

CASE Network Studies & Analyses

Does the Crisis Experience Call for a New Paradigm in Monetary Policy?

John B. Taylor

No. 402/2010



Warsaw Bishkek Kyiv Tbilisi Chisinau Minsk

Materials published here have a working paper character. They can be subject to further publication. The views and opinions expressed here reflect the author(s) point of view and not necessarily those of CASE Network.

Acknowledgement: This publication was financed from 2010 grant extended by BRE Bank S.A. for educational activities

Key words: **financial crisis, monetary policy rule, Taylor rule, quantitative easing**

JEL Codes: **E43, E52, E58, G01**

© CASE – Center for Social and Economic Research, Warsaw, 2010

Graphic Design: Agnieszka Natalia Bury

EAN 9788371785122

Publisher:

CASE-Center for Social and Economic Research on behalf of CASE Network

12 Sienkiewicza, 00-010 Warsaw, Poland

tel.: (48 22) 622 66 27, 828 61 33, fax: (48 22) 828 60 69

e-mail: case@case-research.eu

<http://www.case-research.eu>

Contents

Abstract	4
1. Introduction	5
2. A Framework That Worked	5
3. Extraordinary Measures of 2007-2010.....	9
4. Assessing the Impact of Extraordinary Measures	14
4.1. Three Phases of the Crisis	15
4.2. Legacy Problems	16
5. Returning to the Framework that Worked	17
6. Concluding Remarks.....	20
References.....	21

***John B. Taylor** is known for his research on the foundations of modern monetary theory and policy and his experience in international economics, which has been applied by central banks and financial market analysts around the world. He is the author of the so-called Taylor's rule, which is the best known rule in the contemporary monetary policy.*

John B. Taylor served as a senior economist on the US President's Council of Economic Advisors in 1977-78 and as a member of the President's Council in 1989-1991. From 2001 to 2005 Taylor served as Under Secretary of Treasury of International Affairs in George W. Bush administration.

He is a Professor at Stanford University, a Senior Fellow at the Hoover Institute and the author of numerous publications.

Abstract

This paper shows that the monetary policy paradigm that was in place before the financial crisis worked very well and that the crisis occurred only after policy makers deviated from that paradigm. The paper also evaluates monetary policy during the financial crisis by dividing the crisis into three periods: pre-panic, panic and post-panic. It shows that the extraordinary measures did not work well in the pre-panic or the post-panic periods; instead they helped bring on the panic, even though they may have some positive impact during the panic. The implication of the paper is that the crisis does not call for a new paradigm for monetary policy.

1. Introduction

In this paper I want address the question of whether the financial crisis in 2007-2009 suggests that a new paradigm is needed for monetary policy¹. I begin with a short description of the paradigm that existed before the crisis, and I then evaluate the types of extraordinary monetary policy actions that were undertaken before, during, and after the panic which occurred in the fall of 2008. I also consider the problem of an exit strategy from these extraordinary measures. The empirical and policy analysis are drawn largely from the United States experience, but I believe that the policy implications apply more broadly.

2. A Framework That Worked

What are the key characteristics of the paradigm for monetary policy that were in place in the decades before the crisis? I would focus on these four: First, the short term interest rate (the federal funds rate in the United States) is determined by the forces of supply and demand in the money market. Second, the central bank (the Federal Reserve in the United States) adjusts the supply of money or reserves to bring about a desired target for the short term interest rate; there is thus a link between the quantity of money or reserves and the interest rate. Third, the central bank has a strategy, or rule, to adjust the interest rate depending on economic conditions: In general, the interest rate rises by a certain amount when inflation increases above its target and the interest rate falls when by a certain amount when the economy goes into a recession. Fourth, to maintain its independence and focus on its main objectives of inflation control and macroeconomic stability, the central bank does not allocate credit or engage in fiscal policy by adjusting the composition of its portfolio toward or away from certain firms or sectors. The so-

¹ The paper was prepared for presentation at a seminar organized jointly by CASE – Center for Social and Economic Research and the Department of the Global Economy at the Warsaw School of Economics and held in Warsaw on 23 June 2010.

called Taylor rule is an example of how interest rates are changed in the third part of this framework.

The desirability or optimality of such a framework was derived from empirical models with rational expectations and sticky prices first constructed in the 1970s and 1980s and now continuing with many refinements. Figure 1 provides a list of many of these empirical monetary models which continue to be updated and modified.

Figure 1: Examples of empirical monetary models

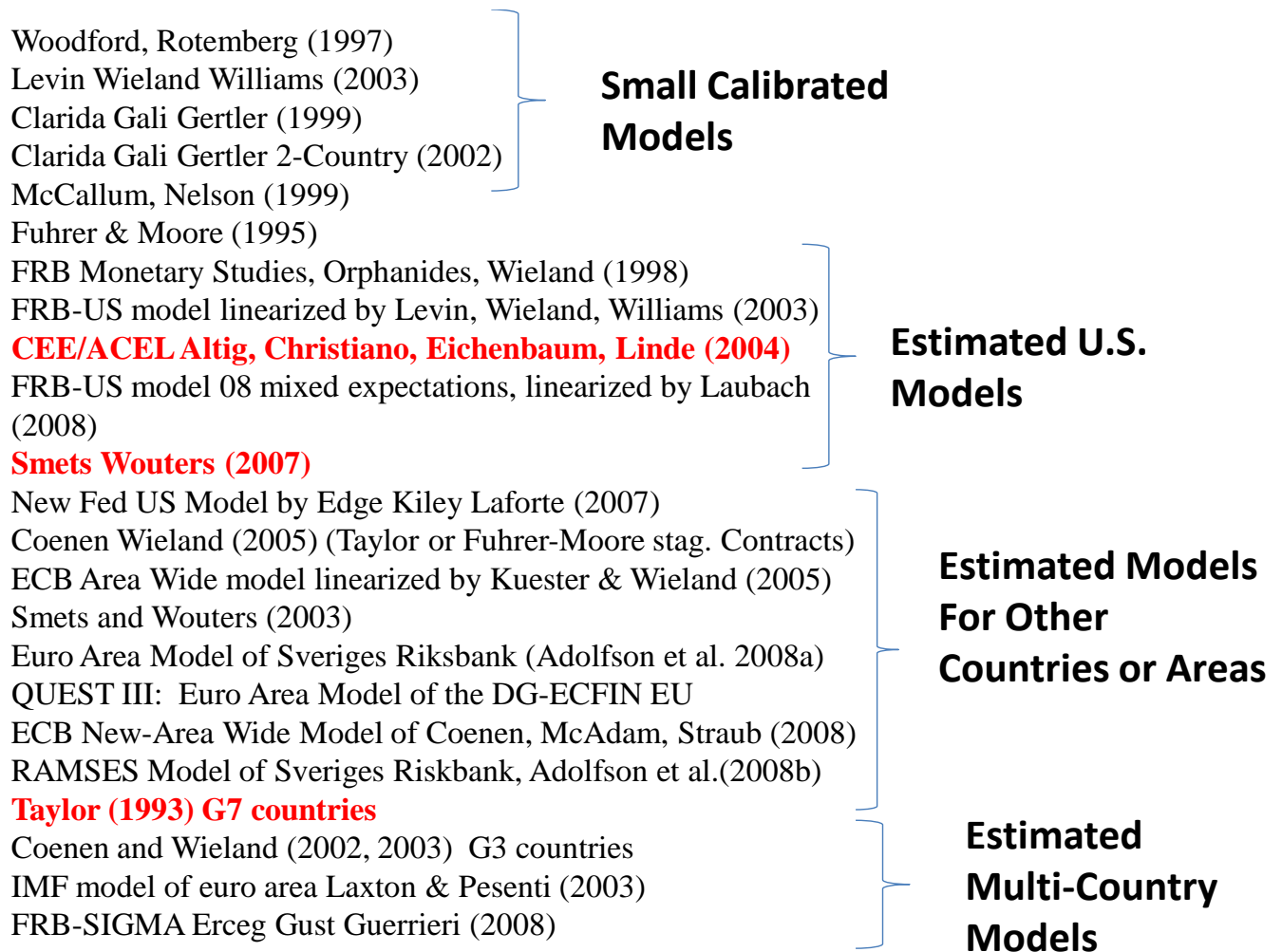
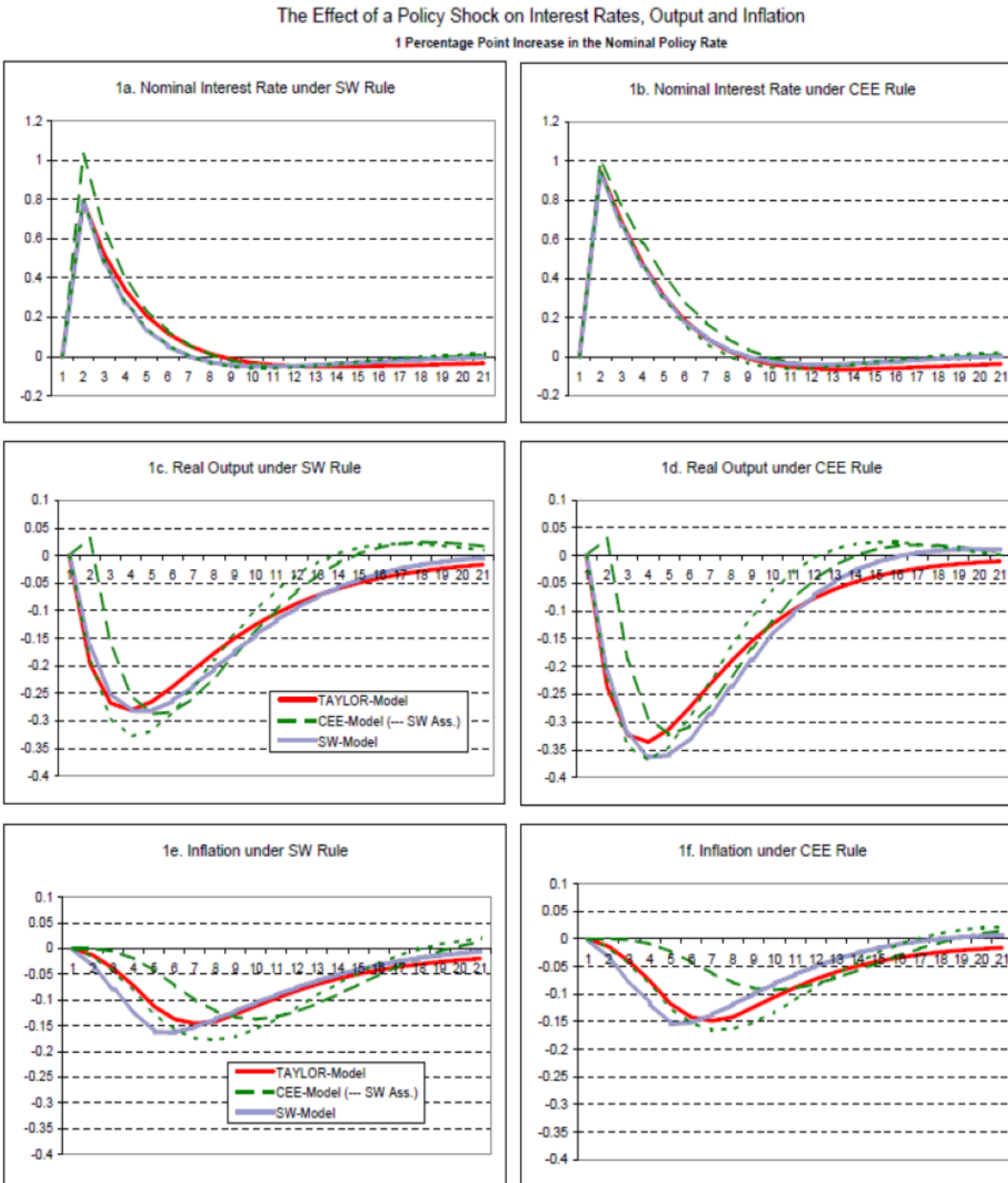


Figure 2 shows how three of these models (the ones in red type, for example) respond to a monetary policy shock—a deviation from Taylor-type rules; note that there is considerable agreement about the impact on output and inflation. The overall approach is built on earlier work of Irving Fisher, Knut Wicksell, and Milton Friedman in which the objective was to find a

monetary policy rule which cushioned the economy from shocks and did not cause its own shocks.

Figure 2: The Effect of Policy Shock on Interest Rates, Output and Inflation



Experience has shown that such an approach worked well in the real world. Performance was good when policy was close to rule; performance was poor when policy was far away from rule. Figures 3 and 4 provide evidence from the United States. Figure 3 is drawn from research at the Federal Reserve Bank of San Francisco (it is Figure 2 from a paper by Judd and Trehan) and Figure 4 is drawn from research at the Federal Reserve Bank of St. Louis. The figures indicate the periods when policy was close, or not so close, to this type of policy framework. Note especially in Figure 4 that policy deviated from the framework, at least as characterized by the Taylor rule, in the 2002-2005 period leading up to the financial crisis. Rarely in economics is there so much empirical and theoretical evidence in support of a particular policy.

Figure 3: Federal Funds Rate: Actual vs. Rule's Prescription for Fed Behavior

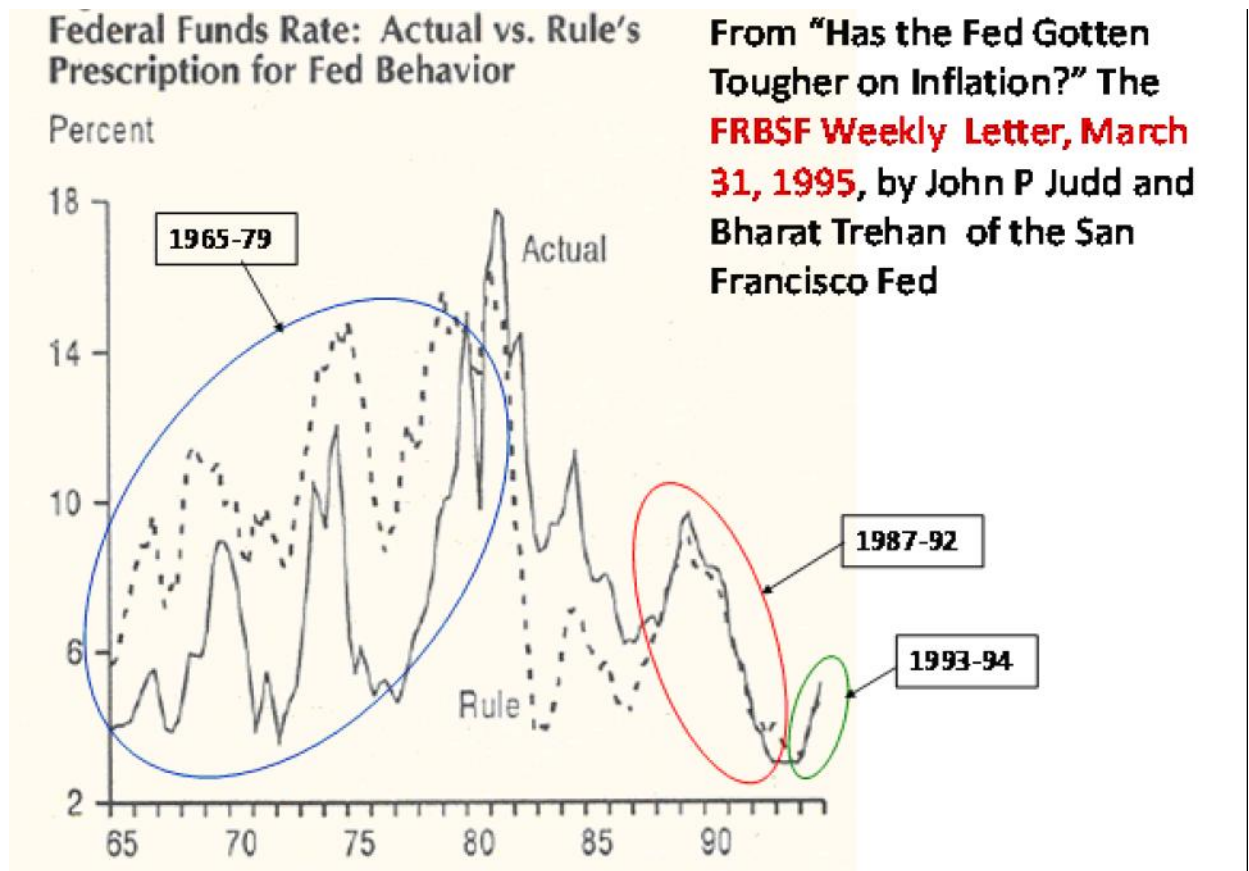
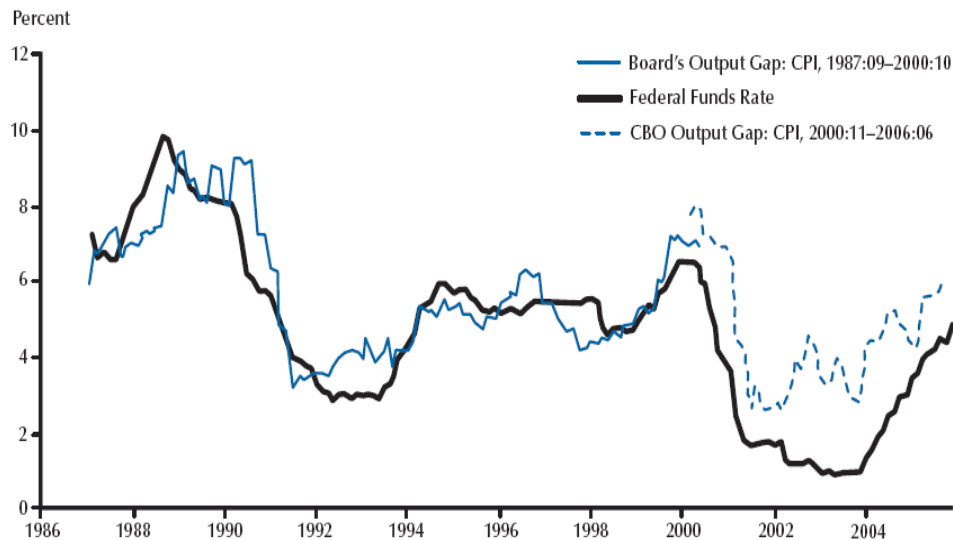


Figure 4: Greenspan Years: Federal Fund Rate and Taylor Rule

Greenspan Years: Federal Funds Rate and Taylor Rule

(CPI $p^* = 2.0$, $r^* = 2.0$) $a = 1.5$, $b = 0.5$



From William Poole, "Understanding the Fed"
St. Louis Review, Jan/Feb 2007

3. Extraordinary Measures of 2007-2010

In addition to the interest rate setting during the period from 2002 to 2005, monetary policy deviated from the traditional framework that worked during the crisis by implementing a large number of new measures. Figure 5 summarizes the Fed's extraordinary measures—mostly special loan and securities purchase programs—going back to 2007 when the financial crisis first flared up in the money markets. Figure 6 shows the impact of these on the Fed's balance sheet. Figures 7 and 10 show how the programs have changed in size during this period, either adding to or subtracting from the Fed's balance sheet.

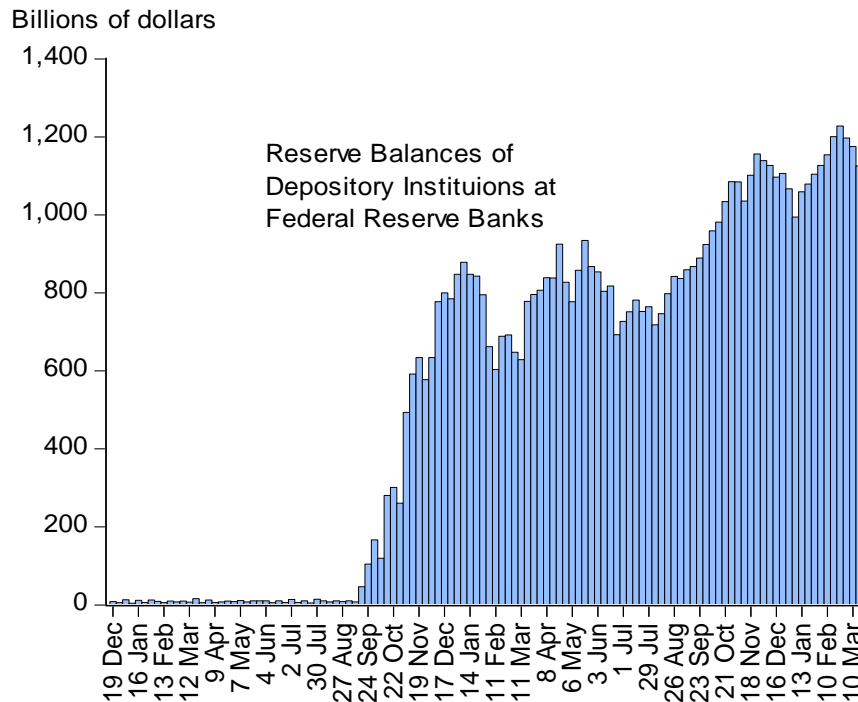


Figure 5: Summary of Fed Extraordinary Measures

Extraordinary Federal Reserve Measures Affecting Its Balance Sheet

TAF (Term Auction Facility)	Dec 2007
SWAPS (Loans to Foreign Central Banks)	Dec 2007
PDCF (Primary Dealer Credit Facility)	Mar 2008
Bailout of Bear Stearns (Loan through JPM, Maiden Lane I)	Mar 2008
Bailout of AIG (Loan to AIG, Maiden Lane II and III, AIA-ALICO)	Sept 2008
AMLF (Asset-Backed Com. Paper Money Mkt Fund Liq. Facility)	Sep 2008
CPFF (Commercial Paper Funding Facility)	Oct 2008
MMIFF (Money Market Investors Funding Facility)	Oct 2008
MBS (Mortgage Backed Securities Purchase Program)	Nov 2008
TALF (Term Asset-Backed Securities Loan Facility)	Nov 2008
New SWAPS lines	May 2010

Figure 6: Reserve Balances of Depository Institutions at Fed



Some of the programs, such as the Mortgage Backed Securities (MBS) purchase program and the Term Asset Backed Securities Loan Facility (TALF), have expanded [Figure 10], while others, such as the Term Auction Facility (TAF) or the SWAP facility with foreign central banks, have contracted [Figures 7 and 8]. Some programs have been closed down, including the Primary Dealer Credit Facility (PDCF), the Commercial Paper Funding Facility (CPFF), and the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF). But the loans and other vehicles used to bailout the creditors of Bear Stearns and AIG are still on the Federal Reserve balance sheet and are about the same size they were a year ago [Figure 9].



Figure 7: Impact of selected Extraordinary Measures on Fed balance sheet

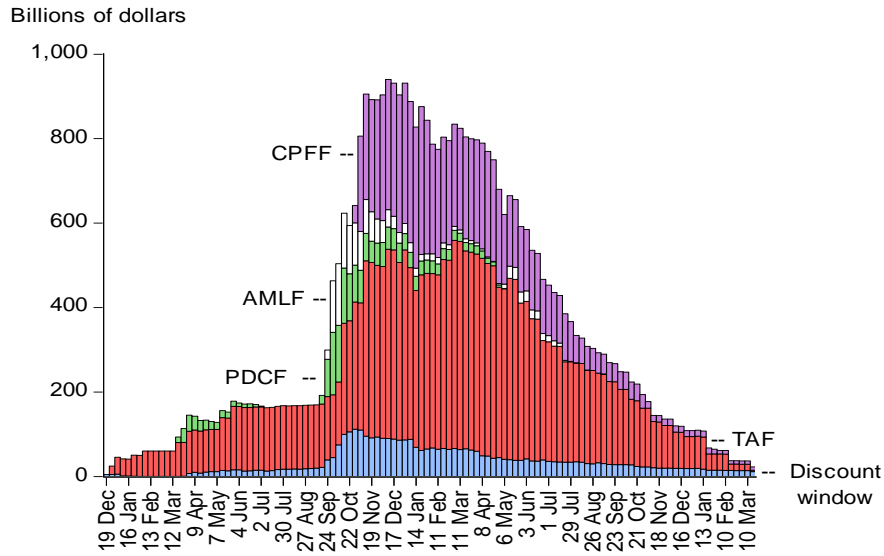


Figure 8: Fed SWAP facility with foreign banks

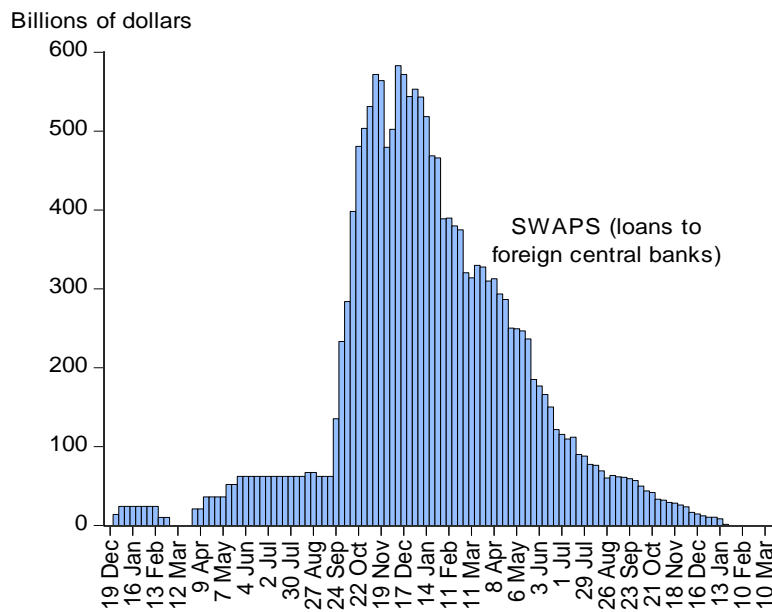


Figure 9: Impact of bailout measures on Fed balance sheet

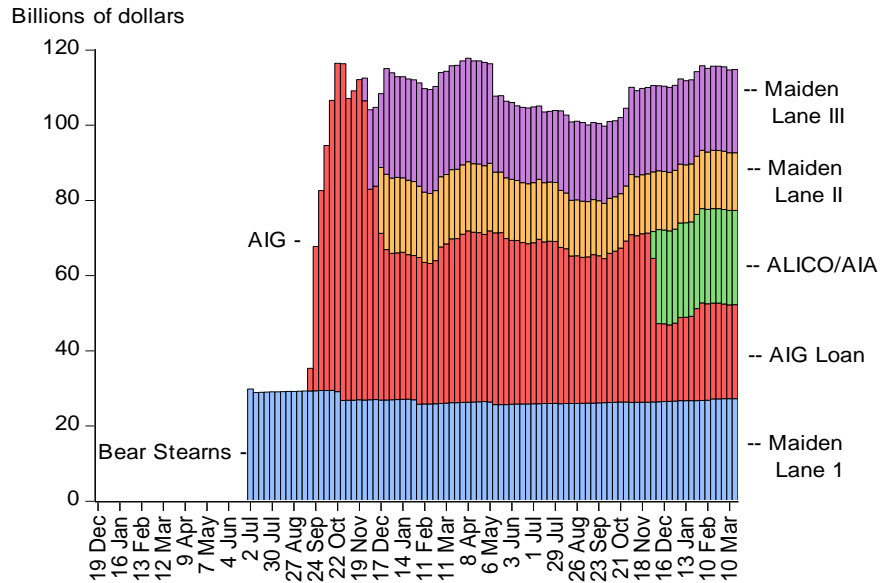
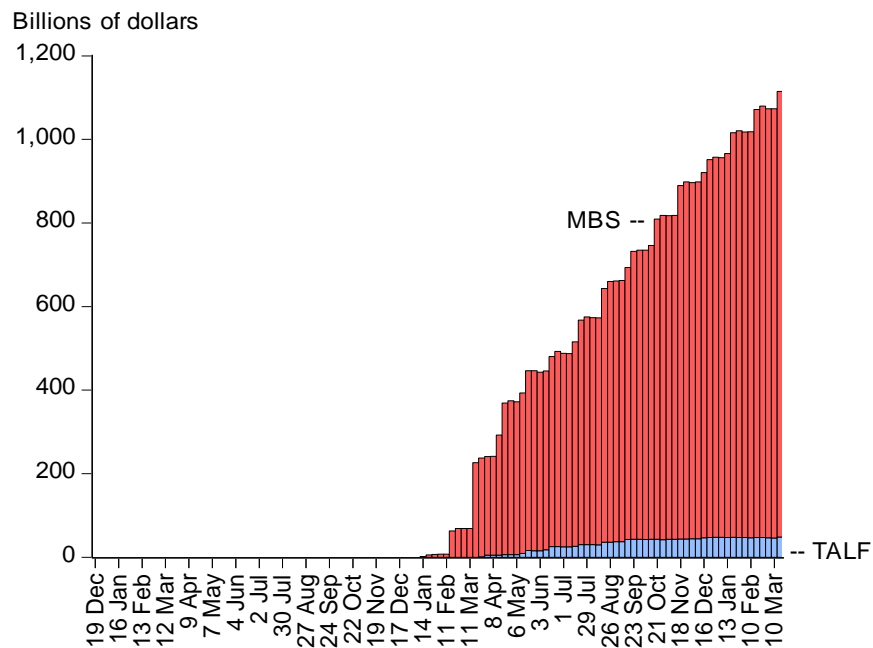


Figure 10: The Dynamics of MBS and TALF programs



The Fed has financed these programs mostly by creating money—crediting banks with reserve balances at the Fed—or by selling other items in its portfolio. From December 2007 until September 2008 it sold other items in its portfolio. Since September 2008 it has added to its reserve balances and expanded its balance sheet. During the past year, reserve balances have continued to rise as expanding programs have kept pace with contracting programs and Treasury has withdrawn deposits from the Fed. For the two weeks ending February 3, 2010, reserve balances were \$1,127 billion, up from \$662 billion during the same period in February 2009. These reserves are still far in excess of normal levels and will eventually have to be wound down to prevent a significant rise in inflation. By way of comparison, reserve balances were only \$9 billion during the same period in February 2008.

4. Assessing the Impact of Extraordinary Measures

Determining whether or not these programs have worked is difficult. First, there are many programs, and they interact with each other. In addition to the Fed's actions, other U.S. government agencies undertook extraordinary interventions, including the takeover of Fannie Mae and Freddie Mac, the FDIC Temporary Liquidity Guarantee Program, the Troubled Asset Relief Program (TARP) and the guarantee of money market portfolios. Moreover, many of the programs were significantly reworked after they were implemented—the switch of the TARP from a program to purchase toxic assets to one of injecting capital into banks was perhaps the biggest reworking. Second, financial conditions and the entire global economy were changing rapidly around the time of these interventions, and markets were dynamically reacting and adjusting to the changes. Third, developing a counterfactual to describe what would have happened in the absence of the programs requires analyzing large quantities of data, and using, when possible, economic models and statistical techniques.

Perhaps for these reasons, there has been surprisingly little empirical work on this important question. Peter Fisher (2009) and James Hamilton (2009b) stress the difficulty of the task. In this paper I make use of empirical research at Stanford University and the Hoover Institution

(Taylor 2007, 2008b, 2009a, 2009b), (Taylor and Williams 2008), (Stroebel and Taylor 2009), which has focused on several of the programs including the TAF, the PDCF, the MBS purchase program, and the bailouts, all in the context of overall monetary policy, including its possible role as one of the causes of the crisis.

4.1. Three Phases of the Crisis

I divide the assessment of the programs into three periods. The first period runs from the flare-up in August 2007 until the severe financial panic in late September 2008. The second period is the panic itself; based on equity prices and interbank borrowing rates, the panic period was concentrated in late September through October 2008 as it spread rapidly around the world, turning the recession into a great recession. The third period occurs after the panic. Thus the financial crisis and the Fed's actions are naturally divided into three periods: pre-panic, panic, and post-panic.

Before the Panic My assessment is that the extraordinary measures taken in the period leading up to the panic did not work, and that some were harmful. The TAF did little to reduce tension in the interbank markets during this period, as I testified to the House Committee on Financial Services in February 2008 (Taylor 2008a) based on research reported in Taylor and Williams (2008), and it drew attention away from counterparty risks in the banking system. The extraordinary bailout measures, which began with Bear Stearns, were the most harmful in my view. The Fed's justification for the use of Section 13(3) of the Federal Reserve Act in the case of Bear Sterns led many to believe that the Fed's balance sheet would again be available in the case that another similar institution, such as Lehman Brothers, failed. But when the Fed was unsuccessful in getting private firms to help rescue Lehman over the weekend of September 13-14, 2008, it surprisingly cut off access to its balance sheet. Then, the next day, it reopened its balance sheet to make loans to rescue the creditors of AIG. It was then turned off again, so a new program, the TARP, was proposed. Event studies show that the chaotic roll out of the TARP then coincided with the severe panic in the following weeks (Taylor 2008b). The Fed's on-again off-again bailout measures were thus an integral part of a generally unpredictable and confusing government response to the crisis which, in my view, led to panic.

During the Panic This is the most complex period to analyze because the Fed's main measures during this period—the AMLF and the CPFF—were intertwined with the FDIC bank debt guarantees and the clarification on October 13, after three weeks of uncertainty, that the TARP would be used for equity injections. This clarification was a major reason for the halt in the panic in my view (Taylor 2008b). Based on conversations with traders and other market participants the Fed's actions taken during the panic, especially the AMLF and the CPFF, were helpful in rebuilding confidence in money market mutual funds and stabilizing the commercial paper market. The Federal Reserve should also be given credit for rebuilding confidence by quickly starting up these complex programs from scratch in a turbulent period and for working closely with central banks abroad in setting up swap lines (Fisher 2009). However, most of the evidence is anecdotal, and it would be useful if the Federal Reserve Board, with its inside information about day to day events and data, examined the programs empirically and reported the results. For example, statistical evidence (Taylor 2009a) indicates that the PDCF was effective in reducing risk (measured by rates on credit default swaps) at Merrill Lynch and Goldman Sachs in October 2009.

After the Panic The two measures introduced by the Fed following the severe panic period were the MBS program and the TALF. Of these two, the MBS has turned out to be much larger as shown in Figure 10, and it will soon reach \$1.25 trillion. As with the other Fed programs there has been little empirical work assessing the impact of the MBS program on mortgage interest rates. My assessment, based on research with Johannes Stroebel, is that it has had a rather small effect on mortgage rates once one controls for prepayment risk and default risk, but the estimates are uncertain. I have not studied the impacts of the TALF; it has been very slow to start and it is still quite small. In the absence of the MBS program, reserve balances and the size of the Fed's balance sheet would already be back to normal levels before the crisis. If it were not for this program, the Fed would have already exited from its emergency measures removing considerable uncertainty about its exit strategy going forward.

4.2. Legacy Problems

Whether one believes that these programs worked or not, there are reasons to believe that their consequences going forward are negative. First, they raise questions about central bank independence. The programs are not monetary policy as conventionally defined, but rather fiscal

policy or credit allocation policy (Goodfriend 2009) or industrial policy (Taylor 2009b) because they try to help some firms or sectors and not others and are financed through money creation rather than taxes or public borrowing. Unlike monetary policy, there is no established rationale that such policies should be run by an independence agency of government (Thornton 2009). By taking these extraordinary measures, the Fed has risked losing its independence over monetary policy (Shultz 2009).

A second negative consequence of the programs is that unwinding them involves considerable risks. In order to unwind the programs in the current situation, for example, the Fed must reduce the size of its MBS portfolio and reduce reserve balances. But there is uncertainty about how much impact the purchases have had on mortgage interest rates, and thus there is uncertainty about how much mortgage interest rates will rise as the MBS are sold. There is also uncertainty and disagreement about why banks are holding so many excess reserves now (Keister and McAndrews 2009). If the current level of reserves represents the amount banks desire to hold, then reducing reserves could cause a further reduction in bank lending.

A third negative consequence is the risk of inflation (Hamilton 2009a). If the Fed finds it politically difficult to reduce the size of the balance sheet as the economy recovers and as public debt increases, then inflationary pressures will undoubtedly increase.

5. Returning to the Framework that Worked

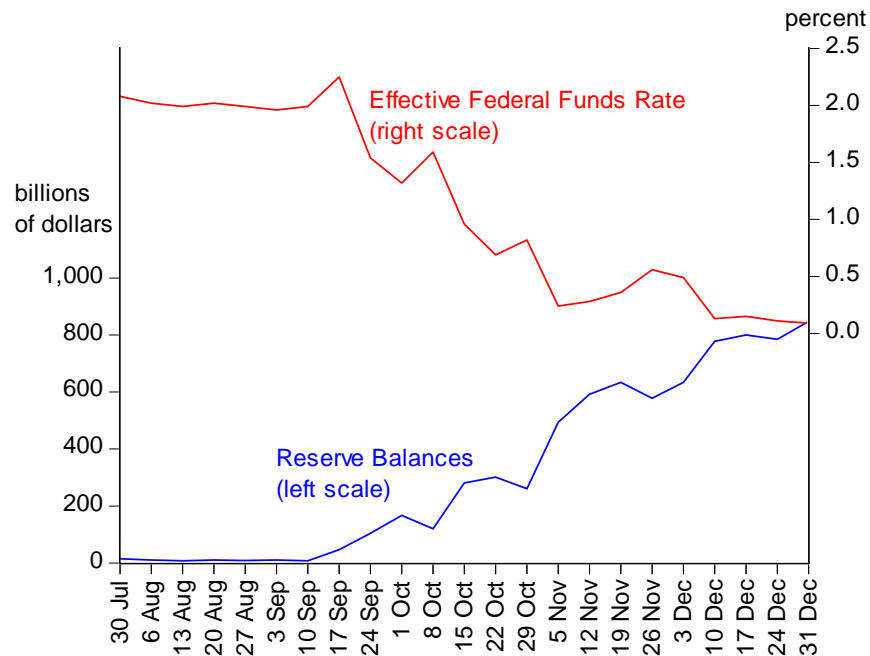
For these reasons, it is important for central banks that have deviated from the paradigm that worked, to return, as soon as possible, to that paradigm. A strategy for such a return must focus on three things: (1) the federal funds rate, (2) the level of reserve balances (or the size of the central bank's balance sheet), and (3) the composition of the central bank's portfolio of assets. In order to achieve this goal the direction of change of all three is clear: The interest rate must move to its normal level, the amount of reserves must decline, and the proportion of the Fed's assets dedicated to the extraordinary programs such as TALF, MBS, and the Bear-Stearns-AIG facilities must be reduced. The timing and the amount by which these changes are made should

depend on economic conditions. In particular the interest rate should be increased as the economy recovers. If the economy weakens, the tightening should be postponed. If inflation picks up, tightening should be accelerated.

Such an exit strategy is more than a list of instruments. It is a policy describing how the instruments will be adjusted over time until the monetary framework is reached. It is analogous to a policy rule for the interest rate in a monetary framework except that it also describes the level of reserves and the composition of the balance sheet. Hence, an exit strategy for monetary policy is essentially an *exit rule*.

How would such an exit rule work? One possible rule would link the Fed's decisions about the interest rate with its decisions about the level of reserves. In other words, when the Fed decides to start increasing the federal funds rate target, it would also reduce reserve balances. One reasonable exit rule would reduce reserve balances by \$100 billion for each 25 basis point increase in the federal funds rate. By the time the funds rate hits 2 percent, the level of reserves would be reduced by \$800 billion and would likely be near the range needed for supply and demand equilibrium in the money market.

Figure 11: Federal Funds Rate vs. Fed balances



Where does the “\$100 billion per quarter point” come from? We do not know much about the reserve-interest rate relationship, but \$100bn per 25bps is close to what was observed when the Fed started increasing reserves in the fall of 2008. As shown in Figure 11 the funds rate fell from 2 percent to 0 percent as the Fed increased the supply of reserves by \$800 billion. Of course we do not know if this relationship will hold now with changed circumstances in the banking sector, but it is a reasonable place to begin. In addition, these dollar amounts are not so large that they should constrain banks or put upward pressure on mortgage rates or other long term rates as the Fed’s MBS or other assets are sold to enable the reduction in reserves. An attractive feature of this approach is that the Fed would exit unorthodoxly at the same 2 percent interest rate as it entered unorthodoxly: The federal funds rate was at 2 percent when it started financing its loans and securities purchases by increasing reserves and the balance sheet.

This exit strategy could be announced to the markets with a degree of precision that the Fed deems appropriate for preserving flexibility. Of course, the Fed would not reduce reserves by the full amount on the day of the interest rate decision. Rather it would be spread out over weeks or months. Policy makers could treat this exit rule as an exit guideline rather than a mechanical formula to be followed literally. They would vote on how much to reduce reserves at each meeting along with the interest rate vote.

Perhaps the biggest advantage of such an exit strategy is that it is predictable. It would reduce uncertainty about the central bank’s unwinding while providing enough flexibility to adjust if the exit appears to be too rapid or too slow. The strategy would likely have a beneficial effect on bank lending and thereby remove a barrier to more rapid growth: Some banks are apparently reluctant to buy mortgage securities because of uncertainty about the prices of the securities during an exit. This strategy would reduce that uncertainty and allow market participants to start pricing securities with some basis for predicting monetary policy during the exit.

6. Concluding Remarks

What are the implications of all this for the question of whether or not we need to change the monetary paradigm? The crisis certainly gives no reason to abandon the core empirical “rational expectations/sticky price” monetary model developed over the past 30 years. Whether you call this type of model “dynamic stochastic general equilibrium,” or “new Keynesian,” or “new neoclassical macroeconomics,” it is the type of model from which modern monetary policy rules and recommendations were derived. Along with rational expectations came reasons for predictable, rule-like policies: time inconsistency, credibility, and the Lucas critique, or simply the practical need to evaluate macro policy as a rule. Along with the sticky prices came specific monetary rules which dealt with the dynamics implied by those rigidities as fit to actual macro data. These models did not fail in their recommendations for rules-based monetary and fiscal policies.

It is easy to criticize the rational expectations/sticky price models by saying that they do not admit enough rigidities, or have only one interest rate, or do not have money in them. But we should not confuse useful simplified versions of models, which frequently boil down to only three equations, with more detailed models used for policy. By focusing on such smaller simplified models one can derive many useful theorems. For practical policy work those simplifying assumptions are relaxed. Many of the rational expectations/sticky price models listed in Figure 1 are more complex and have time varying risk premia in the term structure of interest rates, an exchange rate channel, and more than one country.

Of course, macroeconomists should try to improve their models in whatever ways they think can make them more useful for policymakers. Many have been working on improving our understanding of the credit channel, a worthy task. An implication of my research findings is that we need to do more work on “political macroeconomics.” In particular, we need to explain and understand why policymakers moved in such an interventionist direction despite the research that stressed predictable rule-like monetary and fiscal policy. Once we understand that, practical solutions should follow.



References

- Fisher, Peter (2009), "Compared to What?" paper presented at Federal Reserve Bank of Boston Conference, After the Fall: Re-Evaluating Supervisory, Regulatory, and Monetary Policy, (October).
- Goodfriend, Marvin (2009) "Central Banking in the Credit Turmoil: An Assessment of Federal Reserve Practice," Carnegie Mellon University (May).
- Hamilton, James D. (2009a) "Concerns about the Fed's New Balance Sheet," in John Ciorciari and John B. Taylor, *The Road Ahead for the Fed*, Hoover Press, Stanford, California.
- Hamilton, James D. (2009b), "Evaluating Targeted Liquidity Operations," paper presented at the Federal Reserve Bank of Boston Conference, After the Fall: Re-Evaluating Supervisory, Regulatory, and Monetary Policy, (October).
- Keister, Todd and James McAndrews (2009), "Why Are Banks Holding So Many Excess Reserves?" Federal Reserve Bank of New York, Staff Report No. 380, (July).
- Shultz, George P. (2009), "Think Long," in John Ciorciari and John B. Taylor, *The Road Ahead for the Fed*, Hoover Press, Stanford, California.
- Stroebel, Johannes C. and John B. Taylor (2009) "Estimated Impact of the Fed's Mortgage-Backed Securities Purchase Program," NBER Working Paper 15626 (December).
- Taylor, John B. (2007), "Housing and Monetary Policy," in *Housing, Housing Finance, and Monetary Policy*, Federal Reserve Bank of Kansas City Symposium, Jackson Hole, WY, (September).

Taylor, John B. (2008a) "Monetary Policy and the State of the Economy," Testimony before the Committee on Financial Services, U.S. House of Representatives, February 26, 2008.

Taylor, John B. (2008b), "The Financial Crisis and the Policy Responses: An Empirical Analysis of What Went Wrong," in *A Festschrift in Honour of David Dodge's Contributions to Canadian Public Policy*, Bank of Canada, November 2008, pp. 1-18.

Taylor, John B. (2009a) "Comments on 'The Federal Reserve's Primary Dealer Credit Facility' by Tobias Adrian and James McAndrews," slides, ASSA Meetings, San Francisco, January 4.

Taylor, John B. (2009b) "The Need to Return to a Monetary Framework," *Business Economics*, 44 (2), 2009, pp. 63-72.

Taylor, John B. and John C. Williams (2008), "A Black Swan in the Money Market," Federal Reserve Bank of San Francisco, Working Paper Series, 2008-04, (April); revised version published in *American Economic Journal: Macroeconomics*, 1 (1), pp. 58-83.

Thornton, Daniel L. (2009), "Negating the Inflation Potential of the Fed's Lending Programs," *Economic Synopses*, Federal Reserve Bank of St. Louis, No. 30.