and Schwartz (1970) defined broad money (M2) as currency plus retail deposits, thereby classifying wholesale deposits as nondeposit liabilities; thus, the growth in wholesale relative to core deposits (discussed, for example, in Bernanke, 2010b, p. 86) provides great scope for wedges between deposit growth and bank credit growth.⁷

⁵ Recall that this section is keeping to the case of positive short-term nominal interest rates. I also assume that the interest rate on reserves is below market rates. This implies a clear distinction between reserves and (other) earning assets of banks, so the case in which counterpart to deposit growth is growth in excess reserves can be neglected.

⁶ The distinction between money and credit is stressed in recent contributions such as Belongia and Ireland (2006), Cúrdia and Woodford (2009), and Woodford (2010). The latter two papers take the slippage between money and credit as a point against the value of money as an indicator. But that slippage was actually an essential part of Friedman's view of monetary relationships.

⁷ The exclusion of wholesale deposits is also a principle underlying the official Federal Reserve definition of M2 (see Whitesell, 1996). The extent to which standard central bank actions, such as open market operations in short-term debt, have a dependable effect on the expansion of commercial banks' wholesale deposits is an unresolved issue in the literature. Carpenter and Demiralp (2010) present evidence that the connection is weak. Because Friedman defined money excluding wholesale deposits, such evidence does not preclude a dependable connection between central bank actions on banks' reserve position and money growth (again, sticking here to the case of a positive short-term nominal interest rate). Indeed, Bernanke (2009a) takes the view that existing tools "allow the Federal Reserve to raise interest rates and control money growth."

To Friedman, the tools of monetary policy give the central bank a commanding position over money but not total credit (Friedman, 1970a, pp. 19–20). The central bank has considerable scope to block the effects on the money stock of a credit expansion. For example, a floating exchange rate means that net capital inflows do not have an automatic effect on the monetary base. Thus, any tendency for capital inflows to give rise to deposit expansion via their effect on bank reserves is nipped in the bud by adherence to a floating exchange rate regime. But even under a floating exchange regime, a net capital inflow can add to total *credit* in the economy.

Friedman further contended that the interest rates that matter for credit demand do not overlap completely with the interest rates that matter for money demand. As he saw it, some interest rates, such as the corporate bond rate, were important for both money demand and credit demand.⁸ Central bank actions had an important effect on this and several other interest rates and thereby might affect total credit demand. Other interest rates might not be very susceptible to influence from monetary policy. Friedman (1980, p. 54) argued that a central bank interest-rate increase could not be counted on to reduce credit demand because the relevant interest rates might be only tenuously related to the policy rate; Friedman (1962a, p. 189) specifically cited real property prices as an asset price which matters for credit demand and supply, but which might not be dependably connected to securities-market interest rates. The importance of this possibility was brought out in the recent financial crisis. Bernanke (2010b, pp. 51–52) noted that “the previous relationships between monetary policy and housing prices don’t look remotely like what they would have to have been in order to account for the increase in house prices in the recent episode.”⁹

Moreover, as Friedman saw it, while monetary policy actions impacted significantly on securities-market rates, these interest rates were also affected by a variety of nonmonetary factors, and the numerous securities-market interest rates reacted to nonmonetary factors in different ways. It was possible, by using its control over money, for the central bank to administer one nominal interest rate—the short-term riskless rate, for example—and thereby offset, in the short run, the effect of nonmonetary factors on the chosen instrument rate. But the central bank would then have no separate tool with which to offset the effect of nonmonetary factors on other securities-market interest rates (such as the long-term government bond rate). The significance of this issue was underlined by recent years’ events. Greenspan (2007, p. 378) and Woodford (2010) argue that long-term government bond and corporate bond rate behavior

⁸ For real money demand, nominal interest rates (in this case, the nominal corporate bond rate) would be the relevant rates, while for real credit demand, the relevant rates would generally be real interest rates.

⁹ For supportive empirical evidence, see Dokko et al. (2011).

during the mid-2000s was aberrational relative to that of short-term interest rates, with the long-term rate being swayed by factors other than monetary policy. Net capital inflows are, as noted above, a nonmonetary influence on total credit in the economy even in the absence of monetary accommodation, and Bernanke (2010b, pp. 50–51) argues that capital inflows in the 2000s were a force placing downward pressure on rates on U.S. securitized mortgages.

Policymakers are therefore faced with a variable—credit—which they cannot reliably affect with monetary tools. Behavior of this magnitude matters for the behavior of a variety of interest rates. Some of the interest rates determined in credit markets have only remote connections to the interest rates determined in key markets for nominal securities. And while monetary policy does affect many interest rates, the monetary authority cannot separately set values for more than one of them.

In addition to having an uncertain connection to monetary policy actions, credit market behavior in Friedman’s view exhibited destabilizing characteristics. Kindleberger (2000, p. 67) notes that the pre-Friedman Chicago monetary tradition endorsed the existence of “instability of the credit mechanism,” and argues that Friedman dissented from this perspective. In two little-noted contributions, however, Friedman (1981a, 1981b) clarified that he *did* believe that the credit system was unstable. There were two dimensions to this instability. First, the demand function for credit had unstable parameters (Friedman, 1981a). Second, there was a tendency for the supply side of the credit market to undergo shifts, because creditors could become overleveraged and go through periods of subsequent retrenchment.

Friedman was confident that the central bank did have the capacity to set the money stock at a desired level even in the face of disruption in the credit market. Interactions between bank credit and money did complicate monetary control in a fractional reserve banking system, but not in a way that made central bank influence on the money stock impossible in the context of a credit market disturbance. For an environment in which the short-term nominal interest rate was positive and banks were in a strong financial position, open market operations in short-term debt were sufficient to set this process in motion. The scale of operations required to maintain the money stock in a banking crisis was complicated by the impact of the crisis on the nonbank private sector’s desired currency/deposit ratio. In past financial crises, scrambles for currency had become a destabilizing force promoting a multiple deposit contraction, but Friedman believed that deposit insurance had essentially eliminated this source of instability (see, for example, Friedman and Schwartz, 1963a, pp. 440–442). A remaining obstacle to monetary control took the form of the feedback of credit market disruption onto the banks’ desired

reserve/deposit ratio. Bank capital was a factor that affected banks' willingness to expand their loans and investments, and thus an erosion of banks' capital position created an obstacle to maintaining and expanding the stock of deposits. Nevertheless, even in circumstances of credit market disruption of this kind, the central bank was in a position to preserve and boost the money stock (defined as currency and core commercial bank deposits, and excluding bank reserves) via greater lending to the commercial banks and greater securities purchases; these operations would raise asset prices and thereby encourage bank expansion.

The fact that the central bank can maintain the money stock in the face of credit market disruption offered hope, in Friedman's view, for limiting the damage that the credit market could cause the economy. As noted above, the credit market had destabilizing features, but the situation was brighter than it might appear because the relationship between credit and economic activity was much looser than that between money and economic activity. The interest rates that mattered most for aggregate demand were also those that appeared in the money demand function,¹⁰ while several interest rates that had an important bearing on credit behavior entered with low weight in the money demand and IS equations. And although credit market instability did spill over into asset prices that mattered for spending decisions, maintenance of the money stock helped limit the response of these asset prices.

Thus, by stabilizing and enhancing the money stock in a situation of credit market disruption, the central bank could reduce the impact of credit market disorder on important asset prices and on aggregate demand. The protection that such a response offered the economy would grow in importance over time, since, the longer the period considered, the more decisive monetary policy became—relative to the credit market and other factors—in determining the course of nominal income and inflation.

2.2 Monetarist theory vs. monetarist policy

An unsympathetic position on Friedman's influence could point to the fact that Friedman wanted 100% reserve requirements, abolition of discount lending, a constant money growth rule, and market-determined short-term interest rates. Policymaking in practice, both before and during the crisis, has featured low reserve requirements, heavy use of discount lending, large deviations from the constant money growth rule benchmark, and the use of the short-term interest rate as a policy instrument (including forward guidance on the policy rate after the federal funds rate

¹⁰ These rates would appear as real rates in the IS equation, and nominal rates in the money demand equation.

reached the lower bound). Thus, critics might argue that there can be no comparison of the actual policy response with Friedman's recommendations.

But a moment's consideration should rule out the reasonableness of such an argument. It is worth recalling that Friedman (1983a) pointed to Bank of Japan monetary policy over 1973–1983 as something that approached the monetarist ideal—even though that policy regime featured fractional reserve banking and the use of the discount rate as a policy instrument. Friedman's own work therefore suggests that it is possible to find parallels between actual policy and his framework even when considering policy regimes that do not adhere to all his policy recommendations.

More basically, two distinctions need to be made. First is Friedman's (1983a) distinction between monetarist theory and monetarist policy. His policy rule prescription (monetarist policy), involving a constant money growth rule, appealed not only to his view of the economic structure (monetarist theory), but also to a model uncertainty argument. It is perfectly possible to embrace his theoretical views (concerning, for example, money vs. credit, and of a broad-based transmission mechanism for monetary policy), yet take the position that quantitative knowledge of the transmission mechanism is better than Friedman thought. Partly for this reason, adherents to Friedman's theoretical vision can contend that constant money growth policy can be improved upon by other feasible policy rules.

The second important distinction is between the ideal world of an economist—the fundamental reforms he or she might like to make to the system—and an economist's views on how best to use the tools available. This distinction is applicable to Friedman's coverage of monetary policy issues. It applies equally to other economists' treatments. To take one example, Goodfriend and King (1988), like Friedman (1960), recommended the abolition of the discount window. But Goodfriend (2011) has commented on how discount window policy was used in the recent crisis. Likewise, it is possible to compare actual discount-rate policy with the lending-policy prescriptions that appear in the Friedman and Friedman-Schwartz work.

The approach of this paper is, therefore, not to consider how the policy response matches Friedman's list of the ideal reforms, but instead to bring out his positions on how policymakers should react given the tools available. To that end, let us conclude this section with some brief clarifications of Friedman's views concerning 100% reserve requirements. Friedman's advocacy of 100% reserve banking was *not* a distinguishing feature of his monetary economics. Friedman frequently presented his constant money growth rule without including 100% reserve banking as

part of the package. Friedman (1967, p. 83) stated that 100% reserve banking was less essential than other reforms he recommended. Rather, what was important was the achievement of arrangements under which monetary policy could ensure that the money stock was maintained in the face of credit market disruption. A 100% reserves system was not vital for such monetary control (Friedman, 1960, p. 68).

What Friedman did emphasize was that it was desirable to “rationalize” reserve requirements and make them uniform across deposits and constant over time (Friedman, 1974, p. 23). To achieve this kind of rationalization, Friedman did offer alternatives to 100% reserve banking. Friedman (1960, p. 108) acknowledged that zero reserve requirements could achieve this just as 100% reserve requirements could; he subsequently (Friedman, 1978) presented the 0% and 100% alternatives as equally attractive.

It is clear that, while Friedman’s vision of a fundamental monetary overhaul would involve 100% reserves and no discounting, he was prepared to make policy recommendations that took for granted a fractional reserve system and continuation of a discount window. It is these recommendations, as well as the view of the transmission mechanism underlying them, that it is most fruitful to consider when analyzing actual policy responses observed since 2007. Before we turn to this analysis, it is necessary to consider what additional issues are raised by a zero short-term nominal interest rate.

3. Issues encountered at a zero short-term nominal interest rate

Friedman’s (1969) paper on the optimum quantity of money is often cited in support of the position that at a zero short-term nominal interest rate, increases in the money stock (meaning here increases in the nonbank private sector’s holdings of currency and deposits) are not expansionary. It is said that the 1969 paper established that the private sector’s demand for money is unbounded at zero short-term interest rates, in the sense that real money balances cannot become large relative to desired real balances. In essence, the transactions services provided by money have been exhausted, and the private sector is satiated at the zero lower bound; additions to the nominal money stock would merely add to real money balances and have no other effect.

Friedman, however, did not assent to this characterization. He saw that his 1969 analysis provided too limited a picture of the state of money demand at the zero lower bound: he argued that, in fact, “an interest rate of zero does not imply infinite desired cash balances” (Friedman

and Schwartz, 1982, p. 265). The reason was that the demand for real balances arising from what Friedman and Schwartz (1970, p. 107) called “mechanical transactions needs” was only one reason that agents held money; a second source of money demand was what Friedman and Schwartz called the “temporary abode of purchasing power.” The latter demand arose from the perception of money as a reserve to be held against the holding of riskier assets. This extra source of demand for money meant that the (riskless) short-term nominal interest rate was not the only interest rate entering the money demand function. Due to this extra source of demand for money, it was possible for deposit creation at a zero short-term nominal interest rate to provoke a putative excess demand for money. Certainly, as the economy shifted from a positive to a zero short-term nominal interest rate, the real demand for currency and deposits would rise, and increases in the nominal total of currency and deposits induced expansionary pressure on aggregate demand only insofar as they exceeded this (finite) increase in desired real balances. But once such an excess of actual over desired balances emerged, the attempt by agents to eliminate the excess would lead to upward pressure on a number of financial and real asset prices. The change in asset prices would simultaneously rationalize the higher outstanding level of money holdings, and stimulate spending on goods and services (Friedman and Schwartz, 1970, p. 125).

The temporary abode of purchasing power, in Friedman’s view, was a factor behind *each* dollar demanded of money (Friedman, 1956); agents did not break their money holdings into separate bundles each associated with different functions. Thus, provided the nominal money stock was increased sufficiently, one could be confident that extra money would circulate and be spent in goods and asset markets. The policymaking task is then one of choosing measures in an environment of a zero short-term nominal interest rate that will generate the requisite increase in the nominal money stock.

Open market purchases of short-term government debt are, of course, the traditional means at a central bank’s disposal for generating an increase in bank deposits. In Friedman’s analysis, as in others’, the commercial banking system has an incentive to react to an open market purchase by increasing deposits because the open market purchase creates reserves which bear returns low relative to those that the banks can obtain by expanding their loans and investments. Their doing so will initially raise asset prices and will permanently boost nominal spending and the money stock.

At a zero short-term nominal interest rate, the situation is more complicated. For one thing, as Friedman and Schwartz (1963a, p. 685) observe, to the extent that the surrounding environment

is one of banking difficulties, banks may be rebuilding their liquidity pending a replenishment of their capital base. Consequently, their desired reserve-deposit ratio will go up as they hold more reserves for prudential purposes. The central bank needs to accommodate the increased demand for reserves with reserve creation, in order to go beyond this steep increase in banks' liquidity demand and reach a level of reserves that is actually stimulative.¹¹ Once such accommodation is provided, the question arises of what stimulative actions to undertake. As some of the monetarist literature acknowledges explicitly, and as Friedman's writings acknowledged implicitly, at a zero short-term nominal riskless interest rate, *how* the monetary base is expanded matters for the degree of response of aggregate variables, including economic activity and the money stock.¹² A near-zero short-term rate on Treasury bills leaves commercial banks largely indifferent between holding bank reserves and bills. A reserve injection may still expand the money stock, but cannot be counted on to do so, as the profit-motive basis for expecting an expansion of deposits is no longer present. Operations in securities other than short-term riskless debt offer themselves as a more reliable means of expanding the money stock and providing stimulus. Let us now consider central bank operations in long-term bonds in that light.

4. Central bank operations in long-term government securities

Sixty years ago, Friedman and his colleagues observed, "The major weapon available to the Federal Reserve System is control over its holdings of government securities." (Friedman et al., 1951, p. 459.) This statement is just as applicable today. The Federal Open Market Committee (FOMC) began large-scale asset purchases (LSAP) in November 2008. In March 2009, the FOMC raised the ceiling on its total level of planned purchases of agency mortgage-backed securities to \$1.25 trillion and of agency debt to \$200 billion, and announced a purchase program of \$300 billion for longer-term Treasury securities.¹³ In November 2010, it announced an additional \$600 billion program of purchases of longer-term government securities. (See FOMC, 2009, 2010.)

¹¹ See Friedman and Schwartz (1963a, p. 538).

¹² For example, Brunner (1976, p. 26, fn. 3) states that, when short-term rates were close to zero in the 1930s, monetary stimulus created in financial markets other than those involving short-term liquid assets would have been transmitted to economic activity; likewise, McCallum (2003, p. 5) states that, at near-zero Treasury bill rates, monetary base expansion needs to be effected by something other than purchases of Treasury bills in order to deliver expansionary effects on aggregate demand. This position is also implied by discussions in two of Friedman's works: Friedman and Schwartz (1963a, p. 563) and Bach et al. (1976, pp. 9–10).

¹³ As noted below, all of these securities—longer-term Treasuries, agency debt, and agency MBS—would fall under Friedman's definition of government securities.

Several studies have found that LSAP did reduce long-term bond yields relative to the path of the expected short-term rate (see, for example, and D'Amico and King, 2010, and Gagnon, Raskin, Remache, and Sack, 2010). Such findings are hard to square with standard New Keynesian models, which have the property that affecting the path of the policy rate is the only means through which central bank purchases can affect long-term interest rates (Eggertsson and Woodford, 2003; Walsh, 2009). In these models, the purchases only reduce long-term bond yields to the extent that they serve as an indirect signal of future short-term interest rate policy.

By contrast, another tradition holds that money creation can exert a portfolio effect on long-term interest rates additional to any effect on the expected path of short-term rates. Bernanke (2010a) observes, "I see the evidence as most favorable to the view that such purchases work primarily through the so-called portfolio balance channel." Milton Friedman was a strong advocate of the existence of portfolio effects. As detailed below, Friedman typically treated portfolio effects on long-term bond yields as more important for aggregate spending behavior than portfolio effects on the prices of other prominent financial assets, such as equities.

4.1 Friedman's belief in the portfolio balance channel

Friedman believed that central bank action had both a portfolio balance effect and an expectations effect on the long-term interest rate. In the ordinary circumstances of positive short-term nominal interest rates, an open market purchase in short-term debt would expand the money stock and would have effects on the long-term rate both via the expectations channel and through portfolio effects on long-term securities.¹⁴ The two channels did not confer on a central bank the ability to fix the short-term interest rate and long-term interest rate independently, but did imply that the effects of a monetary expansion on bond rates was not summarized by their implied effect on the path of the short-term interest rate.

Though he believed that central bank operations should ordinarily be in short-term debt (Friedman, 1980, p. 55), Friedman's usage of the term "open market operations" allowed for the possibility of operations in long-term government debt.¹⁵ Direct central bank purchases of long-term debt then offer themselves as an operation that can both raise the money stock and put

¹⁴ See, for example, Friedman and Schwartz (1963a, p. 515) and Friedman (1977, p. 399) on the expectations channel. The portfolio effect is acknowledged in Friedman and Schwartz (1982, p. 41) and in Friedman's June 1966 memorandum to the Board of Governors (Friedman, 1968, p. 156).

¹⁵ Thus, Friedman and Schwartz (1963b, p. 50) defined open market purchases as purchases of "fixed-interest coupon low-risk obligations." At the time that they wrote, the Federal Reserve was indeed conducting some operations in long-term debt as part of Operation Twist.

downward pressure on the long-term interest rate relative to the path of short-term interest rates. Let us now consider why Friedman viewed such actions as effective.

4.2 How Friedman thought the channel worked

In Friedman's framework, the private sector viewed money as carrying out more functions than short-term securities could, and viewed money as more liquid than short-term securities; nevertheless, both these short-term assets were more close substitutes for one another than they were for long-term securities.¹⁶ A major reason for this was that long-term bonds, even if they had little or no default risk, were less safe assets than short-term securities because they could not be redeemed at short notice at face value. Most private agents reacted to the perceived risk of these securities by treating cash and other short-term assets as reserves against the holding of risky assets; these agents were more willing to hold a larger stock of long-term assets if they simultaneously could add to their stock of short-term assets (Friedman, 1971; Friedman, 1988, p. 223). If we consider a case in which the household holds a bundle B of securities each purchased this period for $\$1/(1+R)$ and redeemable for $\$1$ next period, and a bundle of long-term securities with total current market value B_L , then for a given path of the expected short-term rate, agents were inclined to favor stability in the ratio $(M+b[B/(1+R)])/(BL)$, where M is currency plus bank deposits, and $0 \leq b \leq 1.0$.¹⁷ It was as though a large proportion of the private sector had a "desired reserve ratio" for their holding of risky assets, with the reserves consisting of a weighted combination of money and Treasury bills. Movements in long-term interest rates relative to the expected path of short-term rates prompted agents to deviate from a preferred value for this ratio.

On the other hand, there existed some other agents whose portfolio preferences implied a different perspective on the holding of long-term bonds—a perspective which viewed these bonds as a convenient vehicle for matching the maturities of the agents' assets and liabilities. In particular, nonbank long-term savings institutions such as pension funds stood out as "hold-to-maturity" investors in long-term bonds. Once the pegging of bond yields ended in the early 1950s, these institutional investors distinguished themselves from commercial banks in their attitude to holding bonds. Commercial banks had had very large holdings of government securities, including long-term bonds, in the immediate postwar period, but realized major losses during the 1950s when they encountered the need to reduce their bond holdings (Law and Crum, 1963, p. 121). Consequently, U.S. commercial banks became averse to holding long-term

¹⁶ See Friedman's testimony in Joint Committee on the Economic Report (1952, p. 689); Friedman (1960, p. 61); and Friedman and Schwartz (1982, p. 300).

¹⁷ A specification similar to this is used in Andrés, López-Salido, and Nelson (2004), with $b = 0$.

government bonds. Banks could thereafter be treated as falling into the category of investors that viewed long-term bonds as risky, with Lindow (1963, p. 31) noting, “long-term Treasury securities [are] outside the normal ‘bank range’ of maturities.”

By the late 1950s, the modern pattern had taken shape: one class of agents which was inclined not to hold long-term bonds, juxtaposed against certain classes of institutional investor that preferred to hold such bonds. Looking on this situation in 1959, Friedman said, “People have some preferences about the kind of assets they hold; some people place a great deal of importance on holding government-secured obligations.”¹⁸ Holding of this kind largely took place via prominent nonbank savings institutions, which also held high-grade corporate bonds, leading Friedman and Schwartz (1982, p. 572) to observe that “most long-term bonds are apparently held by... pension funds, insurance companies, tax-exempt institutions...” In a television appearance in 1984, Friedman added, “on the part of lending on the long side, much more of that lending is done by institutions such as state and local pension funds, [and] insurance companies, who are more or less committed to buying long-term fixed-coupon securities.” He went on to appeal to this institutional feature to account for term-structure developments.¹⁹

It is this combination—of agents who, for a given yield pattern, are reluctant to hold long-term assets unless their short-term assets are augmented, with agents who see inherent advantages in holding long-term bonds—that underpins the view that long-term interest rate behavior is driven in part by the behavior of relative quantities of assets. This view of yield curve determination has of course gone under many names, including “preferred habitat,” or as a special case of “imperfect asset substitution” or of “market segmentation.”

The implication for monetary policy of this kind of imperfect substitution between assets is that it gives scope for central bank purchases to affect long-term interest rates for a given short-rate path. LeRoy (1972, p. 17) expressed this idea in more modern language than Friedman typically used: “the risk premium shifts over time in response to variations in the supply of money.”²⁰ In Friedman’s framework, provided short-term interest rates were positive, these effects would occur as a result of short-term security purchases because the money thus created would spread

¹⁸ From Friedman’s testimony in Joint Economic Committee (1959, p. 3039).

¹⁹ From Friedman’s appearance on *Wall Street Week*, April 27, 1984 (PBS, 1984; p. 7 of transcript).

²⁰ LeRoy’s description was in the context of a discussion of stock prices, not long-term bond rates. But, as argued below, applying LeRoy’s statement to long-term bonds rather than equities provides a better match with Friedman’s views of the transmission mechanism. See King (1999, p. 42) for another characterization of monetarist views on long-term rates in risk-premia language.

across markets and create a portfolio effect on those markets.²¹ With a zero short-term rate, however, the relative immobility of short-term funds makes direct central bank purchases in the long-term bond market necessary if a portfolio balance effect is to be generated. The same reasoning indicates that such operations provide a profit motive for banks to expand in a way that central bank purchases of short-term securities do not.²² Hence Friedman’s approving observation in October 2001 that the Bank of Japan was not taking a zero short-term interest rate policy to be adequate stimulus; rather, “the Japanese central bank has finally started... buying long-term government securities and increasing high-powered money” (quoted in UPI, 2001).

Much of the initial LSAP took the form of Federal Reserve purchases of agency-related debt (agency securities and agency-guaranteed mortgage-backed securities). Goodfriend (2011) argues that the purchases of agency-related debt amount to “debt-financed fiscal policy,” rather than monetary policy. Friedman’s work, however, suggests a monetary interpretation of these purchases. According to this view, the agency debt issues and agency MBS are federal debt, and Federal Reserve purchases of these assets are tantamount to purchases of government securities. As Friedman (1976, p. 315) reached the conclusion that agency debt is federal debt years before Fannie Mae and Freddie Mac entered conservatorship, this characterization of agency debt necessarily carries over to the post-2008 period. Thus, while Goodfriend views agency-related debt as private debt before and after 2008, and views Federal Reserve operations in such debt as fiscal policy, a more appealing position is that agency debt even before 2008 was merely “nominally private” (in the words of Bernanke, 2010c). Operations in agency debt and agency MBS on the part of the Federal Reserve would then be regarded as falling squarely within the category of monetary policy.

4.3 Other antecedents in the literature

The effect just described is not present in New Keynesian models. Indeed, the prevalence of

²¹ Even at positive short-term rates, however, the portfolio effect on long-term bond rates of a direct operation in long-term debt would be greater than that of a standard open market operation because, while the latter does increase the stock of liquid assets (assuming $b < 1$), it does not reduce the stock of illiquid assets.

²² At a zero short-term interest rate, a central bank purchase of short-term riskless debt leaves commercial banks with an unchanged total of noninterest-bearing assets (i.e., base money plus short-term Treasuries). A central bank purchase of long-term debt, on the other hand, raises this total. If the bond purchase is from a commercial bank, the bank’s earning assets are reduced. This, combined with the fact that it now feels more liquid, provides an incentive for the commercial bank to respond to the bond sale by restoring and then raising its total earning assets, a process that will tend to increase the banking system’s aggregate level of deposits. If the central bank’s bond purchase is from a nonbank seller, and financed by reserve creation, commercial banks’ earning assets do not fall but their noninterest-bearing assets rise. Again, banks feel more liquid and are more inclined to increase their loans and investments. In addition, the proceeds from the bond sale will tend to raise total bank deposits on impact.

New Keynesian analysis, and more generally the pure expectations hypothesis baseline, is a major reason that a belief in these portfolio balance effects is viewed as controversial. The case for portfolio effects is, however, present in the work of several earlier leading writers on monetary policy, not just Friedman. Here, I discuss the views of some of the leading exponents and compare these with Friedman's.

Brunner and Meltzer. Like Friedman, Brunner and Meltzer (1973) saw the transmission of monetary policy as operating partially through portfolio effects on asset yields, including the long-term interest rate, rather than via a short-rate channel alone. Brunner (1983, p. 50) acknowledges the influence of Friedman's (1956) framework on this view of the transmission mechanism.

Modigliani and Sutch. Modigliani and Sutch (1966) introduced the preferred-habitat framework, in which relative quantities of assets affect long-term interest rates relative to the path of short-term interest rates. The preferred-habitat framework is an acknowledged influence on the LSAP initiative (Kohn, 2009) and has been developed recently by Vayanos and Vila (2009) and Doh (2010).²³ As noted above, preferred habitat is consistent in general terms with Friedman's view of the transmission mechanism. The main aspect that marks out Friedman's position is that he regarded money as generally more important than Treasury bills in the basket of liquid assets that agents perceive as less risky than long-term bonds.

Notwithstanding his advocacy of preferred habitat, Modigliani severely limited the degree to which long-term interest rates mattered for monetary policy transmission. In Modigliani's (1971, p. 21) description of the Federal Reserve-MIT-Penn model (whose construction he led), "monetary policy affects the long-term rate which enters the stock market equation." This kind of specification, in which long-term interest rates matter for aggregate demand principally via their effects on stock market behavior, relies critically on a connection between equity prices and bond yields.

Tobin. Tobin's body of work on debt management and on asset markets (including Tobin, 1963) obviously allows for considerable scope for portfolio effects of purchases of long-term bonds. In fact, Tobin (1965, p. 472) explicitly mentioned such purchases as an option that the Federal Reserve should have pursued when short-term interest rates reached near-zero values in the

²³ Conard's (1959) account of term structure behavior is notable for his emphasis on pension funds as institutional investors with a preference for long-term bonds, an identification which (as we have seen) was also made by Friedman. Culbertson (1957) is another widely acknowledged antecedent of the preferred-habitat approach.

1930s. Tobin's (1969) model of monetary policy in an imperfect-asset-substitution framework focused on equity rather than long-term bonds as the "third asset" beside money and short-term securities, but the model can be eclectically interpreted as referring to long-term bond rate determination (see, for example, Andrés, López-Salido, and Nelson, 2004).

There are two major differences between Friedman and Tobin on these issues. The first was of long standing. Tobin saw short-term securities as near-perfect substitutes for money (including bank deposits) even at positive short-term interest rates, whereas for Friedman money was distinctly more liquid than Treasury bills.

A second difference between Friedman and Tobin may be even more important in considering the significance of central bank actions on longer-term interest rates. The difference is that, while Friedman came to discount heavily the economic significance of equity prices and to pay more attention to corporate bond rates, Tobin went in the opposite direction. In the 1970s, real rates on U.S. long-term government and corporate bonds were low, while raising equity finance became almost prohibitively difficult as the stock market slumped. Pointing to the behavior of "Tobin's q ," and contending that monetary policy exerted powerful effects on q , Tobin (1981) rejected the evidence from interest-rate and money growth data that monetary policy in the 1970s had been loose, and instead interpreted the 1970s as featuring a very restrictive monetary policy—the opposite of Friedman's conclusion.

Friedman, on the other hand, was doubtful about the value of the equity market as an indicator of economic or financial conditions. Friedman and Schwartz (1982, pp. 508, 510) argued that the idiosyncratic behavior of stock prices made them unreliable as an indicator of yields that mattered for aggregate behavior. Testing for the significance of stock market variables, Friedman (1988) found that they hardly entered his annual money demand function estimates. The equity market seemed largely disconnected from other variables. In contrast, Friedman continued to regard the interest rate on corporate bonds as a significant variable for the determination of money demand and aggregate demand. Friedman and Schwartz (1982, pp. 294–304) estimated money demand equations with term-structure information derived from corporate bond rates.

The different perspectives on the connection between the equity market and monetary policy between the Friedman and Tobin traditions were reflected in judgments about the appropriate policy response to the stock market crash of 1987. Friedman doubted that the stock market decline would have repercussions for aggregate demand, provided financial markets were kept

liquid and the money stock was not allowed to decline. He stated in November 1987 that “monetary policy may easily overwhelm and offset any dampening effect which the decline in the market could have on consumer spending.”²⁴ This contrasted with the response of Willem Buiter, who had collaborated with Tobin in one of Tobin’s debates with Friedman (Tobin and Buiter, 1976; Friedman, 1976). Buiter (1987) called for the U.S. and U.K. governments to carry out a stock price stabilization scheme through equity purchases “financed in the short run either by borrowing or money creation...”

Developments have borne out Friedman’s greater confidence in the value of bond prices as an indicator. The 1987 stock market crash did not translate into macroeconomic instability, and maintenance of the money stock and provision by the authorities of liquidity proved to be powerful stabilization measures. More generally, corporate bond prices have provided more reliable information concerning aggregate activity than have stock prices (Philippon, 2009; Gilchrist and Zakrajšek, 2010).

A key difference between Friedman and Tobin’s ultimate views on monetary transmission, therefore, is that Friedman downgraded the significance of equities, both as an asset price that mattered for aggregate spending and as a conduit through which monetary policy affected the economy. By contrast, his belief in the significance of interest rates on long-term bonds was reaffirmed. This belief distinguished him from Tobin and provides a greater basis for monetary policy actions centered on long-term bond markets.

4.4 Forward guidance as an alternative to long-term debt purchases

Forward guidance regarding short-term interest rates is a more widely accepted means through which monetary policy can affect long-term rates. While acknowledging that expectations of short-term interest rates mattered for long-term rates, Friedman viewed portfolio effects of monetary injections as a supplement to this expectations channel, and a feature of the “real-world term structure” (Friedman, 1977, p. 401).

4.5 Spillovers to private yields

As Friedman saw it, operations that reduced long-term government bond rates had various spillovers to rates on private securities. As government bond rates fell, other long-term rates

²⁴ From Friedman’s appearance on *Nightline*, November 6, 1987, in ABC (1987, p. 21).

would too; this reflected arbitrage between government and high-grade corporate bonds, and also the portfolio effect, which left agents more willing to hold a greater volume of risky assets once their money balances had been augmented (Friedman and Schwartz, 1963b, p. 60).

A further effect on yields of these operations came indirectly via their impact on commercial banks' capital position. Friedman (1970b, pp. 9–10) and Friedman and Schwartz (1963a, pp. 355–356) argue that the fall in long-term bond prices in the early 1930s led to the marking-down of banks' capital positions, prompting contraction of banks' balance sheets. After the 1950s, as noted above, commercial banks have become less inclined to hold long-term bonds than in previous decades, so operations that underpin bond prices now had a less sizable effect on banks' capital position. On the other hand, as commercial banks in recent years have taken off-balance-sheet mortgage-backed securities onto their balance sheets, the LSAP operations have tended to support banks' capital positions via the bolstering effect of LSAPs on the MBS market. Other ways through which monetary policy actions can reduce the yields on risky private assets are best brought out by examining the central bank's lender-of-last-resort function.

5. Lender of last resort

In considering the Federal Reserve's actions as a lender of last resort during the financial crisis, I look at three general topics: lending against risky assets; lending at a subsidized rate; and lending to a wider variety of institutions.

5.1 Lending against risky assets

Textbook presentations have made it customary to think of maintaining a constant money stock and maintaining a constant interest rate as monetary policy measures that are in conflict. But in a financial crisis, the opposite tends to be the case: measures that maintain the money stock will help to stabilize interest rates. There is one qualification: the interest rate should be interpreted as a vector of interest rates, including rates on private risky assets. As Friedman and Schwartz (1963a, p. 455) observe, the 1929–1933 contraction witnessed a “sharp widening in spread[s] among assets differing in the degree of confidence the holder could attach to their convertibility into a known cash sum at need and on short notice.” This was the same period over which the money stock shrank. Maintaining riskless rates at a low level was not sufficient to expand the money stock; indeed, low riskless rates proved consistent with a major monetary contraction.

This combination of a shrinking money stock and erupting private yields in the 1930s may be an extreme demonstration of the portfolio effect of monetary actions on risky yields. A version of this process is apparent in postwar episodes, as monetary expansion seems to reduce the spread between riskless and risky assets in the short run (Romer and Romer, 1990, p. 166). In a situation of financial crisis, of course, with other factors widening the spreads, the scope for monetary policy to counter this widening gains prominence. Actions that maintain and expand the money stock, by accommodating the scramble for liquidity associated with the crisis, can limit the extent to which such a scramble forces a large-scale selloff of private assets.

For reasons already discussed, open market purchases of short-term Treasuries are unlikely to be a reliable means of boosting the money stock under these circumstances. They are thus unlikely to deliver the desired downward pressure on risky rates. Operations in long-term debt can help deliver these effects. But purchases of risky private assets may be especially helpful both in stimulating aggregate demand and forestalling the pressure on banks to contract that arises from banks' capital erosion. Poole (1976, p. 34), after noting that policies that deliver low riskless yields may not be sufficient to maintain the money stock, argued that a central bank aiming to preserve the money stock may have to work on yields for "risky *private* paper." The policy that Friedman and Schwartz advocated for the 1930s, though couched largely in terms of maintaining the money stock, can be seen as entailing official actions to liquefy impaired risky assets.

Limitations on the securities that are eligible for open market operations mean that central bank the purchase of risky private assets is not an option available to the Federal Reserve (see Clouse, Henderson, Orphanides, Small, and Tinsley, 2000, p. 49). But lending against risky assets via the discount window is permissible under specified conditions. The effect on bank deposits, interest rates on risky assets, and aggregate demand that might be achieved by a central bank purchase of risky private assets can be largely approximated by central bank lending against those risky assets.²⁵ During the financial crisis, the Federal Reserve widened the scope of assets eligible as collateral in its provision of liquidity, adding for example various asset-backed securities (see Cecchetti, 2009; Bernanke, 2009b). The Federal Reserve's reaction to the financial crisis thereby helped stabilize banks' balance sheets and limit the rise in risk spreads in a way that policymakers failed to do in the Great Depression.

²⁵ Like an open-market purchase, a discount window loan exchanges bank reserves for a nonmonetary asset. Friedman and Schwartz (1963a, pp. 511–512) accordingly view the two operations as similar, likening them to the two blades of a pair of scissors. In the same vein, Duro's (1980, p. 1) exposition of discount window borrowing refers to the collateral being "purchased (discounted)" by the central bank. The central bank's provision of Treasury bills in exchange for other assets can likewise be viewed as analogous to sterilized purchases of the assets (as in Cecchetti's (2009) discussion of the Term Securities Lending Facility).

5.2 Lending at a subsidized rate

Starting in August 2007, the Federal Reserve reduced the spread of the discount rate (primary credit rate) from 100 basis points to 25 basis points, and took several measures, including the creation of the Term Auction Facility, to lengthen the terms of loans from the Federal Reserve to the banking system (see Bernanke, 2009b; Cecchetti, 2009; Klee, 2010). Though the provision of liquidity made during this process has been likened to the Bagehot (1873/1897)-Thornton (1802/1962) prescription for the behavior of the lender of last resort (see Kohn, 2009; Madigan, 2009), there are significant departures from the policy responses that Bagehot and Thornton advocated. Relative to pre-crisis conditions, the discount rate (i.e., the Federal Reserve's primary credit rate) was low in absolute terms and in relation to the funds rate. This contrasts with the celebrated Bagehot-Thornton prescription not only to lend freely and on good collateral, but to do so *at a high lending rate*. McCallum (1995, p. 393) concludes that, while that prescription does not mean that rates should be more penal than those in crisis-stricken markets, the prescription still implies that the discount rate should be about 200 basis points higher than the funds rate in a financial crisis. Federal Reserve policy in 2007–2009 entailed a considerably less penal rate than this formulation would imply. Figure 1 plots the primary credit rate over this period, as well as the spread over the effective funds rate. The rate became less of a penalty rate during the crisis; the spread over the funds rate target was reduced in August 2007 and March 2008. To the extent that there has been a high borrowing cost, it has taken the form the treatment of collateral for the loans, not in the lending rate *per se* (see Madigan, 2009, p. 177).

The discount rate, not just the volume of discount lending, was thus used as a means of supporting the banking system during the crisis. Cecchetti and Disyatat (2010, p. 39) argue that

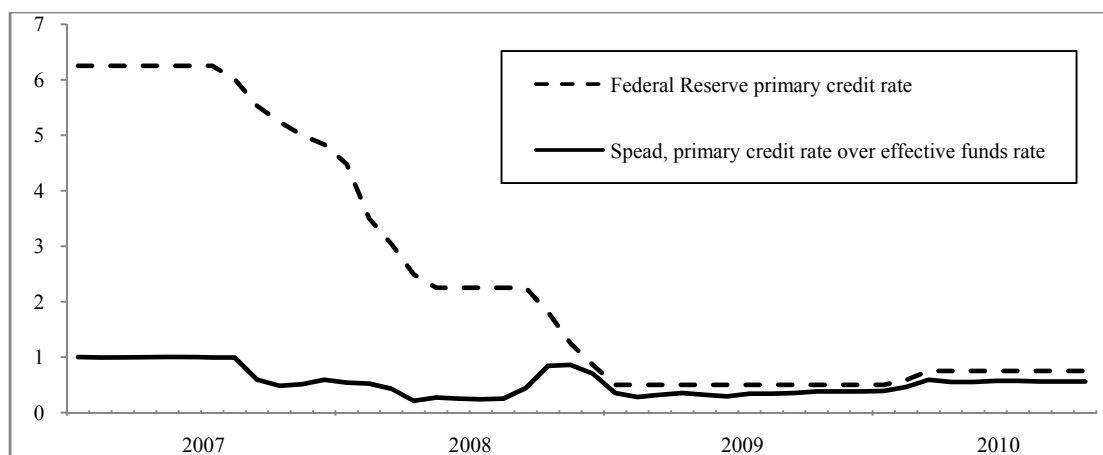


Figure 1. Federal Reserve primary credit rate and its spread over effective funds rate, monthly averages, percent, January 2007–June 2010

this has been an appropriate step. They note the existence of prior arguments dissenting from the Bagehot position on this point; none of the references they cite (2010, p. 30), however, predates the 1990s. The notion that the lending rate in a crisis should be deliberately non-penal was actually advocated much earlier by Friedman and Schwartz (1963a). Friedman and Schwartz praise Bagehot, and Friedman's position was that the discount rate should normally be a penalty rate (Friedman, 1982, p. 117). In an emergency situation, however, Friedman and Schwartz argued that making the discount rate low relative to prevailing market rates was necessary to bolster asset prices and the money stock. They criticized the Federal Reserve for allowing the commercial paper rate to fall below the discount rate, and cited the failure to reduce the discount rate as a factor that kept up long-term interest rates during the 1930s (Friedman and Schwartz, 1963a, pp. 323–324). Friedman and Schwartz thus viewed discount lending at low rates as an important mechanism for creating downward pressure on market interest rates and maintaining the money stock in a financial crisis.

5.3 Lending broadly

Bernanke (2009b) numbers the creation of the Primary Dealer Credit Facility and the Term Securities Lending Facility among the “extraordinary actions” that the Federal Reserve took in response to the financial crisis. These facilities allowed primary dealers to receive liquidity from the Federal Reserve in return for less-liquid collateral. The class of institutions able to borrow from the Federal Reserve was thereby broadened—from commercial banks alone, to both primary dealers and commercial banks.

This measure contrasts with the parochial attitude taken by policymakers during the 1930s. Friedman and Schwartz criticize the Federal Reserve for interpreting its responsibilities narrowly: the central bank's monetary-stability function should not have been limited to actions that supported those institutions for which the Federal Reserve traditionally was assigned specific obligations. In particular, Friedman and Schwartz (1963a, p. 358) contend that the Federal Reserve was sanguine about the failure of commercial banks that were not Federal Reserve member banks. These nonmember banks constituted a large share of the failures (see Wheelock, 1989, p. 163). In the modern context, a broad conception of the financial institutions that require support in an emergency is consistent even from a viewpoint, such as Friedman's, that sees maintenance of commercial bank deposits as paramount. Because of counterparty

relationships, contraction of a major part of the financial system is likely to have repercussions for commercial banks' balance sheet position and thereby aggregates like M2.²⁶

6. Maintaining the money stock

I turn now to the issue of the maintenance of M2 through measures to boost reserves (Section 6.1) and to extend deposit insurance (Section 6.2).

6.1 Reserve injections

Friedman and Schwartz advocated the expansion of bank reserves on the scale required to meet, and exceed, the higher demand for reserves that emerges in a financial crisis. Consistent with such a prescription, the Federal Reserve doubled the monetary base in the course of the crisis, with the twelve-month growth rate of the St. Louis Adjusted Monetary Base crossing 100% in three of the first six months of 2009. One indication of the success of this action is that the stock of M2 was maintained and fortified during the financial crisis (Figure 2).

The behavior of the money stock in this episode contrasts with the pattern in two prior periods of credit market disruption—the early 1930s and 1980—also considered in Figure 2.²⁷ In the early

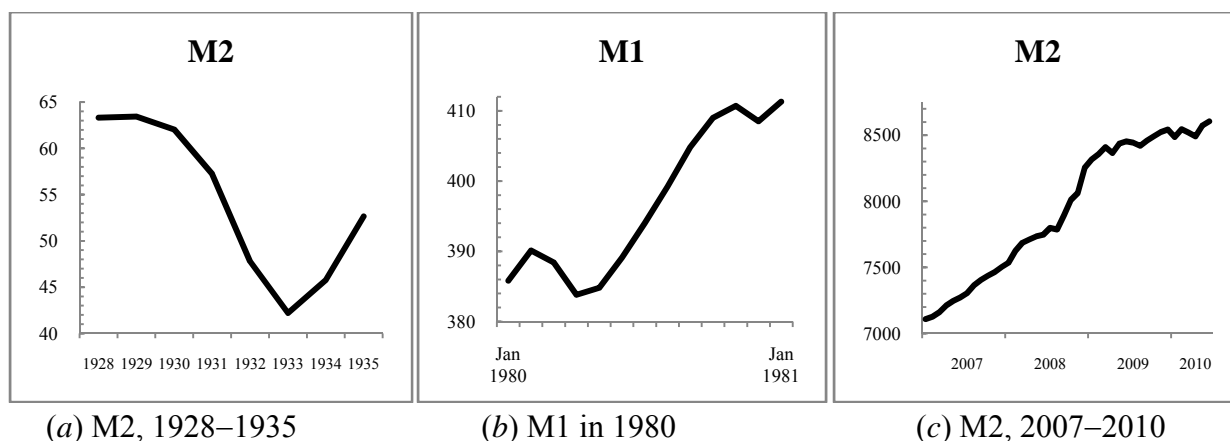


Figure 2. The money stock (\$ billion) in three periods of credit market disruption.

Source: Balke and Gordon (1986); Federal Reserve Bank of St. Louis' FRED portal.

²⁶ Bernanke (2008) and Brunnermeier (2009) discuss counterparty considerations in the context of Federal Reserve actions to prevent the failure of the Bear Stearns investment bank in March 2008.

²⁷ M1 is shown instead of M2 in the center panel of Figure 2 because, as of 1980, greater obstacles to shifting between M1 deposits and non-M1 deposits existed than were present either before 1933 or after 1980. In addition, discrepancies between M2 and Divisia M2 behavior in the early 1980s make "simple-sum" M2 difficult to interpret over that period (see Barnett and Chauvet, 2009).

1930s, the monetary base was not allowed to expand fast enough for reserves to increase; bank reserves actually fell from 1929 to 1933. Reserve behavior thus reinforced rather than offset the rise in the reserve/deposit ratio, and M1 and M2 fell by a third. In 1980, the disruption to financial markets associated with the imposition of credit controls was allowed to produce a fall in adjusted bank reserves and a sizable decline in M1, leading to Friedman's (1985, p. 58) criticism that the Federal Reserve, by permitting the money stock to decline, had worsened the contractionary pressure that the credit controls engendered.

The fact that M2 has not fallen is generally little remarked upon, but amounts to an example of a dog that didn't bark.²⁸ There are sound reasons for believing that the prevention of money stock decline was a significant stabilizing factor in recent years. Using a New Keynesian model, Eggertsson and Pugsley (2006, p. 11) argue that "the money supply is irrelevant when the interest rate is zero." Statements of this nature are usually qualified only by allowing that money growth might matter if it helps signal future policy rate movements. This limited view of money's importance contrasts with the perspective that "rapid declines in deposits may affect the capacity of intermediaries to function normally" (Bernanke, 1986, p. 62). From this perspective, preservation of the money stock contributes to economic stabilization, even aside from the impact on the path of the policy rate. For an individual bank, a loss of deposits means a loss of reserves, and—in the absence of reserve provision from the central bank—widespread deposit drains, or the prospect of them, will trigger what Friedman and Schwartz (1963a, p. 346) call "the famous multiple expansion process of the banking system in vicious reverse." The avoidance of aggregate deposit declines helps prevent the adverse portfolio effects on asset prices that would occur if banks as a whole were under greater pressure to become more liquid.

6.2 Deposit insurance

In response to the financial turmoil of 2008, temporarily higher levels of deposit insurance were legislated, and temporary guarantees were also provided for certain other types of bank liabilities; see Gilchrist and Zakrajšek (2010) for a brief description. The existence and reinforcement of deposit insurance have contributed to the maintenance and expansion of deposit-inclusive monetary aggregates during the financial crisis. Thomas Sargent has pointed to the extension of deposit insurance as an important aspect of the post-2007 policy response, and

²⁸ The maintenance of the money stock is emphasized as a feature of the Federal Reserve's policy response in Lothian's (2011) discussion. In addition, the importance of supporting and increasing the money stock has featured prominently in expositions of the Bank of England's quantitative easing policy (see Bank of England, 2009, and Joyce, Lasaoa, Stevens, and Tong, 2010).

argues that some of the assistance to nonbank institutions has been motivated by analogy to bank deposit insurance. In considering the source of policymakers' view of the stabilizing effect of deposit insurance, Sargent states (in Rolnick, 2010), "I believe that the Bryant-Diamond-Dybvig model has been very influential generally, and in particular that it was very influential in 2008 among policymakers."²⁹ This characterization surely neglects the influence of the Friedman and Schwartz (1963a) study in informing thinking about deposit insurance. Friedman and Schwartz's emphasis on the stabilizing effects of deposit insurance was an important aspect of their discussion of post-1933 policies. The broadening of deposit insurance in 2008 can be viewed as an effort to secure, in a more complicated financial environment, stabilizing effects like those achieved by the introduction of deposit insurance in the 1930s.

7. Assistance to banks

The policy response to the financial crisis has included assistance to banks, such as the recapitalization carried out via the Treasury's Troubled Asset Relief Program (TARP). Wessel (2010) claims that Friedman would have "condemned" the recapitalization program of recent years. In fact, however, Friedman accepted that when the banking system as a whole is in distress, there is a case for an official recapitalization policy. Friedman and Schwartz (1963a, pp. 330–331) are not critical of the official recapitalization that was undertaken during the New Deal, and indicate that it would have been desirable for the Reconstruction Finance Corporation to have had greater recapitalization powers prior to 1933. Friedman also supported the official rescue of the large commercial bank, Continental Illinois, in 1984 (see Barro, 1985). While preserving bank deposits,³⁰ neither the Continental rescue nor the TARP prevented losses to existing shareholders, in keeping with what Friedman (1983b) characterized as the desirable state of affairs: "If any loans go sour, the banks (i.e., their stockholders) should bear the losses."

Aware of the moral hazard problems that might come from bank rescues, Friedman (1992a, p. 251) judged that "a substantial equity cushion" gives banks "ample incentives to avoid excessive risk." This position points to capital ratios as the preferred form of prudential control. It is therefore in keeping with much of the analysis in recent years of the form that macroprudential policy might take (see, for example, Bean, Paustian, Penalver, and Taylor, 2010).

²⁹ See Bryant (1980) and Diamond and Dybvig (1983).

³⁰ Protection of retail deposits was in line with Friedman's concern with maintaining M2. Maintenance of M2 might also motivate protection of wholesale liabilities, due to the counterparty implications of wholesale activity.

8. Interest on reserves

Friedman (1960) argued that the Federal Reserve should pay interest on bank reserves. Though his 1960 proposal was part of a package that included making all reserves required reserves, Friedman made it clear that he supported payment on reserves (both required and excess) in a fractional reserve system: see Friedman (1960, p. 74; 1962b, p. 27) and Lenzner (1981). Keister, Martin, and McAndrews (2008, p. 49) note that payment of interest on all reserves is a logical implication of Friedman's argument. The Federal Reserve introduced interest payments on reserves (required reserve balances and excess reserves)³¹ in October 2008.

Tobin (1960) advocated interest on excess reserves only, with required reserves continuing to be noninterest bearing. In that respect, his recommendation has proved a less close match to the Federal Reserve's actual interest-on-reserves policy than was Friedman's. Tobin (1960) and Phillips and Jacobs (1983) appear, however, to be more prescient regarding the modern literature on interest on reserves (such as Woodford, 2000) than was Friedman, in the sense that they viewed the interest rate on reserves as a leading policy instrument. This difference from Friedman is not as great as it might appear. Friedman's preferred procedure was for the central bank to announce its open market operations in advance: it "should decide in advance each week how much to buy or sell, not the price at which it will buy or sell" (1980, p. 56). Market interest rates would adjust to these operations, and the interest rate on reserves would be tied to those rates. Under such an arrangement, it is likely that observers would interpret the interest rate on reserves as the "policy rate." Indeed, such an interpretation could be justified by Friedman's (1980, p. 53) acknowledgement, "Of course, direct control of the monetary base will affect interest rates." Thus even under Friedman's preferred arrangements, it would be appropriate to regard the interest-on-reserves rate as reflecting monetary policy intentions, in the sense that the chosen scale of open market operations implies a decision regarding—or acquiescence to—a certain pattern of behavior of the interest-on-reserves rate.

9. TALF and anchoring inflation expectations

This section takes up two further aspects of the policy response: the Term Asset-Backed Securities Loan Facility (TALF), and the anchoring of inflation expectations. TALF is a policy measure that draws on perspectives on the transmission mechanism that are different from

³¹ The Federal Reserve does not have the authority to pay interest on vault cash, which also counts toward required reserves. In addition, only the reserve balances that are held by the banking system may bear interest. See Bech and Klee (2010) for further discussion.

Friedman's. Anchoring inflation expectations is at variance with the prescriptions of New Keynesian economics, but is in line with Friedman's prescriptions.

9.1 TALF

The TALF initiative, lasting from March 2009 to June 2010, involved Federal Reserve loans to investors in asset-backed securities. TALF clearly draws on frameworks different from Friedman's. Friedman's position, as we have seen, was that the harm done by credit disruptions largely occurs through their repercussions for the money stock. It was precisely this aspect of the Friedman-Schwartz account of the Great Depression which Bernanke (1983, 2002) used as motivation for an alternative view that the credit contraction mattered in its own right. From the latter perspective, there is an important role for intervention in credit markets to preserve intermediation, as opposed to the interventions designed to maintain the money stock that Friedman emphasized. Goodhart (1973) noted that the public sector's advantage in bearing risk provided a rationale for the authorities to step into the intermediation process, and Gertler and Karadi (2011) formalize the case for their doing so in a financial crisis. By contrast, Friedman advocated the indirect benefits of monetary stabilization on credit market behavior: in particular, he suggested that maintaining the money stock would help stabilize asset prices and thereby provide a better environment for borrowing and lending (see, for example, Friedman and Schwartz, 1963a, p. 356; Friedman, 1992b).

The TALF initiative ultimately amounted to about \$70 billion in loans, compared to the \$200 billion sum that was authorized and the maximum of \$1 trillion which the Federal Reserve indicated that it was prepared to authorize (see Campbell, Covitz, Nelson, and Pence, 2011). Thus, while it is a notable example of a policy response that is not on the list of measures that Friedman recommended, TALF has proved to be quantitatively fairly modest.

9.2 Anchoring inflation expectations

There is widespread agreement that keeping expectations of inflation from declining below levels consistent with price stability is desirable under all circumstances.³² There is more contention when it comes to the issue of whether—in an environment of a zero short-term nominal interest rate—there is a case for a monetary policy that deliberately encourages inflation

³² Though he found some beneficial steady-state welfare effects of deflation, Friedman (1969) ultimately concluded against deflation even as a long-run objective.

expectations to rise above rates consistent with price stability. New Keynesian analysis of monetary policy at the zero lower bound tends to suggest that a forward guidance policy that encourages temporarily higher inflation would contribute to closing the output gap (see, for example, Eggertsson and Woodford, 2003, and Walsh, 2009). Kohn (2009) notes that the Federal Reserve has rejected this option. Kohn (2009) and Bernanke (2010a) cite the danger that temporarily higher inflation might upset longer-term inflation expectations.

Such a concern is consistent with views that Friedman expressed. Although he accepted that inflation was in large part a forward-looking variable, Friedman believed that prior inflation rates did enter with some weight in the Phillips curve. Consequently, even a policy measure intended to elevate the inflation rate only temporarily—such as an increase in value added tax—would have enduring effects on expected future inflation, and this would complicate the monetary policy problem. A VAT increase that was intended to deliver a one-time price-level increase only, and was not accommodated by monetary policy, would nevertheless boost inflation expectations beyond the period of the VAT rise. Bringing those expectations down would imply short-term costs in terms of real output. Thus, after the Thatcher Government raised VAT in 1979, Friedman said it was “very foolish to raise people’s expectations of inflation” (quoted in Huhne, 1980). The same argument carries over to monetary-policy-induced increases in expected inflation. Furthermore, the multiple-asset view of transmission advocated by Friedman means that monetary policy can stimulate the economy even when the policy rate is at zero, and can do so without recourse to an attempt to increase inflation expectations.

10. Conclusions

In the preceding sections, I have considered the response of monetary and financial policy to the recent financial crisis from the perspective of Milton Friedman’s monetary economics. While one notable part of the policy response—the TALF initiative—draws largely on frameworks other than Friedman’s, the overall response fits in closely with Friedman’s views concerning the transmission mechanism of monetary policy and the appropriate policy reaction to a financial crisis. In particular, the response lines up with Friedman’s prescriptions in the areas of discount rate policy, large-scale Federal Reserve purchases of long-term government securities, maintenance of the stock of commercial bank deposits, commercial bank recapitalization, and interest on reserves. In the words of Chairman Bernanke, “I grasp the mantle of Milton Friedman. I think we are doing everything Milton Friedman would have us do.”³³

³³ November 6, 2010, remarks, quoted in Chan (2010).

Appendix A: A Note on Sources

Here I discuss the sources used in this paper. Starting in the mid-1940s, Friedman shifted to a viewpoint that emphasized the importance of monetary policy. But it was only in the years from 1948 to 1951 that his views crystallized into the position recognizable as the monetarist standpoint for which he became known; see Tavlas (1977) and Nelson (2009, pp. 477–479). Accordingly, I concentrate on Friedman’s work from the early 1950s onward in my characterization of his monetary economics. I also use the report of the Bach Committee (Bach et al., 1976) as a source. Friedman was a member of the Committee, and, to judge from the writing style in its published report and from his later supportive words for the report (in Friedman, 1982, p. 107, for example), a leading contributor to the drafting of the report.

Appendix B: Sketch of Friedman’s view of money/credit interaction

Below I sketch what Friedman’s ideas on money and credit might imply for the specification of a small macroeconomic model. In this simplified exposition, I make no allowance for dynamics other than admitting a distinction between a short-term and long-term interest rate.

Let R be a nominal interest rate on a Treasury bill, R_L the nominal rate on a long-term corporate bond, π^e and π_L^e be the expected inflation rates relevant for the respective interest rates, and r^* and r_L^* be the real natural values of these rates. In addition, let Y be the level of real output, Y^* be its natural value, M/P be the stock of real balances, and B_L be the nominal market value of corporate bonds held by the private sector. A stripped-down version of the IS equation (written in output-gap terms), the money demand equation, the term-structure equation, and the Phillips curve in Friedman’s conception of the transmission mechanism might be:

$$Y/Y^* = f(R - \pi^e - r^*, R_L - \pi_L^e - r_L^*) \quad (1)$$

$$M/P = g(Y, R, B_L/P) \quad (2)$$

$$R_L = h(R, (M/B_L)) \quad (3)$$

$$\pi - \pi^e = n(Y/Y^*) \quad (4)$$

Letting subscripts denote partial derivatives of a function with respect to argument i , these functions feature the restrictions $f_1 < 0$, $f_2 < 0$, $g_1 > 0$, $g_2 < 0$, $g_3 > 0$, $h_1 > 0$, $h_2 < 0$, and $n_1 > 0$. Equations (1) to (3) capture the notions that both the short- and long-term interest rate matter for aggregate demand (equation 1), that—as discussed in Section 4—money is demanded partly as a reserve against the holding of long-term bonds (equation 2), and that there is a portfolio effect of

real money balances on the long-term interest rate for a given path of the short rate (equation 3).³⁴ A further structural equation involving the stock of bonds B_L is needed to complete the specification of private sector behavior, but here I simply take B_L as given, requiring only that central bank actions on M can move the ratio (M/B_L) in the same direction in the short run.

Now let us consider adding a credit market. Let this credit market be responsible for setting an asset price, P_H (the real house price, for concreteness). Furthermore, let us take Friedman's position that some asset prices have little bearing in themselves for aggregate demand determination, and are also only very remotely related to monetary policy, by excluding P_H from all the equations above. That is, the credit market determines P_H , but the central bank's influence on the credit market is assumed not to be pervasive enough to determine P_H , while P_H appears negligibly in the IS equation. To capture Friedman's notion that the credit market matters for the rest of the economy via its spillover effects on banks' capital position, let us specify a relationship between the real short-term natural rate and the real asset price as follows:

$$r^* = d \cdot P_H + r_L^* \tag{5}$$

where $d > 0$. This equation captures the idea that, as Friedman and Schwartz (1963a, p. 323) observe, banks "seek safety... through government securities." A collapse of asset prices is assumed to erode banks' capital position and to produce a flight to safety that lowers the real short-term natural rate. Long-term bonds, including long-term securities with no default risk, are assumed not to benefit from the flight to safety because fluctuations in bond prices make long-term bonds inherently riskier than short-term securities.

To concentrate on the effects on aggregate demand of disturbances from this source, normalize $r_L^* = 0$ and assume $Y^* = 1$. Then the system becomes (5) and:

$$\begin{aligned} Y &= f(R - \pi^e - r^*, R_L - \pi_L^e) \\ M/P &= g(Y, R, B_L/P) \\ R_L &= h(R, M/B_L) \\ \pi - \pi^e &= n(Y). \end{aligned}$$

³⁴ Substitution of the term-structure equation into the money demand function indicates that both short- and long-term interest rates enter the money demand function. Even so, this modification of the money demand function only goes partly in the direction of achieving the multiple-argument money demand equation that Friedman envisaged.

Let us contemplate the case of a fall in the asset price P_H . This will lower the short-term real natural rate, r^* . Let us assume that P , π^e , and π_L^e are inertial in the short run.³⁵ Then if R is positive, actions on R are feasible and translate into actions on the real interest rate, and the appropriate stabilizing action is to let real and nominal short-term interest rate fall with r^* .

Consider, however, a policy reaction which does not reduce the nominal and real interest rate in response to the decline in P_H . Then output Y will fall and real balances M/P will decline via the money demand relationship; in addition, the fall in M/P will raise the long-term interest rate and thereby compound the contraction in output. Thus, using prevention of the fall in M/P (which, with P predetermined, means stabilizing the nominal money stock) as a criterion in the policy response would be one way of countering the contractionary effects of the fall in the unobserved natural rate. Moreover, when reductions in R are not feasible because of the zero lower bound, additions to M/P still provide stimulus via portfolio effects on (real and nominal) long-term interest rates.³⁶

The preceding outline does not incorporate the idea that a flight to safety will not only reduce the natural real short-term interest rate, but will likely increase desired real money balances as well. This factor is cited by Friedman and Schwartz (1963a, pp. 352–353) as the reason that real money balances rose in the 1930s even though the nominal money stock contracted. The implied shift in money demand is incorporated into Christiano, Motto, and Rostagno's (2003) characterization of the Friedman-Schwartz hypothesis regarding the Great Depression. Allowing for this factor would strengthen the case for expansion of the nominal money stock as a stabilizing action during a financial crisis.

³⁵ P and π^e might be inertial because of price stickiness, while π_L^e might be inertial because the monetary policy regime has anchored π_L^e to such a degree that short-run variations in the policy instrument (M or R) have little effect on π_L^e .

³⁶ The Bank of England has characterized its quantitative easing operations as the direct replacement of nonbank holdings of long-term debt (B_L) with deposit money (included in M); see Bank of England (2009) and Joyce, Lasasosa, Stevens and Tong (2010). LSAP might be viewed as having the same effect. From equation (2), at $R = 0$, such operations reduce one right-hand-side term (the real bond stock times its positive coefficient) while augmenting the left-hand-side variable (real money balances). To balance the equation, output (Y) can rise. The dependence of Y on the long-term interest rate, coupled with the portfolio effect on long-term rates of the central bank's purchase program, provides a basis for believing that Y will indeed rise in response to the expansion of money relative to long-term debt.

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