

Time-Consistency and Credible Monetary Policy After the Crisis*

BY JAMES M. NASON AND CHARLES I. PLOSSER

The economic crisis and its aftermath have posed significant challenges to policymakers. To help meet those challenges, the Federal Reserve deployed several innovative policy tools to help relieve the stress in financial markets during the crisis. These tools have created their own significant challenges for the conduct of monetary policy in the post-crisis era. The wider range of policy options now available to policymakers makes it more difficult to credibly commit to a particular policy course, and this discretion poses a problem. This is because monetary policy is subject to a time-inconsistency problem. The new monetary policy tools introduced during the crisis can make such time-inconsistency problems worse by reinforcing the incentives for financial institutions or other sectors of the economy to take on excessive risk. In this article, Jim Nason and Charles Plosser discuss why it is important for central banks to consider ways in which they can limit discretion and use these new tools in a systematic way.

not yet have well-developed theories about how such tools can be optimally deployed, but we can draw on earlier economic research to reach some conclusions. In particular, we know that the wider range of policy options now available to policymakers and the lack of fully articulated models make it more difficult for policymakers to credibly commit to a particular policy course and that this discretion poses a problem. Research since the late 1970s, including important contributions by Henry Simons, Guillermo Calvo, Finn Kydland, and Edward Prescott, indicates, perhaps paradoxically, that when policymakers take a more systematic approach to policy and use less discretion, their policies yield better outcomes.

This is because monetary policy is subject to what economists call a time-inconsistency problem — what might seem like the best policy when first announced may not be viewed as best when the time comes to act. But if policymakers yield to temptation and renege on that announced policy, this can lead to worse outcomes than if they were able to stick with the original plan. This is a well-known aspect of many forms of policymaking and one reason monetary policymak-

The economic crisis and its aftermath have posed significant challenges to policymakers around the world. To help meet those challenges, the Fed-

eral Reserve developed and deployed some innovative policy tools, including liquidity programs, to help stressed markets and large-scale purchases of mortgage-backed securities and longer maturity Treasury securities, which altered the size and composition of the Fed's balance sheet. These tools have created their own significant challenges for the conduct of monetary policy in the post-crisis era. We do



Jim Nason is a vice president and economist in the Research Department of the Philadelphia Fed and the head of the Macroeconomics section. This

article is available free of charge at www.philadelphiafed.org/research-and-data/publications.



Charles Plosser is the president and chief executive officer of the Federal Reserve Bank of Philadelphia. This article is available free of charge at www.philadelphiafed.org/research-and-data/publications.

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ers often talk about the importance of commitment, credibility of previous policy promises, and reputation, and they look for ways to limit the use of discretion in their policymaking.

But the new monetary policy tools introduced during the crisis can make such time-inconsistency problems worse by reinforcing the incentives for financial institutions or other sectors of the economy to take on excessive risk — so-called moral hazard. These firms know that in the midst of severe problems in financial markets, policymakers might find it extremely difficult to refrain from acting as lender of last resort to rescue them, even if doing so would lead to better risk-taking incentives in the future. Such a policy of refraining from bailouts would not be credible or time-consistent. But knowing this, firms have less incentive to refrain from excessive risk-taking in the first place, making the likelihood that policymakers might face a situation in which a firm will need to be rescued even greater. Thus, with new tools now at policymakers' disposal, it is important that they understand the interplay between time inconsistency and moral hazard. As we'll discuss below, we think it is important for central banks to consider ways in which they can limit discretion and use these tools in a systematic, or rule-like, way.

A TIME-CONSISTENT BEDTIME STORY

Although “time-inconsistency” is an economic concept, it affects almost everyone at some time or another. Consider Jane and her parents, who have given Jane a bedtime rule. On a school night, Jane must turn off the TV, laptop, and smartphone, as well as unplug the electric guitar and amplifier at 9 p.m. and go to bed. The parents' goal of setting the rule is for Jane to be well rested for school. They also anticipate that without a rule, it will be very costly negotiating bedtime every

school night with Jane, whose goal is to watch TV, IM her friends, and play guitar (all at the same time!).

How the rule works in practice, however, is different than intended. One school night at 9 p.m., Jane complains loudly and persistently to her parents that there is a TV show that she must watch. Her complaints impose high enough costs on her parents that they relent and give Jane more time before going to bed.

What do you think will happen on future school nights? Jane reasons that because her parents have deviated from their bedtime rule once, they are likely to do so again. In other words, the bedtime rule has lost its credibility. The loss of credibility gives Jane the incentive to test her parents' willing-

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ness to stand by their bedtime rule on future school nights. She doubts that her parents are prepared to bear the costs necessary to enforce the bedtime rule in the future. Jane's parents have lost their reputation for following their bedtime rule.

This bedtime story shares much in common with the canonical monetary policy “game” facing central banks.¹

¹ Our interest is in the class of monetary policy “games” that focus on the economic costs the private sector can impose on a central bank engaged in discretionary monetary policy. Economic costs are generated by, for example, disagreements over the (specific) goals of monetary policy. There are monetary policy “games” that include political costs. Political costs can arise because pre-election promises and post-election outcomes are not time-consistent.

The key elements are: (a) the central bank engages in discretionary policy because it is next to impossible to credibly commit today to follow rules in the future; (b) the central bank and the private sector can have different goals; (c) the monetary policy “game” is repeated over and over; and (d) the central bank and the private sector each believe the other will act in its own best interest, given previous actions and outcomes. When the central bank engages in discretionary monetary policy, say, by cutting interest rates in an attempt to boost employment in the short to medium run, the private sector has incentives to challenge the credibility of the central bank's commitment to price stability over the medium to longer run, as Jane did with her parents'

bedtime rule. Over time, the public will learn by experience whether the central bank's commitment is sustained, and the central bank will develop a reputation for either making credible commitments or not.

TIME-INCONSISTENCY AND COMMITMENT

While time-inconsistency problems will arise when a central bank changes its goals for inflation and output growth over time,² this is not the only, or even main way, it arises in monetary policymaking. Similar to Jane's parents' experience with their

² The seminal reference is the paper by Robert Strotz.

bedtime rule, time-inconsistency is driven by incentives that encourage a central bank to deviate today from a previously announced policy.³ Even though there are well-known benefits to having policymakers commit to engage in systematic or rule-like behavior over time and limit their use of discretion, full commitment by a central bank is not possible.⁴ That is, there is no credible way for a policymaker, before the fact, to promise always and everywhere not to take discretionary actions and follow rules announced earlier. However, while full commitment is not feasible for real world central banks, economics can provide alternative ways to limit discretion and tie the hands of policymakers, thereby yielding better economic outcomes. One such method is reputation; another is central bank independence.

Reputation. The current U.S. monetary policy regime has been associated with great diversity on the FOMC led by Chairmen as different as William McChesney Martin, Arthur Burns, Paul Volcker, Alan Greenspan, and Ben Bernanke.⁵ Under Chairman Martin, the FOMC established its reputation with a long period of low inflation, which is often credited with the sustained real growth experienced

during his tenure. Responsibility for the disinflation of the 1980s is often attributed to the FOMC because it rebuilt its anti-inflation reputation under Chairman Volcker after having lost it in the 1970s.⁶

These examples suggest that time-consistency problems can be solved by

reputation of being tough on inflation will eventually lose control of inflation in the long run.

There is at least one partial solution to this public-private coordination problem. The solution is to have the government and the central bank strike a contract that creates incen-

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reputation when it fills in gaps created by a lack of commitment.⁷ A central bank can use a reputation for being intolerant of high inflation to commit to low inflation.⁸ Although reputation can surmount time-consistency problems, a study by Kenneth Rogoff shows that reputation alone cannot determine the inflation rate for an economy.⁹ Instead, private-sector market participants must agree about the inflation rate on which to focus, given that many inflation rates are possible. But this creates a problem for central banks. Because the way in which market participants determine which inflation rate they believe will prevail is beyond the control of policymakers, a central bank depending only on its

reputation for being tough on inflation will eventually lose control of inflation in the long run. There is at least one partial solution to this public-private coordination problem. The solution is to have the government and the central bank strike a contract that creates incentives for the central bank to adopt low-inflation policies. In a 1995 study, Carl Walsh provides the first example in which a contract between the government and its central bank is a means to coordinate market participants' beliefs about policies that yield low inflation.¹⁰ Since the 1980s, several countries have altered the design of their central banks by offering monetary policymakers a contract with inducements to achieve, say, a low inflation rate averaged over three to five years. While such contracts can help, experience with these contracts teaches us that central bank reputations are fragile unless supported by actual achievements.

Central Bank Independence. Designing a central bank so that its monetary policy decisions are inde-

³ These incentives are part of an economic environment in which market participants and policymakers act rationally.

⁴ See the 2008 and 2010(a) speeches by Charles Plosser and the paper by John Taylor. Although rule-like behavior generally yields better outcomes than discretion, it may not be desirable to entirely rule out discretion by policymakers in all cases, especially in a democracy. In the U.S. democratic system, the make-up of the legislative, executive, and judicial branches changes over time by design. Future Congresses, Presidents, and federal judges can repudiate current law constrained only by the U.S. Constitution and its legal interpretation.

⁵ Martin served as Federal Reserve Chairman from 1951 to 1970; Burns served 1970-1978; Volcker from 1979-1987; Greenspan from 1987-2006; and Bernanke from 2006 to the present.

⁶ See the 2007 speech by Charles Plosser.

⁷ For a nontechnical exposition of how reputation can support a central bank in attaining low inflation, see the article by Herb Taylor.

⁸ The 1985 paper by Kenneth Rogoff provides an example of the importance of the central bank's reputation for supporting a low inflation policy that has been interpreted as explaining the Volcker deflation of the early 1980s. For a nontechnical discussion of these issues, see the article by Herb Taylor.

⁹ See the 1989 study by Rogoff.

¹⁰ Walsh studies a wage contract between the government and the central banker. The contract specifies an inflation goal and a wage for the central banker. The more negative actual inflation is net of the inflation goal, the higher is the central banker's wage. Walsh argues that his interpretation of the contract between the central bank and the government can be generalized. The contract can include rewards and punishments based on things other than wages to encourage the central bank to achieve the outcomes desired by the government.

pendent of the political process can also help moderate time-consistency problems.¹¹ In the U.S., several Congresses and Presidents have delegated monetary policy to the Federal Reserve and Federal Open Market Committee (FOMC). This sort of independence seems to be necessary for a central bank to wield its reputation as a pledge to keep inflation low. Nonetheless, central bank independence is no guarantee that similar pledges will always lead to low inflation as the Fed and the country learned during the Great Inflation of the 1970s.

TIME-INCONSISTENCY AND MONETARY POLICY AFTER THE CRISIS

The Fed responded to the crisis with some innovative policy tools, including paying interest on the excess reserves that banks hold in their accounts at the Fed, setting up special lending facilities, and engaging in large-scale purchases of assets that increased the size of the Fed's balance sheet. These tools have expanded the scope of discretion available to the Fed. But as the time-inconsistency literature indicates, regardless of how necessary the exercise of discretion during the crisis may have been, it presents the Fed with the possible loss of credibility and independence.

Interest on Excess Reserves: Fed Independence and the Balance Sheet. In October 2008, Congress and the President gave authority to the Board of Governors to pay *interest on excess reserves* (IOER). This authority means the Fed compensates private banks on reserves they hold at the Fed that are in excess of the reserves required by Fed regulation. The return on the reserves in excess of the required reserves is the IOER. The Board of Governors has discretion to

¹¹ See the speech by Charles Plosser (2010b).

set the IOER, which it does in consultation with the FOMC.

The economist and Nobel laureate Milton Friedman argued that a central bank should pay interest on reserves to improve financial market efficiency.¹² When a central bank pays IOER, the difference between the rate of return

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a bank earns on reserves it holds at the Fed and what it would earn by investing in short-term assets (e.g., in the money markets) is reduced, if not eliminated. Thus, banks no longer have a reason to look for ways to avoid an implicit tax on their reserve holdings, thereby increasing efficiency in the intermediation process. However, Friedman also noted that inherent in IOER is a trade-off. Greater financial market efficiency resulting from paying IOER may align the interests of the fiscal authority too closely with those of the central bank. Friedman's argument is that when taxes fund IOER payments to private banks, the balance sheet of the central bank becomes entwined with the fiscal authority.¹³

¹² See the study by Milton Friedman and the paper by Thomas Sargent.

¹³ When IOER are financed by taxes, the budget constraints of the central bank and the rest of the government are explicitly tied together. Thomas Sargent discusses IOER and central bank independence in the context of Friedman's monetary policy proposals.

This raises questions about the central bank's independence.

The trade-off becomes starker when we consider the impact the IOER operating mechanism can have on the Fed's balance sheet. Two different kinds of IOER operating mechanisms have been proposed for the Fed once monetary policy returns to more normal operating conditions.¹⁴ Under the *corridor system*, the Fed's policy rate would lie within a range bounded below by the IOER rate and above by the Fed's *discount rate*. The discount rate is the rate the Fed charges on short-term loans it makes to banks facing temporary liquidity needs that come to borrow at the Fed's discount window. The corridor system is consistent with the monetary policy procedures the Fed employed for 25 years or more prior to the financial crisis. Since the Fed did not pay interest on excess reserves during this period, the IOER rate was implicitly zero, and the Fed's policy rate, the fed funds rate, lay below the discount rate.

Whether the IOER rate is zero or not, the corridor system only requires that the IOER rate be less than the policy rate for private banks to want to minimize the opportunity cost of holding excess reserves. This cost reflects the best alternative use of these funds for banks (i.e., the return banks can earn by investing in other assets). An implication is that banks' demand for excess reserves will fall as the policy rate rises and the opportunity cost increases. This demand does not go all the way down to zero because the rate charged at the discount window, which is greater than the policy rate, is an incentive for a bank to hold at least some excess reserves as insurance against unexpected liquidity needs. Converse-

¹⁴ The study by Marvin Goodfriend and the one by Todd Keister, Antoine Martin, and James McAndrews analyze the IOER operating mechanisms in full.

ly, a fall in the policy rate encourages banks to hold more reserves, since the opportunity cost of holding those reserves has fallen. When the IOER rate is non-zero and less than the policy rate, the opportunity cost of holding excess reserves limits the amount that banks are willing to hold. Reserves are a liability on the Fed's balance sheet, which are offset by the assets the Fed holds, mainly marketable securities. By limiting the amount of reserves, the corridor system puts a constraint on discretionary use of the Fed's balance sheet by placing an upper bound on its size — it gives the balance sheet a “small footprint.”

The other IOER operating mechanism is called the floor system. Under the floor system, the central bank's policy rate is set equal to the IOER rate. This equality implies that private banks face no opportunity cost when holding excess reserves. Under this system, the demand for excess reserves does not respond to the IOER policy rate, and the central bank always supplies the amount of reserves that meets the demand for reserves of private banks.

Essentially, the Fed has been operating under the floor system for the past two years since the depths of the crisis. Notice that the independence of the IOER policy rate from the supply of excess reserves in the floor system gives the Fed two policy tools: the IOER rate and the size (and composition) of the Fed's balance sheet.¹⁵ Under the floor system, the Fed has been able to saturate banks with excess reserves to satisfy liquidity needs in financial markets without having to change the IOER policy rate, that is,

¹⁵ Under the floor system, the demand for reserves is not determined by the price — the IOER policy rate — in the sense that the supply of reserves is any amount that is consistent with the IOER policy rate; see the article by Goodfriend and the one by Keister, Martin, and McAndrews.

without having to alter the stance of monetary policy.

This benefit that the floor system can bestow during a financial crisis needs to be weighed against the potential costs of such a system. A central bank using the floor system faces the potential of a very large balance sheet, that is, one with a “big footprint.” In fact, reserves are potentially in unlimited supply at the IOER policy rate, so the floor system calls into question the credibility of commitments to limit the size of the Fed's balance sheet. As long as the Fed's balance sheet is seen as a policy tool with little or no costs, there likely will be those who want to employ it to solve problems even if the expected benefits are small or to achieve

some limits on the Board's discretionary authority under 13(3). In particular, the Board must now act in concert with the Treasury to broadly supply liquidity to the financial system rather than to assist a financial firm that is in trouble. Nonetheless, the Board retains substantial discretion to employ section 13(3) because the Dodd-Frank Act imposes few other restrictions on the uses to which the Fed can put its balance sheet.

The Fed Balance Sheet: Large Scale Asset Purchases. Large scale asset purchases refer to policies in which the Fed buys long-term non-Treasury and Treasury securities. Purchases of mortgage-backed securities (MBS) and government agency (i.e., Freddie Mac,

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goals outside the realm of monetary policy, such as supporting particular industrial sectors of the economy. Such policy actions risk not only the Fed's credibility but its independence as well.

The Fed Balance Sheet: Section 13(3). During the financial crisis, for the first time since the 1930s, the Board of Governors invoked section 13(3) of the Federal Reserve Act to offer liquidity to particular financial market participants. Prior to being amended by passage of the Dodd-Frank Wall Street Reform and Consumer Protection Act in July 2010, section 13(3) granted the Board the authority to discount securities of “corporations, partnerships, and individuals” when it deemed there were “unusual and exigent circumstances.” The Board used this authority to set up several term lending facilities and create entities that discounted private securities.¹⁶ The Dodd-Frank Act put

Fannie Mae, and Federal Home Loan Banks) debt helped to support housing finance. Buying MBS and agency debt broke a self-imposed Fed rule of a “Treasury-only balance sheet” that dated at least to the Treasury-Fed Accord of March 1951.¹⁷ However, these purchases were motivated by a desire to shore up distressed financial markets and were justified by the Fed's responsibilities as the U.S.'s lender of last

¹⁶ Examples are the Asset-Backed Commercial Paper Facility, Money Market Fund Liquidity Facility, the Term Asset-Backed Securities Loan Facility, Term Asset Lending Facility, and Maiden Lane, Maiden Lane II, and Maiden Lane III. For more details, see the 2010(b) speech by Charles Plosser.

¹⁷ From 1971 to 2003, the Fed's balance sheet held agency debt. These holdings of non-Treasury securities were tiny compared with the stock of Treasury securities on the balance sheet. The Fed's balance sheet consisted only of Treasury securities from January 2004 to September 2008.

resort.¹⁸ The FOMC has also scaled up its purchases of longer-dated Treasury securities for the Fed's balance sheet — the so-called quantitative easing program. Having already reduced its policy rate, the fed funds rate, to essentially zero, the Fed began purchasing longer maturity Treasuries with the goal of lowering long-term interest rates. The large scale asset purchases programs enlarged the Fed's balance sheet as well as altered its composition and maturity structure.¹⁹

A concern of holding MBS on the Fed's balance sheet is that moral hazard becomes incorporated into the time-consistency problem.²⁰ Having seen the Fed purchase non-Treasury assets, market participants may come to expect that the Fed will adopt a policy to purchase other assets with credit risk greater than Treasuries or even than MBS.²¹ This might induce these participants to take on excessive risk. The expense of such policies could fall on taxpayers.²²

¹⁸ David Small and James Clouse discuss the legal restrictions on monetary policy and the Fed's balance sheet prior to IOER and the Dodd-Frank Act. James Clouse, Dale Henderson, Athanasios Orphanides, David Small, and Peter Tinsley extend this analysis to environments in which the zero bound on the federal funds rate binds.

¹⁹ Prior to the crisis, the Fed aimed its Treasuries-only balance sheet at replicating approximately the maturity structure of outstanding Treasury securities.

²⁰ See the 2009 speech by Charles Plosser.

²¹ Current policy for the Fed's MBS and agency debt holdings is contained in the FOMC statement of August 10, 2010 in which the FOMC announced that the Fed's balance sheet will not be allowed to shrink and that it would reinvest principal payments from agency debt and agency mortgage-backed securities in longer-term Treasury securities.

²² For example, the U.S. Treasury has committed to absorbing the Maiden Lane facilities on the Fed's balance sheet, according to the Treasury-Fed joint statement, "The Role of the Federal Reserve in Preserving Financial and Monetary Stability," of March 23, 2009. However, this commitment has yet to be fulfilled

Without constraints on the composition of the Fed's balance sheet, discretion may also encourage time-inconsistent policies independent of the amount of credit risk or interest-rate risk the Fed might take on its balance sheet.²³ Instead, MBS holdings can prompt expectations that the Fed's balance sheet is a tool that could be put

ers of section 13(3), say, to a 120-day window during which the Fed would seek public support from the Treasury and congressional leadership to continue the emergency lending in a crisis for an additional 60-day period. Assuming the extra 60-day period is granted, the Fed would have six months to manage the crisis during which time Congress

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to uses outside the realm of monetary policy. When market participants come to embrace these expectations, the Fed's credibility and reputation suffer, and this makes it more costly for the Fed to achieve its monetary policy mandates.

Proposals to Sustain Fed Independence and Constrain the Balance Sheet. Without systematic policy or rule-like behavior to constrain discretion, are there other actions that could raise the hurdle for the Fed to deviate from widely agreed-to policy rules? Let's discuss a few possibilities.

A good initial step is the restrictions imposed by the Dodd-Frank Act on the Board's use of section 13(3). Another step could be for the Board to announce that, in the future, it would limit the use of the discretionary pow-

and, at the moment, appears to have fallen by the wayside.

²³ Holding MBS on the Fed's balance sheet most likely does not generate much credit risk given that market participants believe that at least some of these securities have implicit U.S. government guarantees. The potential for interest-rate risk from holding MBS is greater because the maturity duration of the Fed's balance sheet is longer.

and the President could enact legislation aimed at resolving the crisis.

By adopting this proposal, the Board of Governors would impose constraints on a future Board. This is a theme that runs through the academic literature on time-inconsistency: designing constraints to minimize the discretion available to future policymakers. It is always possible for a future Board to decide to deviate from this constraint, but such an action could entail its own costs in the form of stronger congressional prohibitions on Fed discretion. For example, the Fed could find itself restricted to lending under section 13(3) only when there is a request from the Treasury and Congress.

Another possibility for limiting Fed discretion is to have the Treasury and Congress become increasingly responsible for taking discretionary actions about lending during the "unusual and exigent circumstances" of a financial crisis, which seems reasonable given that this type of lending is part of fiscal policy. For example, the Treasury and Fed could negotiate and commit to an accord under which the Treasury could agree that during a

financial crisis it would exchange its own securities for non-Treasury securities purchased and held by the Fed, say, after 120 days.²⁴ With such an accord, fiscal policy remains outside the province of the Fed, but policy has the flexibility to respond to a crisis in the short run. Once again, this would give Congress and the Treasury time to prepare a legislative response to a crisis. Committing to a corridor system, with a positive IOER rate, would dovetail with these proposals.

CONCLUSION


Congress delegated authority for monetary policy to the Federal Reserve System beginning with its founding in 1913. Inherent in monetary policy are time-inconsistency problems that are not eliminated by making the central bank independent. Time-consistent

²⁴See the 2010(b) speech by Plosser.

policy will remain a problem for central banks because current and future policymakers will not conduct policy in a systematic manner without credible commitments to explicit rules. Ample theory and empirical evidence exist to support the view that limiting discretionary behavior yields better economic outcomes over the long run.

The Fed reacted to the recent financial crisis by employing its balance sheet in innovative ways. Much credit should be given to the Fed for these actions. However, the Fed may find it increasingly difficult to reduce the size of its balance sheet and return it to a Treasuries-only balance sheet without a commitment to explicit rules to do so. In the absence of such rules, the Fed's balance sheet remains a discretionary tool carrying the risk of being used for activities unrelated to the Fed's monetary policy mandate. Engaging in these policies would present

the Fed with a loss of credibility and independence.

The Treasury-Fed Accord of March 1951 helped William McChesney Martin and his colleagues on the FOMC to establish a tradition of Fed independence and an admirable record of monetary policy. The accord helped release the Fed from an obligation to support the price of U.S. government debt, which it had done since World War II. This history indicates that, at this moment, there is a need for a new Treasury-Fed accord. A new accord should contribute to maintaining a credibly independent Fed by correctly aligning incentives between it, the Treasury, and Congress. The proposals suggested here are not the final words on monetary policy reform, but such reforms are of profound importance for the future of the Federal Reserve System and the U.S. economy in the post-crisis world. 

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