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Monetary Policy Rules Work and Discretion Doesn't: A Tale of Two Eras

by John B. Taylor

Stanford Institute for Economic Policy Research
Stanford University
Stanford, CA 94305
(650) 725-1874

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**Monetary Policy Rules Work and Discretion Doesn't:
A Tale of Two Eras**

John B. Taylor
Professor of Economics
Stanford University

The Journal of Money Credit and Banking Lecture¹

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Abstract: This lecture examines monetary policy during the past three decades. It documents two contrasting eras: first a Rules-Based Era from 1985 to 2003 and second an Ad Hoc Era from 2003 to the present. During the Rules-Based Era, monetary policy, in broad terms, followed a predictable systemic approach, and economic performance was generally good. During the Ad Hoc Era monetary policy is best described as a “discretion of authorities” approach, and economic performance was decidedly poor. By considering alternative explanations of this policy-performance correlation and examining corroborating evidence, the paper concludes that rules based policies have clear advantages over discretion.

Thirty years ago Milton Friedman delivered the Journal of Money, Credit and Banking Lecture.² He began by reiterating that “the long-run objective of monetary policy must be price stability” and then focused on what he called the “fundamental issue...Rules versus Authorities....Should the tactics” for setting the instruments of monetary policy, he asked, “be determined by relatively mechanical rules that are publicly promulgated, or by the discretion of

¹ This is a written version of the Journal of Money, Credit and Banking Lecture I gave on September 21, 2011 at Ohio State University. The lecture analyzed monetary and fiscal policy leading up to, during, and following the financial crisis. This written version focusses on monetary policy. For parallel developments in fiscal policy see Taylor (2011). I am grateful to Bill Dupor, Paul Evans, and Pok-Sang Lam for useful comments.

² See Friedman (1982). The lecture was given in July 1981 in San Francisco, and the revised version was published in 1982.

authorizes instructed to follow the right policy at the right time for the right objective?” By empirically examining monetary policy during the seven decades from the founding of the Fed until around the time of his lecture, Friedman concluded that “the discretion of authorities” was severely deficient and recommended a predictable rules-based approach to monetary policy.

In this lecture I examine monetary policy during the period since Friedman gave that lecture. I show that during the first part of this period—I’ll call it the Rules-Based Era—monetary policy, in broad terms followed a more predictable systemic approach, and economic performance improved dramatically. But during the second part of this period—the Ad Hoc Era—monetary policy returned to the “discretion of authorities” approach that Friedman warned about, and economic performance has been decidedly worse. My conclusion is thus much the same as Friedman’s, but reinforced by two highly informative experiences.

1. The Rules-Based Era: 1985-2003

When assessing in practice whether monetary policy is rules-based, it is not necessary to focus on purely theoretical definitions of rules versus discretion—such as might come out of game theory or the time-inconsistency literature, where policy is at one extreme or the other. Nor is it necessary to limit the definition of rules-based policy to situations where the policy instruments are set perfectly in line with an algebraic formula. Rather, the distinction between rules and discretion is more a matter of degree. There are several ways to assess and measure whether monetary policy is more rules-based or less rules-based.

When monetary policy is rules-based, decisions about the policy instruments are more predictable and more systematic. Policy makers can and do discuss their strategy in dynamic terms, including the implications of a decision today for decisions in the future. They tend to use

formulas or equations for the policy instruments, at least as a guide when making decisions. And their decisions about the policy instruments can be described reasonably well by a stable relationship, which shows a consistent reaction of the policy instruments to observable events such as changes in inflation and real economic growth.

In contrast, in the case of more discretionary policy-making, decisions are less predictable and more ad hoc, and they tend to focus on short-term fine-tuning. Policymakers show little interest in coming to agreement about an overall contingency strategy for setting the instruments of policy, and the historical paths for the instruments are not well described by stable algebraic relationships.

Using such considerations to assess policy, it is clear that American monetary policy started to become more rules-based starting in the early 1980s compared to earlier decades and especially compared to the decades immediately before. The late 1960s and 1970s were a period where the Federal Reserve exercised little long-term thinking and a great deal of short-term fine tuning. This is evidenced most obviously by the go-stop money growth cycles with booms followed by busts and with the inflation rate rising steadily higher at each cycle. Reports of what went on inside the Federal Reserve confirm this. Federal Reserve Board Governor Sherman Maisel (1973) demonstrated in his memoirs that policy was extremely ad hoc, with little emphasis on strategy or systematic thinking. Policy got so bad that Fed Chairman Arthur Burns (1972) effectively gave up on using monetary policy as a means to achieve the goal of price stability and instead said he had to rely on wage and price controls, arguing that “wage rates and prices no longer respond as they once did to the play of market forces.” One can show that the Fed’s responses to events were erratic during this period in the sense that policy reaction

functions were unstable empirically, as Andrew Levin and I (2012) showed for interest rate decisions.

A marked shift away from these discretionary policies occurred when Federal Reserve policy began to focus on price stability under the chairmanship of Paul Volcker which began in 1979. It was a dramatic change from the late 1960s and 1970s, enabling Volcker to say by 1983 that “We have...gone a long way toward changing the trends of the past decade and more.” By the time Alan Greenspan took over as chairman in 1987 the commitment to the goal of price stability at the Federal Reserve was strong, and the FOMC was implementing a strategy for setting the instruments of policy to achieve this goal.

Although, at the time, commentators talked of a “Greenspan standard,” suggesting a more ad hoc rather than systematic approach to policy, there is considerable evidence that a more rules based policy was being followed, at least compared with earlier periods. For example, Asso, Kahn, and Leeson (2010) studied the transcripts of the Federal Open Market Committee during this period, and they report a large number of references by committee members and the staff to monetary policy rules, at least as guides for decision making. Additional evidence is found in the memoirs of Federal Reserve Board Governor Meyer (2004) who emphasized a systematic policy framework and provided a stark contrast with the memoirs of Governor Maisel (1973).

Real-time statistical analyses at the Federal Reserve—from simple charts to econometric equations—provide some of the best quantitative measures of the degree to which policy became relatively rules-based in the 1980s. Consider Figure 1, which is a reproduction of a chart originally produced in 1995 at the Federal Reserve Bank of San Francisco by Judd and Trehan (1995). It shows the actual federal funds rate and the interest rate recommended by a simple policy rule—in this case the Taylor rule (Taylor (1993)). Note that there was little relationship

between the actual policy rate and the rule-based policy rate in the late 1960s and 1970s. But then, after the period of the disinflation—when the actual interest rate was held very high to undo the inflationary damage caused by the excessively low rates in the 1970s—the actual and the rules-based lines converge.

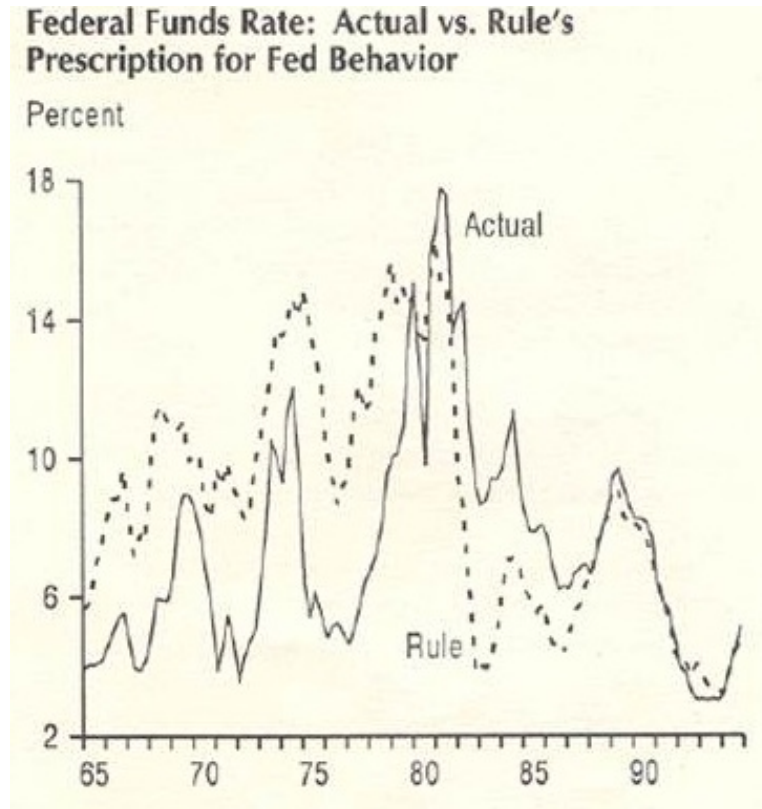


Figure 1. Federal Funds Rate: Actual and Policy Rule, 1965-1994.
Reproduction of a chart from Federal Reserve Bank of San Francisco,
Judd and Trehan (1995)

That close correspondence between the actual rate and the rules-based rate continued in fairly stable fashion for nearly two decades as shown in Figure 2, which is another reproduction of a chart originally produced at the Federal Reserve, this one at the Federal Reserve Bank of St. Louis by William Poole (2007) when he was president of the Bank. Poole uses a version of the

Taylor rule—though with the monthly consumer price index measuring inflation—to represent rule-like behavior. He uses the Fed’s measure of the GDP gap for the period that it was publically available at the time the Federal Reserve Bank of St. Louis published the chart, and he uses the CBO’s measure for later periods. Observe that there is a reasonably close correlation between the actual interest rate and the rule-based rate that lasted until around 2003.

Greenspan Years: Federal Funds Rate and Taylor Rule
 (CPI $p^* = 2.0$, $r^* = 2.0$) $a = 1.5$, $b = 0.5$

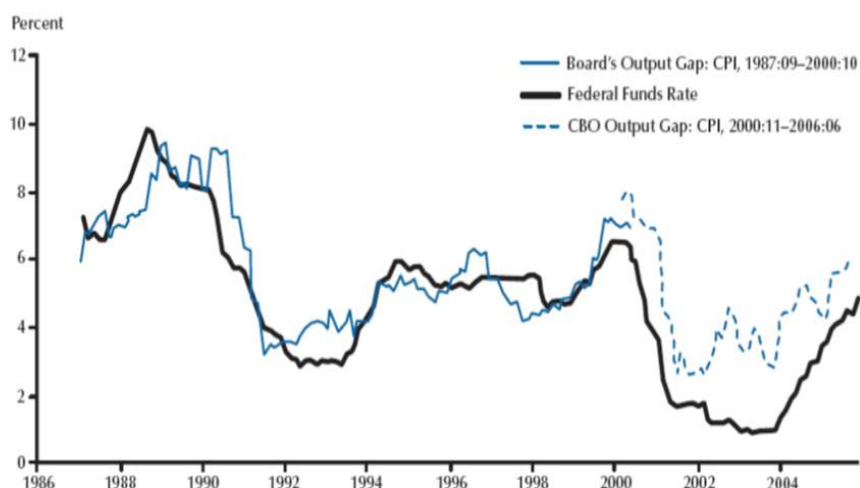


Figure 2. Federal Funds Rate: Actual and Policy Rule, 1985-2006
 Reproduction of a chart from Federal Reserve Bank of St. Louis, Poole (2007)

Based on these considerations and a close reading of many other historical documents in his book *A History of the Federal Reserve* (2009), Allan Meltzer (2011) concludes that monetary policy during this period was more rules-based than at any other period of comparable length in the history of the Federal Reserve. Though it is difficult to pinpoint exact dates, Meltzer designated the years from 1985 to 2003 as the rules based period, and noted that it was “by far the longest period [in Federal Reserve history] of stable growth and low inflation. The few

recessions in these years were short and mild. During this period, the Fed appears to have approximately followed a Taylor rule.”

One might say that the rules-based period began earlier, perhaps during the Volcker disinflation period from 1980 to 1984 when the Fed had clearly shifted to price stability as the key goal. But that period is more like a transition during which policy had not yet settled down to a particular strategy for setting the interest rate, as Figure 1 makes clear.

2. *The Ad Hoc Era: 2003--?*

There is much less uncertainty about Meltzer’s choice of 2003 as the end of the rules-based period. As seen in the far right part of Figure 2, starting around 2003 the actual interest rate policy of the Fed deviated considerably from the strategy followed in the 1985-2003 period. The interest rate was held well below the level implied by the rules-based policy that had described policy in the 1980s and 1990s. Without this deviation, interest rates would not have reached such a low level, and they would have returned much sooner to a neutral level. The deviation was large—on the order of magnitude of the discretionary decade of the 1970s—as a comparison of the right side of Figure 2 and the left side of Figure 1 makes clear.

One does not need to rely on an algebraic policy rule to document that the interest rate deviated from the rules-based policy, at least in comparison to what the Fed did under comparable conditions in the 1980s and 1990s. The Federal Open Market Committee released statements that interest rates would be low for a “prolonged period” and that interest rates would rise at a “measured pace,” clear evidence that this was an intentional departure from the 1980s and 1990s.

Additional evidence is shown in Figure 3 which is a chart prepared by the Federal Reserve Bank of Kansas City and presented in 2010 in a speech by then president Thomas Hoenig (2010). It shows that the real interest rate was negative for a very long period in the 2000s, similar to what happened in the 1970s.

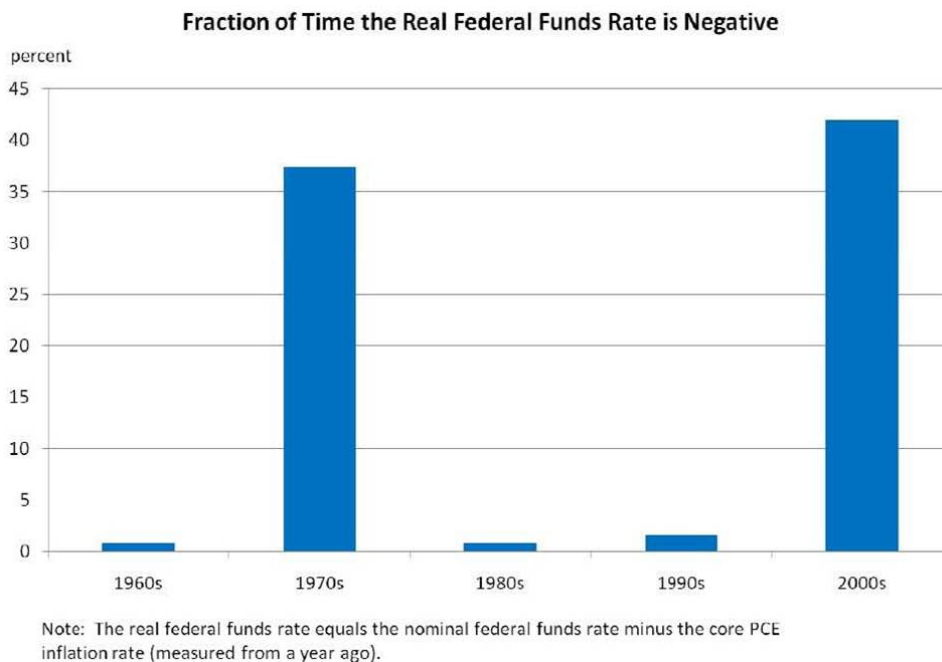


Figure 3. Fraction of Time the Real Federal Funds Rate is Negative
Reproduction of a chart from Federal Reserve Bank of Kansas City, Hoenig (2010)

But the low interest rates in 2003-2005 are by no means the only manifestation of a more discretionary policy. After interbank money markets rates rose in August 2007, the Fed introduced a number of unusual measures. For example, in December 2007 it created a new term auction facility (TAF) to provide loans to banks with the purpose of reducing tensions in the interbank market. Soon after the TAF was introduced, the Fed began the most unusual and unorthodox monetary policy interventions: the on-again/off again rescues of financial firms and their creditors. The interventions started when the Fed opened its balance sheet to rescue the

creditors of Bear Stearns in March 2008 and then made loans available to Fannie Mae and Freddie Mac. The Fed's interventions were then turned off for Lehman, turned on again for AIG, and then turned off again when the Troubled Asset Relief Program (TARP) was introduced on September 19, 2008.

One might ask whether the unpredictable and ad hoc nature of these interventions could have been avoided or reduced. My view, stated at the time, is that if the Federal Reserve and the Treasury had laid out the reasons behind the Bear Stearns intervention as well as the intentions of policy going forward, then people would have had some sense of what was to come. But no such description was provided. Uncertainty was heightened and probably reached a peak when the TARP was rolled out. In fact, the panic halted when uncertainty about the TARP was removed on October 13, 2008, as I discuss below.

Other policy interventions were taken during the panic in late September and October 2008, including the Fed's programs to assist money market mutual funds and the commercial paper markets. Programs during the panic period are difficult to analyze empirically because so much was going on at the same time. In addition to the Fed's interventions, there was the FDIC guarantee of bank debt and then clarification that the TARP would be used for equity injections.

In the period following the panic, other interventions were introduced by the Fed, most significantly the Mortgage Backed Securities (MBS) purchase program, which eventually turned out to be \$1.25 trillion in size. This intervention, later dubbed Quantitative Easing I (QEI), was followed by massive purchases of medium and long term treasury debt, which was called QEII. QEI and QEII were financed by massive expansions of the monetary base. Following QEII the Fed embarked on an "operation twist" in which it purchased long term Treasuries and sold short term Treasuries. Then in 2011 and 2012, it announced that the federal funds rate would most

likely stay near zero through 2014. Clearly these policies were discretionary, ad hoc, and unpredictable, and cannot be described by a stable reaction function. Moreover, they have created legacies of monetary overhang—a greatly expanded Federal Reserve balance sheet—which eventually needs to be run down which creates more uncertainty and unpredictability. And the actions do not constitute monetary policy as conventionally defined, but rather fiscal policy or credit allocation policy, which increases the likelihood of political interference and thus more unpredictability.

3. Economic Performance Compared: The Rules-Based Era and the Ad Hoc Era

The overall economic performance during these two monetary eras is vastly different—a fact which is well known but too rarely attributed to the vastly different monetary policy environments. The more rules-based period from the mid-1980s until the early mid-2000s was a remarkably stable economic period, frequently called the Great Moderation. Inflation and interest rates and their volatilities fell compared with the 1970s. The volatility of real GDP was cut in half. Economic expansions became longer and stronger while recessions became shorter and shallower. The rate of unemployment declined.

The discretionary period, in contrast, included a massive housing boom and bust with excessive risk taking, a financial crisis, and a Great Recession whose depth was much greater than any recession in the Great Moderation period. And the discretionary period also includes the anemic recovery with economic growth averaging only 2.4 percent, much lower than previous recoveries including the recovery from the severe early 1980s recession. Unemployment has been slow to come down and remains very high.

Of course correlation does not prove causation. Could the correlation reflect a cause and effect in the opposite direction? In other words could the poor economic performance have brought about deviation from rules based policies, or could good economic performance have led to more rules-based policies? The timing of events makes such an interpretation highly unlikely.

It is obviously wrong to argue that the Fed's adoption of a price stability strategy to reduce inflation in the early 1980s was caused by the lower inflation and more stable economy of the mid 1980s and 1990s. Perhaps one could more plausibly argue that the discretionary monetary policies in ad hoc era were due to the severe financial panic of 2008, requiring large discretionary monetary interventions. Even in this case, however, the move toward discretion began before the panic in the fall of 2008—the low interest rates of 2003-2005. Moreover, the unprecedented use of the Fed's balance sheet began in early 2008, well before the panic. If the emergency of the panic was the explanation then one would have seen a return to rules-based policies when the panic ended in late 2008, or certainly by early 2009. But instead, other large discretionary actions, QEI and QEII, have been undertaken, rationalized by a slowdown in the economic recovery and the view that the near zero interest rate monetary policy was not already easy enough to combat deflation.

Much economic theory supports the more straightforward explanation that rules-based policy caused the improved performance. Economic models in which people are forward-looking and take time to adjust their behavior imply that policy rules work better than discretion. Kydland and Prescott (1977) put forth the time inconsistency argument in favor of rules and Robert Lucas (1976) shows that rules are essential for conducting and evaluating policy.

But there are many other reasons why rules-based policies work better. Rules reduce uncertainty about future policy. They help policymakers avoid pressures from special interest

groups and instead take actions consistent with long-run goals. Policy rules facilitate communication and increase accountability. The strong case for rules-based policies is summarized by McCallum (1999) in the *Handbook of Macroeconomics* and by Taylor and Williams (2010) in the *Handbook of Monetary Economics*.

4. Corroborating Evidence

There is also much evidence about specific policy actions. Modern monetary theory predicts that the Fed's focus on price stability and lower inflation—as occurred in the 1980s and 1990s—would not increase unemployment as old fashioned Phillips curves suggested. It also predicts that go-stop discretionary monetary policy causes booms and busts. When the Fed focused on price stability and largely ended its go-stop policy in the 1980s and 1990s, both predictions were borne out. Cecchetti, Flores-Lagunes, and Krause (2006) showed that the change to a more rules-based monetary policy in the 1980s and 1990s was a factor in the improved economic performance.

Regarding the impact of specific discretionary policies, my empirical and simulation research (for example, Taylor (2007)) shows that the low interest rates set by the Fed in 2003-2005 added to the housing boom and led to risk taking and eventually a sharp increase in delinquencies, foreclosures, and toxic assets at financial institutions. The research also shows that a more rules-based federal funds rate would have prevented much of the boom and bust.

By now considerable additional empirical work supports the view that interest rates were too low for too long and that this was a factor in the boom and bust in housing. Following my 2007 paper, Jarocinski and Smets (2008) estimated a Vector Auto-regression (VAR) for the United States and found evidence that “monetary policy has significant effects on housing

investment and house prices and that easy monetary policy designed to stave off perceived risks of deflation in 2002-04 has contributed to the boom in the housing market in 2004 and 2005.”

George Kahn (2010) of the Federal Reserve Bank of Kansas City looked at deviations from policy rules and showed that they are correlated with housing bubbles. In counterfactual simulations without such deviations he showed that the booms and busts largely go away. As he writes: “When the Taylor rule deviations are excluded from the forecasting equation, the bubble in housing prices looks more like a bump.”

Additional empirical evidence is found in international comparisons, including a series of studies which looks at all OECD countries. Rudiger Ahrend (2010)—see also Ahrend et al. (2008)—writes that “‘below Taylor’ episodes have generally been associated with the build-up of financial imbalances in housing markets.” Ahrend’s work also addresses why there was a housing boom in Spain but not in Germany with both countries in the euro zone. The answer is that the policy rule deviations were quite different in the two countries even though they have the same short term interest rate.

In a Bank of England study, Bean et al. (2010) argue that the low policy rates were a factor in the crisis, though only a “modest” factor. Like Jarocinski and Smets (2008), Bean et al. (2010) estimate a VAR. They use different variables, but they also find that policy rule deviations had an effect on housing prices; they find that 26 percent of the U.S. price increase was due to the low rates. In comparison, the bust in house prices following the peak of the boom was about 30 percent in the United States. Their “impulse response functions” show that the impact of the policy rule deviations on housing is significantly different from zero, and the largest impact of monetary policy of all the variables in the VAR is on housing prices. Bean et al. also find that monetary policy during 2002-2005 was loose relative to estimated policy rules.

Of course there are different views. Bernanke (2010) cites research by the Federal Reserve Board staff which shows that if you put the Fed's forecasts of inflation rather than the actual inflation rate into a Taylor rule, then there was not such a big deviation. But as I argued in Taylor (2010), it is inappropriate to put in forecasts in this way. Such forecasts are neither objective nor accurate. Indeed, in the episode in question, the Fed's inflation forecasts were lower than what actually happened and also lower than the private sector forecasts.

Now consider the impact of the discretionary interventions that followed the too low for too long period which likely led to the financial crisis. For this purpose it is useful to divide the financial crisis into three phases as shown in Figure 4: (1) the period between the flare-up of the crisis in August 2007 and the panic in late September 2008 and (2) the panic itself from late September through October 2008, and (3) the post-panic period, which started after the panic subsided. Figure 6 shows the LIBOR-OIS spread during these three periods.

Three Phases of the Crisis: Pre-Panic, Panic, Post-Panic

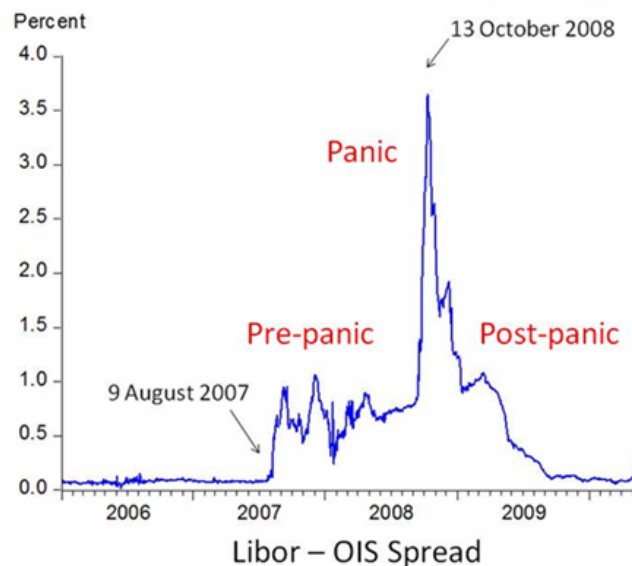


Figure 4. Three Phases of the Financial Crisis

My research on several of the extraordinary measures taken in the pre-panic is that they did not work, and that some were harmful. The Term Auction Facility (TAF) did little to reduce tension in the interbank markets during this period, as shown by Taylor and Williams (2009), and it drew attention away from counterparty risks in the banking system. The unpredictable and extraordinary bailout measures, which began with Bear Stearns, were the most harmful in my view. The Bear Stearns actions led many to believe that the Fed's balance sheet would again be available in the case that another similar institution failed. But the Fed closed its balance sheet in the case of Lehman Brothers, and then reopened it again in the case of AIG. It was then closed off again for such bailouts and the TARP was proposed. Event studies reported in Taylor (2008) show that the roll out of the TARP coincided with the severe panic.

The on again/off again bailout policies of the Fed did not prevent the panic that began in September 2008. The unpredictable nature of these interventions could have been avoided, as I mentioned earlier in this lecture, if the Fed and the Treasury had stated more clearly the reasons behind the Bear Stearns intervention and their intentions for future policy. Confusion about policy rose when the TARP was rolled out and panic ensued as the S&P 500 fell by 30 percent. The original stated purpose of the TARP—to buy up toxic assets on banks' balance sheets—was never credibly viewed as operational and it caused uncertainty. It was only when the purpose of TARP was changed and clarified on October 13, 2008 to inject equity into the banks that the panic subsided.

The panic period is the most complex to analyze because the Fed's main measures during this period—those designed to deal with problems in the money market mutual fund and the commercial paper markets—were intertwined with the FDIC bank debt guarantees and the clarification that the TARP would be used for equity injections, which was a major reason for the

halt in the panic. A detailed examination of micro data by Duygan-Bumput et al. (2010) shows that the Fed's asset backed commercial paper money market mutual fund liquidity facility (AMLF) was effective. And 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.

Now consider the post panic period starting with the large-scale asset purchase programs, QEI and QEII. Evaluations reported by the Fed concluded that the asset purchases were effective. However, most of these studies, such as Gagnon et al. (2010), are based on “announcement effects” which can be quite misleading. If one looks at the programs themselves—at the amount purchased and the timing—the conclusions are quite different. For example, consider the impact of the Fed's mortgage backed securities (MBS) purchase program, which at \$1.25 trillion is the largest single program. My research on that program with based on Johannes Stroebel is that the MBS program had a rather small and uncertain effect on mortgage rates once one controls for prepayment risk and default risk. Figure 5—drawn from Stroebel and Taylor (2012)—illustrates the reason for the result. It shows that the major movements up and down in the swap Option Adjusted Spread (Swap-OAS)—a mortgage yield spreads which controls for prepayment risk—is explained by changes in default risk as shown by the “predicted” Swap-OAS line in the graphs. The residual after these risks are controlled for leaves little if anything for the MBS purchase program to explain

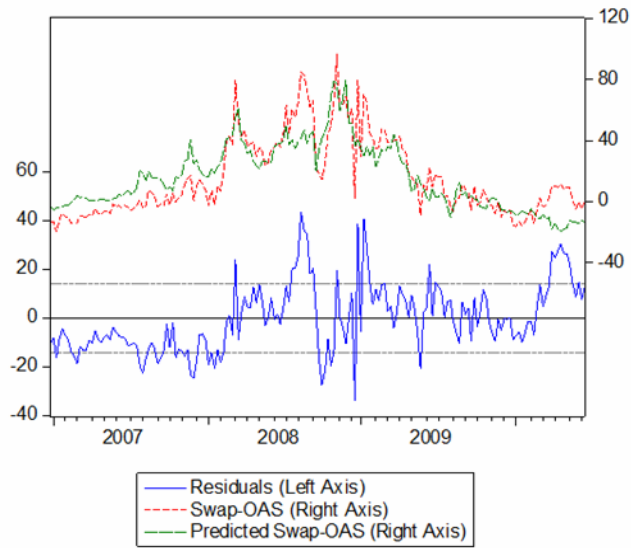
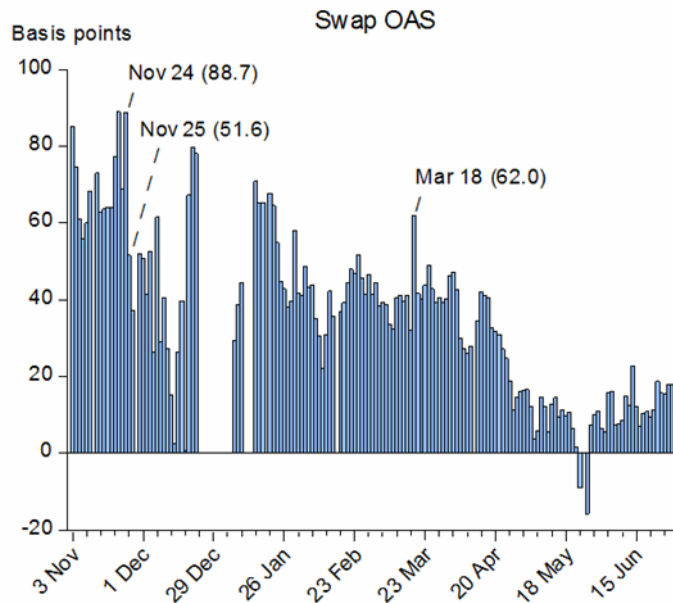


Figure 5. Swap OAS: Predicted, Actual and Residual

Figure 6 shows how misleading it can be to judge the effectiveness of asset purchase programs by looking at announcement effects. The initial announcement of the MBS program on November 25, 2008 had a noticeable short run effect on the swap OAS, but the effects soon disappeared as the longer term trend effects shows in Figure 5 continued. The March 18, 2009 announcement effect of the extension of the program, also shown in Figures 5, has the wrong sign on the spread, but it too was soon reversed.



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Figure 6. Temporary Announcement Effects

Whether or not one believes that these discretionary interventions worked, 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 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 independent agency of government. By taking these extraordinary measures, the Fed has risked losing its independence over monetary policy.

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. 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. 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.

Some argue that the Fed needs to introduce even more discretion. One proposal is to introduce new countercyclical instruments such as pro-cyclical capital buffers. These new

instruments would work along with the interest rate instrument of monetary policy to cool credit or asset price booms. Unfortunately there has been very little analytical or empirical work on this subject, and I do not see evidence that such instruments are needed. Yes, capital requirements should be higher and commensurate with the risk that a financial institution takes; and effective supervision and regulation is essential.

However, the rationale for discretionary changes in capital requirements to attenuate booms is based on the view that simply keeping the interest rate instrument from deviating from the policy rules approach of the 1980s and 1990s would not have prevented the worst of the housing boom. If one believes that low policy rates were a large factor in the recent boom and the bust leading to the crisis, then there is still much that one can do with the interest rate instrument before using these alternatives.

Another proposed change which would require more discretion would be to do more to burst bubbles before they get out of hand. But we know little about identifying bubbles let alone popping them without causing more harm than good. A higher priority for monetary policy in the future is to avoid causing the bubbles in the first place. The successful policy during the Rules-Base Era did not include such attempts to pop bubbles and the economy functioned very well.

Yet another proposed deviation from a policy rule framework would have central banks temporarily raise inflation targets. The reason is that with a two percent target in policy rules the interest rate would have to go negative in a severe crisis. But in the current crisis, the Taylor rule had interest rates going close to zero and remaining there for a while, but not going significantly negative. Moreover, raising inflation targets could easily reduce credibility about an inflation target at all, further damaging central bank credibility.

Although the basic policy rule framework is still sound, the crisis does reveal some he need to improve international aspects of monetary policy. The impact of increased globalization and international connection between financial markets was very evident during the panic part of the crisis in late 2008. These interconnections raise questions about the impact of central banks on each other. In the period leading up to the crisis there is evidence that the European Central Bank and other central banks held interest rates lower than they would otherwise be because the Federal Reserve set its interest rate so low. The reason, of course, is the exchange rate. A large gap between interest rates would cause the exchange rate to appreciate with adverse consequences on exports.

Less erratic or unpredictable movements in the interest rate would help, so a rules-based policy would have this added advantage. Another possibility is to have a global target for the inflation rate. If there was a multi-country target which was considered in the deliberations of

each central bank then there would be a smaller tendency to swing individual interest rates around by large amounts.

5. *The Need to Exit*

For all the reasons given in this lecture, it is crucial to announce a clear and predictable exit strategy and get back to rules based policy. I have outlined such a strategy in Taylor (2009). By definition an exit strategy is a policy describing how the instruments will be adjusted over time until the normal monetary rule 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 of the central bank.

How would such an exit rule work? One possibility would be to link the Fed's decisions about the interest rate with its decisions about the level of bank reserves held at the Fed. When the Fed decides to start increasing the federal funds rate target, it would also reduce reserve balances. One reasonable exit strategy for Fed would reduce reserve balances by specific amount for each 25 basis point increase in the federal funds rate. The goal should be to have reserves near the level needed for supply and demand equilibrium in the money market by the time the interest rate hits 2 percent, which was where it was when the balance sheet started to explode as the Fed started increasing reserves in the fall of 2008. The funds rate fell from 2 percent to 0 percent as the Fed increased the supply of reserves. An attractive feature of this exit strategy is that the Fed would exit unorthodoxy at the same 2 percent interest rate as it entered unorthodoxy.

6. Conclusion

The purpose of this lecture has been to examine and learn from broad trends in monetary policy in the three decades since Milton Friedman (1982) gave the Journal of Money Credit and Banking Lecture, and thereby provide an update on the Rules versus Authorities issue which he addressed.

I demonstrated that there was a Rules-Based Era in monetary policy as well as an Ad Hoc Era during the past three decades. The Rules-Based Era, which spanned roughly the years from 1985 to 2003, saw the Great Moderation with few and mild recessions and long economic expansions. The Ad Hoc Era, which began in 2003 and continues, has seen a devastating boom and bust in the housing market, excessive risk taking leading to a deep financial crisis, a Great Recession, and an anemic recovery with persistently high employment.

After examining the timing of events, reviewing basic economic theory, and examining empirical studies of specific actions and interventions, I conclude that the vastly different approach to monetary policy in the two eras is a key factor in explaining the vastly different economic performance. When combined with similar conclusions of Friedman in his review of first seven decades of the Federal Reserve, this three-decade update has obvious policy implications as we approach the 100th anniversary of the founding of the Federal Reserve System in 2013.

References

- Ahrend, Rudiger (2010), "Monetary Ease: A Factor Behind Financial Crises? Some Evidence from OECD Countries," *Economics: The Open Access, Open Assessment E-Journal*, Vol. 4, 2010-12, April 14, 2010
- Ahrend, Rudiger, B. Cournède, and R. Price (2008), "Monetary Policy, Market Excesses and Financial Turmoil," OECD Economics Department Working Paper No. 597, March 2008
- Asso, Pier Francesco, George A. Kahn, Robert Leeson (2010), "The Taylor rule and the practice of central banking," Research Working Paper RWP 10-05, Federal Reserve Bank of Kansas City.
- Bean, Charles, Matthias Paustian, Adrian Penalver and Tim Taylor (2010), "Monetary Policy after the Fall," Presented at the Federal Reserve Bank of Kansas Annual Conference Jackson Hole, Wyoming, August 28
- Bernanke, Ben S. (2010), "Monetary Policy and the Housing Bubble," presented at the American Economic Association Annual meeting, January 3, 2010
- Burns, Arthur, F. (1972), "The Problem of Inflation," Address before the Joint Meeting of the American Economic Association and the American Finance Association, December 29, 1972
- Cecchetti, Stephen G., Alfonso Flores-Lagunes, and Stefan Krause (2006) "Has Monetary Policy Become More Efficient? A Cross-country Analysis" *Economic Journal*, Vol. 116, No. 115, pp. 408-433
- Duygan-Bumpt, B., Parkinson, P. M., Rosengren, E. S., Suarez, G. A., and Willen, P. S. (2010), "How Effective Were the Federal Reserve Emergency Liquidity Facilities? Evidence

- from the Asset-Backed Commercial Paper and Money Market Mutual Fund Liquidity Facility,” Working Paper QAU10-3, Federal Reserve Bank of Boston, April 29
- Friedman, Milton (1982), “Monetary Policy: Theory and Practice,” *Journal of Money Credit and Banking*, Vol. 14, No. 1, pp. 98-118, February
- Gagnon, Joseph, Matthew Raskin, Julie Remanche, and Brian Sack (2010), “Large-Scale Asset Purchases by the Federal Reserve: Did They Work?” Federal Reserve Bank of New York Staff Report no. 441, March 2010
- Hoenig, Thomas (2010), “The 2010 Outlook and the Path Back to Stability,” The Central Exchange, Kansas City Missouri, January 7.
- Jarocinski, Marek and Frank R. Smets (2008), “House Prices and the Stance of Monetary Policy,” *Federal Reserve Bank of St. Louis Review*, July/August 2008, pp 339-365.
- Judd, John P. and Bharat Trehan (1995) “Has the Fed Gotten Tougher on Inflation?” *The FRBSF Weekly Letter*, March 31, 1995.
- Kahn, George A. (2010), “Taylor Rule Deviations and Financial Imbalances,” *Federal Reserve Bank of Kansas City Economic Review*, Second Quarter, pp 63-99.
- Kydland, Finn and Edward Prescott (1977), “Rules rather than Discretion: The Inconsistency of Optimal Plans,” *Journal of Political Economy*, 85, 473-491.
- Levin, Andrew T., and John B. Taylor (2012), “Falling Behind the Curve: A Positive Analysis of Stop-Start Monetary Policies and the Great Inflation,” In *The Great Inflation*, Michael D. Bordo and Athanasios Orphanides (Eds.), University of Chicago Press, Chicago, forthcoming
- Lucas, Robert E. Jr. (1976), “Econometric Policy Evaluation: A Critique,” *Carnegie-Rochester Conference Series on Public Policy*, 1, 19-46.

- Maisel, Sherman J. (1973), *Managing the Dollar*, W.W. Norton, New York
- McCallum, Bennett (1999) "Issues in the Design of Monetary Policy Rules," *Handbook of Macroeconomics*, John B. Taylor and Michael Woodford (Eds.), Elsevier
- Meltzer, Allan H. (2009), *A History of the Federal Reserve*, Volume 2, University of Chicago Press, Chicago
- Meltzer, Allan H. (2011) "Federal Reserve Policy in the Great Recession," Remarks presented at Cato Institute Monetary Conference, November
- Meyer, Laurence (2004), *A Term at the Fed: An Insider's View*, HarperCollins, New York.
- Poole, W. (2007): "Understanding the Fed." *Federal Reserve Bank of St. Louis Review* 89, 3–13.
- Stroebel, Johannes C. and John B. Taylor (2012), "Estimated Impact of the Fed's Mortgage-Backed Securities Purchase Program," *International Journal of Central Banking*, August
- Taylor, John B. (1993), "Discretion versus Policy Rules in Practice." *Carnegie Rochester Conference Series on Public Policy* 39, pp. 195-214
- Taylor, John B. (2007), "Housing and Monetary Policy," in *Housing, Housing Finance, and Monetary Policy* proceedings of FRB of Kansas City Symposium, Jackson Hole, WY, September 2007. pp. 463-476
- Taylor, John B. (2008) "The Financial Crisis and the Policy Responses: An Empirical Analysis of What Went Wrong," *A Festschrift in Honour of David Dodge's Contributions to Canadian Public Policy*, Bank of Canada, November 2008, pp. 1-18.
- Taylor, John B. (2009), "The Need for a Clear and Credible Exit Strategy," in John Ciorciari and John Taylor (Eds.) *The Road Ahead for the Fed*, Hoover Institution Press, Stanford, 2009.

Taylor, John B. and John C. Williams (2009), “A Black Swan in the Money Market,” *American Economic Journal: Macroeconomics*, 1 (1), January 2009, pp. 58-83.

Taylor, John B. (2010), “The Fed and the Crisis: A Reply to Ben Bernanke,” *Wall Street Journal*, p A19, January 11, 2010

Taylor, John B. and John C. Williams (2010), “Simple and Robust Rules for Monetary Policy,” *Handbook of Monetary Economics*, Benjamin Friedman and Michael Woodford (Eds.), Elsevier, pp. 829-859.

Taylor, John B. (2011) “An Empirical Analysis of the Revival of Fiscal Activism in the 2000s,” *Journal of Economic Literature*, Vol. 49, No. 3, pp. 686–702

Volcker, Paul A. (1983), “We Can Survive Prosperity,” Remarks at the Joint Meeting of the American Economic Association and the American Finance Association, December 28, 1983