Better Living through Monetary Economics[1]

By

John B. Taylor
Stanford University

January 2008

Ten years ago macroeconomists began noticing and studying a remarkable change in the performance of the U.S. economy. The economy had become much more stable than in the past. The change appeared to occur some fifteen years earlier, in the early 1980s. Not only had inflation and interest rates and their volatilities diminished compared with the experience of the 1970s, but the volatility of real GDP had reached lows never seen before. It appeared that economic expansions were becoming longer and stronger while recessions were becoming rarer and shorter.

At the time I called this phenomenon the Long Boom (Taylor(1998). It was as if there was one long growth expansion starting with the end of the deep recession in November 1982 and continuing right through its fifteenth anniversary in November 1997, with the mild 1990-91 recession seeming like a small interruption compared to recessions of the past. Others called the phenomenon the Great Moderation (Blanchard and Simon (2001)), because of the general decline in volatility of output growth and the inflation rate.

I conjectured that the improved macroeconomic performance could be explained by a regime shift in monetary policy, which also appeared to occur in the early 1980s. I argued that this shift in monetary policy could be explained by a major change in

monetary theory (Taylor (1997)), which also occurred at about the same time. In other words, there was a Great Moderation in economic performance, which could be explained by a Great Regime Shift in monetary policy, which in turn could be explained by a Great Awakening in monetary theory.

Neither the Great Moderation, the Great Regime Shift, nor the Great Awakening turned out to be flash in the pan. Each has lasted for another ten years. The Long Boom reached its twenty-fifth anniversary in November 2007, with the mild 2001 recession turning out to be an even smaller interruption than the 1990-91 recession. The monetary policy that characterized the Great Regime Shift continued and the Great Awakening of monetary theory blossomed into a more fully developed theory which some now call New Keynesian economics. Great moderations have now been seen in many other economies around the world with associated monetary policy regime shifts and an apparent spread of the economic ideas. Indeed, it now appears that, at least since the start of the 21st Century, we have had a Long Boom on a global scale.

All these events have been researched thoroughly during the last decade to the point where I think it is possible to go beyond conjecture and present evidence that empirically establishes the influence of theory on policy and outcomes. The purpose of this paper is to review and present that evidence. There is no question that these improvements in economic performance—the shorter, more mild recessions, the lower, more stable inflation rates—in the United States and around the world have improved peoples lives. If we can establish that the ultimate cause of this improvement was economics—and in particular monetary economics—then this is an excellent example of "better living through economics."

1. Documenting the Great Moderation

Many research papers have documented the improved cyclical performance of the U.S. economy and pinpointed the date as starting in the early 1980s, including Kim and Nelson (1999), McConnell and Perez-Quiros (2000), Blanchard and Simon (2001) Koenig and Ball (2007). No matter what metric you use—the variance of the real GDP growth rate, the variance of the real GDP gap, the average length of expansions, the frequency of recessions, or the duration of recessions—there has been a huge improvement in economic performance. There has also been an improvement in price stability with the inflation rate much lower and less volatile than the period from the late 1960s to the early 1980s.

Figures 1 and 2 present a simple summary of the facts. Figure 1, which is based on Rosenblum (2007), measures the improvement in terms of the reduction in the time that the economy spends in recession. This is a remarkable change and clearly an improvement in peoples' lives. Figure 2, which is based on Koenig and Ball (2007), shows the quarterly growth rate of real GDP from the 1950s to the present. It is clear that the volatility of the growth rate declined sharply starting in the early 1980s.

Much of the research on the Great Moderation in the United States has focused on the decline in variability in the 1980s compared with the earlier post World War II period as exemplified by Figure 2. However, as shown in Figure 1, the decline appears to be part of a longer term trend. Of course, a large component of the high proportion of time the economy spent in recession in the pre-World War II period was due to the Great Depression. If one excludes the Great Depression, looks at the earlier pre-World War II

period, and makes adjustments in the data as recommended by Romer (1986), then one finds that there was not much of a reduction in the post World War II period until early 1980s. In this sense, the shift in the 1980s is a unique shift and not part of a longer term trend.

Table 1 which is drawn from Cechetti et al. (2007) shows that this same type of improved performance has occurred in other developed countries. Related work by Cechetti et al. (2006) shows that the same is true of an even broader group of countries, including most developing countries.

Finally, it has been widely documented that the rate of inflation and the volatility of the inflation rate have come down dramatically in the United States in the 1980s and have stayed low compared with the period of high and rising inflation of the late 1960s and 1970s. More recently, researchers have documented that the inflation rate and the volatility of inflation has declined dramatically for many other economies around the world. For the industrial countries as a whole, the timing is similar to the United States; for the developing countries the decline in inflation and volatility occurred later. Figure 3, which is drawn from IMF staff research, reported in the 2006 World Economic Outlook shows that the decline is more recent in the developing countries.

2. The Great Regime Shift in Monetary Policy

Just as there are several ways to document the Great Moderation, there are several ways to document a regime shift in monetary policy. I will consider four here. By all these measures the shift appears to have occurred in the early to mid 1980s and to have

continued to the present. The shift is thereby closely temporally correlated with the Great Moderation in output volatility.

First, consistent with the view that inflation is ultimately a monetary phenomenon, *the decline in the inflation rate itself*, as shown in Figure 3, must be included as part of the evidence of a regime change. Over long periods of time, inflation and money growth, suitably measured, are strongly correlated. Hence, in effect a shift in monetary policy from consistently inflationary levels of money growth to consistently non-inflationary levels of money growth represents a regime change. However, as monetary policy is currently practiced, money growth does not play a central role in day to day decisions, which are focused on the appropriate settings for the short-term interest rate. Fortunately, as I describe below, there is evidence of a regime shift which is based on measures of how central banks set interest rates.

A second piece of evidence is the greater focus on *inflation targets*, either informally as has been the case of the Federal Reserve, or more formally as in the case of the Reserve Bank of New Zealand, the Central Bank of Chile, the Bank of England, the Riksbank, and now many other central banks. The shift to a regime that would focus much more on price stability than in the 1970s under the leadership of Paul Volcker was the most dramatic and obvious. Volcker, his colleagues, and his successors have been clear about the goal of price stability, arguing that, at the least, inflation should be low enough not to interfere with the decision-making of firms and investors. The use of more formal inflation targets at other central banks is also a dramatic and obvious change; it has helped to spread the idea of price stability as the primary goal of monetary policy around the world. A closely related development has been the shift, for example in the

U.K., to more independent central banks, although there was no similar formal change in the United States.

Third, in the new regime, central banks have focused much more on *predictable or rule-like decision-making* including a focus on *transparency and expectations of future policy actions*. The increase in transparency about the process for making decisions can be seen in many different ways. For example, in the case of the Federal Reserve, prior to the 1980s decisions about an interest rate change were tied in vague ways to decisions about borrowed reserves and were usually left to the market to figure out. A far different and clearer communications method is used today; the Fed announces its interest rate decision immediately after making it and endeavors to explain to the markets what it is thinking about the future. Such changes have enhanced the central bank's *credibility* to stick to its predictable operations and inflation targets.

Other central banks have also been clearer about their policy process sometimes by publishing "Inflation Reports" with their own inflation and output forecasts and their analyses of the current situation. The aim has been to be as predictable and systematic as possible with the instruments of policy convincingly and consistently aimed at the inflation target or price stability goal. This is a huge change from the days when central bankers tried to preserve their mystique and thought that they had to surprise markets from time to time in order for monetary policy to be effective.

Fourth, central banks have become markedly *more responsive to developments in the economy* when they adjust their policy interest rate. In my view this is the most important part of the regime change. It refers specifically to the actual actions of central banks rather than to their words, and it can be measured and investigated empirically to

determine whether the change in policy has affected economic performance, as discussed below. Indeed, this is a policy regime change in the classic sense in that one can observe it by estimating, during different time periods, the coefficients of the central bank's policy rule—in particular a Taylor rule which describes of how the central bank sets its interest rate in response to inflation and real GDP.

A number of researchers have used this technique to detect a regime shift, including Judd and Rudebusch (1998), Clarida, Gali, and Gertler (2000), Woodford (2003), Stock and Watson (2004) and others. Such studies have shown that the Fed's interest rate moves were less responsive to changes in inflation and to real GDP in the old regime, the period before the 1980s. After the mid 1980s, the reaction coefficients increased significantly. The reaction coefficient to inflation nearly doubled. The estimated reaction of the interest rate to a one percentage point increase in inflation rose from about three-quarters to about one-and-a-half. The reaction to real output is also higher. In general the coefficients are much closer to the parameters of a Taylor rule in the post mid-1980s period than they were before. I found similar results over longer sample periods for the United States: The implied reaction coefficients were also low in the highly volatile pre-World War II period (Taylor (1999)).

Cecchetti et al (2007) and others have shown that this same type of shift occurred in other countries. Figure 5, which is drawn from Cecchetti et al (2007), pinpoints the regime shift as having occurred for a number of countries in the early 1980s. It presents the deviations from a Taylor rule, which indicates that monetary policy reactions as measured by the coefficients were much different in the earlier period.

The Causal Connection between Policy Regime Change and Improved Performance

So far we have established that there was a Great Moderation which has lasted about 25 years, and a Great Regime Shift which has lasted for about the same 25 years. This coincidence of timing suggests, of course, that the two were related and that the regime shift may have led to the improved performance, but it does not prove it. For this reason researchers have endeavored to use formal statistical techniques or macroeconomic models to help assess causality and help us understand what aspects of the regime shift led to the improvement in performance. Beyond causality it is important for the future to know what parts of the regime change were essential and what may have been incidental.

For example, Stock and Watson (2002) used a statistical time-series decomposition technique to assess the causality. They found that the change in monetary policy did have an effect on performance, though they also found that other factors—mainly a reduction in other sources of shocks to the economy (inventories, supply factors)—were responsible for a larger part of the reduction in volatility. In particular they showed that the shift in the monetary policy rule (the fourth piece of evidence listed in the previous section) led to a more efficient point on the output-inflation variance tradeoff.

With the same goals in mind, Cecchetti et al (2006) used a more structural model and empirically studied many different countries. For 20 of the 21countries which had experienced a moderation in the variance of inflation and output, they found that better monetary policy accounted for over 80 percent of the moderation. They use the same type of output-inflation variability tradeoff that Stock and Watson (2002) used.

At a fundamental level I think there is a more straight-forward way to make the case that the change in regime improved performance. First, simply making policy more predictable, which has been a key part of the regime change, would reduce uncertainty, making it easier for the private sector to plan, and thereby reduce volatility. In his last academic paper, Milton Friedman (2006), for example, argued that it was the reduction in the fluctuations and uncertainty relating to money growth that led to the reduction in output volatility.

Moreover, as I show in the next section, the change in regime was precisely in the direction recommended by monetary models of the economy. The recommendations from simulations and analyses with these monetary models were policy prescriptions with an inflation target and rules for the instruments to achieve this target. The models predicted that the variance of inflation and output (or at least a weighted sum of the variance of inflation and output) would decline if the policy was conducted in the recommended way rather than in the way it was conducted in the 1970s and earlier. In other words, the policy rules that were recommended were derived from models that showed such policy rules would bring about a great moderation. So it is not entirely surprising therefore that when actual policy was conducted in such a way, at least approximately, that there was such a moderation.

3. A Great Awakening in Monetary Theory

I now turn to developments in monetary economics and their role in helping to bring about a change in monetary policy and the resulting improvement in performance. It was during the mid to late 1970s that monetary economists began to focus intently on

finding policies that would reduce the volatility of real GDP and inflation. Some evidence

of this is found in the very explicit and frequent use of an objective function which

captured that goal. It was usually written down in the form of a quadratic loss $\lambda \text{Var}(y) +$

$(1-\lambda)\text{Var}(\pi)$, which was to be minimized, where y represented real GDP relative to

normal levels and π represented the inflation rate relative to target. The weight λ

described the relative importance of each variable and for most of the models there was a

tradeoff between these two variances. See, for example, Sargent and Wallace (1975),

Kydland and Prescott (1977), and Taylor (1979).

In this research the form of the policy to accomplish this objective was usually a

policy rule for the monetary instruments. One reason for the focus on policy rules was

the idea of rational expectations which required that contingency plans for policy be part

of the analysis, as laid out by Lucas (1976). The time inconsistency argument of Kydland

and Prescott (1977) was another motivation.

The monetary theory that was developed to address this policy objective had at its

center a description of the inflation process which included both *rational expectations*—

the importance of which was clear from the Lucas critique—*and sticky prices*—which

were the source of monetary non-neutrality. Also included was a description of how the

real economy was affected by the policy interest rate and a description of how the policy

interest rate is set, again usually through a policy rule.

Before the advent of rational expectations in monetary economics Milton

Friedman and Edmund Phelps proposed, in the late 1960s, the expectations augmented

Phillips curve which showed that if inflation rose above expected inflation, then output

and employment would rise above normal. It also showed that if inflation is to be reduced

below its currently expected level, then real output and employment would have to fall below normal levels for a time. As long as expectations were adaptive, the expectations augmented Phillips curve gave a reasonably accurate description of the time series pattern of inflation and real GDP. But rational expectations changed this. If expectations were rational, then monetary policy—if it was anticipated or followed a known rule—could not create a difference between the actual and expected inflation rate; thus there was no way for monetary policy to affect real GDP. It could achieve any inflation rate it wanted with any degree of accuracy without any adverse impact on the real economy.

Though this result attracted a lot of attention at the time, it was not very useful for monetary policy analysis. For this reason a new theory was developed with a defining characteristic: the combination of sticky prices and rational expectations. The basic idea was that firms would not change their prices instantaneously. There would be a period of time during which the firm's price would be fixed, and the pricing decisions of different firms would not all be made at the same time. Rather they would be staggered and unsynchronized.

With this new pricing assumption, the usual equilibrium theory where price was given by the intersection of the supply and demand curves would not work, and a number of important issues arose that were not part of the classic supply and demand framework. Some firms' prices will be outstanding when another firm is deciding on a price to set. Thus, these firms need to look back at the price decisions of other firms. Also each firm's price will last for a period of time; hence, firms must forecast the future including the prices of other firms.

One of the ways this theoretical problem was first handled in the 1970s was to make the simplifying assumption that the price is set at a fixed level for a fixed period of time (Taylor (1980)) similar to the simplifying assumption in the original overlapping generation model that all people live for exactly two periods. This was the staggered pricing assumption, and like the overlapping generations model the simplifying aspects of the assumption could be dropped in practical empirical work.

Despite the simplicity of staggered pricing with rational expectations, the theory yielded a set of results with implications for monetary policy. The first result was that *expectations of future inflation matter for pricing decisions today*. The reason is that with the current price decision expected to last into the future, some prices set in the future will be relevant for today's decision. This is a very important result for monetary policy. For the first time, expectations of *future* inflation come into play in determining the current inflation rate. This gave a rationale for central bank credibility in its commitment to price stability and for setting an inflation target.

A second result is that the *inertia in the inflation process was more complex* than in the expectations augmented Phillips curve and other earlier models without the combination of rational expectations and staggered pricing. Past prices matter because they are relevant for present price decisions. But the *inertia is longer than the length of the period during which prices are fixed*. Price shocks take a long time to run through the market because last period's price decisions depend on price decisions in the period before that and so on into the distant past. The theory also predicted that the *degree of inertia or persistence depends on monetary policy*. The more aggressively the central bank responds to inflation, the less persistent are inflation shocks. That this prediction

was later shown to be true is part of the evidence that the theory and the policy were related. Indeed over time inflation persistence has come down as the monetary responses have gone up.

Third, the newer theory implied *a tradeoff curve between price stability and output stability*, and monetary policy could achieve better results in both dimensions by moving the economy toward the curve. In other words, inefficient monetary policies would be off the curve while efficient monetary policies would be on the curve. Moreover, changes in policy could actually move the trade-off curve in a favorable direction due to expectations effects which would change the price setting process. For example, a policy that resulted in a movement along the curve toward more price stability and less output stability could shift the curve, bringing about more output stability. Bernanke (2004) used this trade-off curve to explain the role of monetary policy in the Great Moderation. This is the type of framework that led to the recommendations for particular policy rules.

Fourth, the o*ptimal monetary policy rule* to minimize the variability of output and inflation could be calculated numerically either by simulating the new monetary models or by using optimal control theory with these models. The optimal monetary policy involved reacting to both inflation and real GDP. If the policy instrument was the money supply, as it was in the earliest research, then it was optimal to react to real GDP unlike a fixed growth rate of the money supply. If the policy instrument was the interest rate, as it was coming to be in the early 1980s, then it would involve moving the interest rate more aggressively to control inflation and real GDP.

Fifth, *the costs of disinflation were less than in the expectations augmented Phillips curve*. This prediction proved accurate when people later examined the disinflation of the early 1980s. It is relevant for the current discussion because it may have been a factor tipping the balance in favor of undertaking the Volcker disinflation.

Over time the underlying monetary theory that yielded these results and principles has evolved and improved greatly. An important improvement is that the price adjustment equations have now been derived formally from an individual firm optimization problem. See Woodford (2003) for this and other examples of how the theory has developed. In general, the original principles and results, at least the five listed here, have proved robust to these changes. For example, simulations of policy rules derived in the early models perform well in the more recent models with optimally derived equations (Taylor (1999)). The defining characteristic of the theory as it first developed—that expectations are rational and that prices are set in a staggered unsynchronized fashion—is still the defining characteristic in my view.

More recently, researchers have relaxed the simplifying assumption that prices are set for an exogenous interval of time. Rather, firms' pricing decisions depend on the state of the market, which has given rise to the name "state dependent" pricing models and created the need to give the original models a new name, "time dependent" (Dotsey, King, and Wolman (1999), Golosov and Lucas (2006), and Gertler and Leahy (2006)). Klenow and Kryvtsov (2007) consider some of the pros and cons of the newer models by looking at how they compare with actual pricing decisions using BLS micro data.

The Causal Connection between Theory and Policy

There is a close connection in time between what I am calling the Great Regime Shift in monetary policy and the Great Awakening in monetary economics. Moreover, as the summaries of the theory and the policy make clear, there are close connections between the principles/recommendations and the actual policy, including the importance for expectations of setting an inflation target, the importance of more predictable policy, and the importance of responding aggressively to inflation and real output. That policy changed in the directions of the recommendations is certainly some evidence that there was a causal connection.

But can we go further in establishing a connection? Or must we settle for Keynes' famous view that policy makers are the slaves of some defunct economists no matter what the policy makers say. Though difficult I believe we can go further. For example, Asso, Kahn, and Leeson (2007) have documented a large number of references to policy rules and related developments in the transcripts of the FOMC. Meyer (2004), who is one of the policy makers referred to in their paper, makes it clear in his insider's story that there was a framework underlying the policy and that this framework is similar to the theory that I have outlined above. If you compare Meyer's (2004) account during the period after the regime shift with the account of an insider such as Maisel (1973) before the regime shift, you will find a huge difference in the framework underlying policy decisions. The most recent editions of the Fed's official *Purposes and Functions* has a section on policy rules. Other evidence comes from the increased interaction between researchers at central banks and monetary economists more generally. Indeed

much of the research that has formed this Great Awaking has been conducted by the staffs at the central banks.

4. Conclusion

I began by summarizing the key characteristics of the Great Moderation of the past 25 years. I then reviewed developments in monetary policy and monetary economics that took place during the same period of time, and I drew attention to a Great Regime Shift in monetary policy and a Great Awakening in monetary economics that, like the Great Moderation, are still with us. This review as well as more direct evidence of causality suggests that all three of these developments were closely related and that monetary theory had a constructive influence on monetary policy and thereby on the favorable macroeconomic outcomes.

Of course monetary economics was not all that mattered. Factors other than monetary theory were certainly part of the influence on monetary policy, and factors other than monetary policy were certainly partly responsible for the improved cyclical performance. Nonetheless, monetary economics mattered significantly and is thus an excellent example of "Better Living through Economics."

References

Asso, Pier Francesco, George Kahn and Robert Leeson "Monetary Policy Rules: from Adam Smith to John Taylor," paper presented at Dallas Federal Reserve Bank conference. October 2007.

Bernanke, Ben (2004), "The Great Moderation," Eastern Economic Association, Washington, D.C. February 20, 2004.

Blanchard, Olivier and John Simon (2001), "The Long and Large Decline in U.S. Output Volatility," *Brookings Papers on Economic Activity*, Vol. 2001, No. 1, pp.135-164.

Board of Governors of the Federal Reserve System (2005) *Purposes and Functions*, Ninth Edition, June 2005, Chapter 2. Washington D.C.

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.*

Cecchetti, Stephen G., Peter Hooper, Bruce C. Kasman, Kermit L. Schoenholtz, and Mark W. Watson (2007), "Understanding the Evolving Inflation Process," presented at the U.S. Monetary Policy Forum 2007.

Clarida, Richard, Jordi Gali, and Mark Gertler (2000), "Monetary Policy Rules and Macroeconomic Stability: Evidence and Some Theory," *Quarterly Journal of Economics* (February), 115, 1, 147-180.

Chari, V.V., Patrick Kehoe, and Ellen McGrattan (2000), "Sticky Price Models of the Business Cycle: Can the Contract Multiplier Solve the Persistence Problem," *Econometrica*, 68, 1151-1179.

Dotsey, Michael, Robert G. King, and Alex Wolman(1999), "State Dependent Pricing and the General Equilibrium Dynamics of Money and Output," *Quarterly Journal of Economics*, 114, 3, pp. 655-90.

Friedman, Milton (2006), "Tradeoffs in Monetary Policy," paper prepared for David Laidler Festschrift, Hoover Institution.

Gertler, Mark and John Leahy (2006), "A Phillips Curve with an (S,s) Foundation," NBER Working Paper 11971.

Golosov, Mikhail and Robert E. Lucas, Jr., (2006), "Menu Costs and the Phillips Curve," *Journal of Political Economy*, Vol. 115, No. 2, 171-199.

Judd, John and Glenn D. Rudebusch (1998). "Taylor's Rule and the Fed: 1970-1997." Federal Reserve Bank of San Francisco *Economic Review* 3, pp. 1-16.

Kim, Chang-Jin and Charles R. Nelson (1999), "Has the U.S. Economy Become More Stable? A Bayesian Approach Based on a Markov Switching Model," *Review of Economics and Statistics*, Vol. 81, No. 4, pp 608-616.

Klenow, Peter J. and Oleksiy Kryvtsov (2007), "State Dependent or Time Dependent Pricing: Does It Matter for Recent U.S. Inflation?" Stanford University.

Koenig, Evan F. and Nicole Ball (2007), "The Great Moderation in Output and Employment Volatility," *Economic Letter*, Federal Reserve Bank of Dallas, Vol. 2, No. 9, September.

Kydland, Finn E. and Edward C. Prescott (1977), "Rules Rather than Discretion: The Inconsistency of Optimal Policy," *The Journal of Political Economy*, Vol. 85, No. 3, 473-492.

Lucas, Robert E. (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.

McConnell. Margaret M. and Gabriel Prez-Quiros (2000), "Output Fluctuations in the United States: What Hs Changed Since the Early 1990s," *American Economic Review*, Vol. 90, No, 5, pp314-334.

Meyer, Laurence (2004), *A Term at the Fed: An Insider's View*, HarperCollins, New York.

Romer, Christina (1986), "Is the Stabilization of the Post War Economy a Figment of the Data?" *American Economic Review*, Vol. 76, pp. 314-334.

Rosenblum, Harvey (2007), "Fed Policy and Moral Hazard," *Wall Street Journal*, October 18, 2007.

Sargent, Thomas J. and Neil Wallace (1975), "'Rational' Expectations, the Optimal Monetary Instrument, and the Optimal Money Supply Rule," *Journal of Political Economy*, Vol. 83, No. 2.

Stock, James and Mark Watson (2002), "Has the Business Cycle Changed," in *Monetary Policy and Uncertainty: Adapting to a Changing Economy*, Jackson Hole Conference, Federal Reserve Bank of Kansas City,   pp 9-56.

Taylor. John B. (1979), "Estimation and Control of an Econometric Model with Rational Expectations," *Econometrica,* Vol. 47, No. 5, September, pp. 1267-86.

Taylor, John B. (1980), "Aggregate Dynamics and Staggered Contracts," *Journal of Political Economy*, 88, 1, pp. 1-23.

Taylor, John B. (1998), "Monetary Policy and the Long Boom," *Review*, Federal Reserve Bank of St. Louis, November/December, 1998.

Taylor, John B. (1997). "A Core of Practical Macroeconomics," *American Economic Review, Papers and Proceedings*, May 1997, Vol. 87, No. 2, pp. 233-235.

Taylor, John B. (1999) *Monetary Policy Rules*, University of Chicago Press, Chicago

Woodford, Michael (2003), *Interest and Prices: Foundations of a Theory of Monetary Policy*, Princeton University Press.
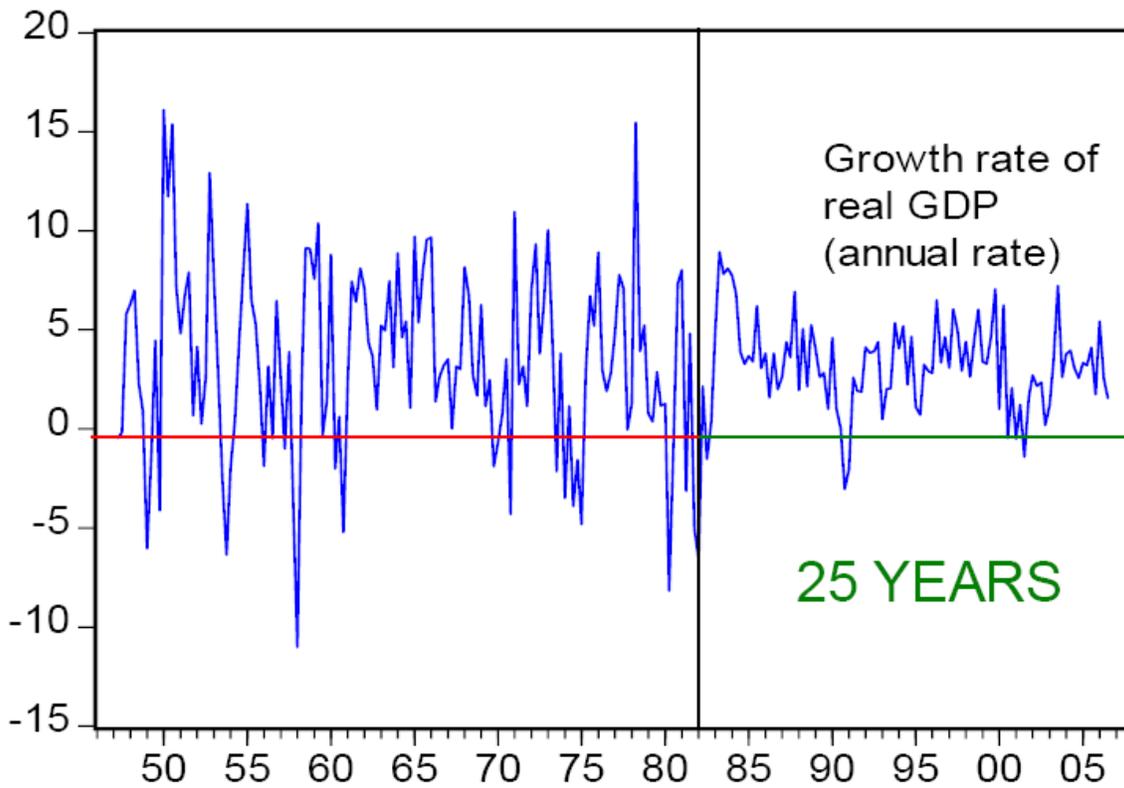
Figure 1. Decline in the Volatility of the Growth Rate of Real GDP
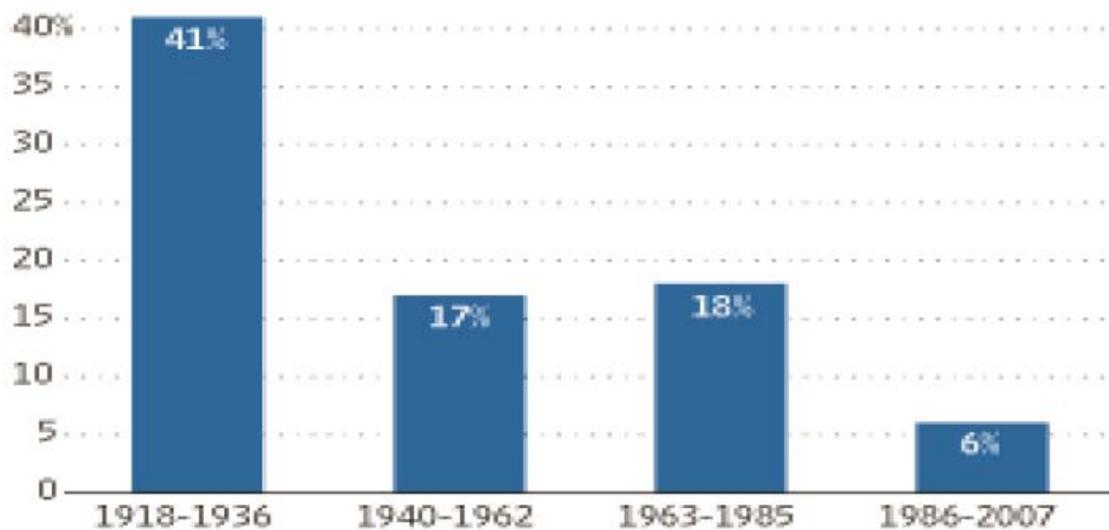
Figure 2. Percentage of Time Spent in Recession in the United States.
Source: Rosenblum (2007)
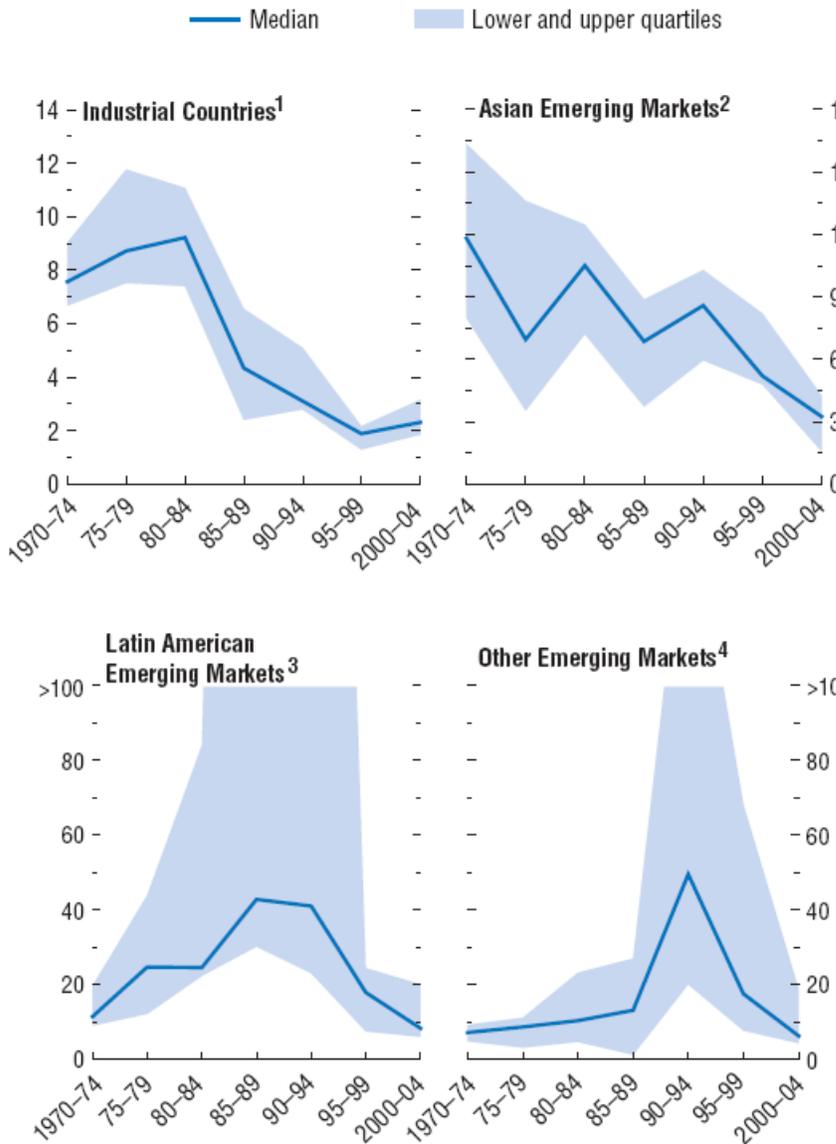
Figure 3. CPI Inflation Rates: Five-Year Moving Averages

Source: IMF World Economics Outlook, April 2006, Figure 3.1
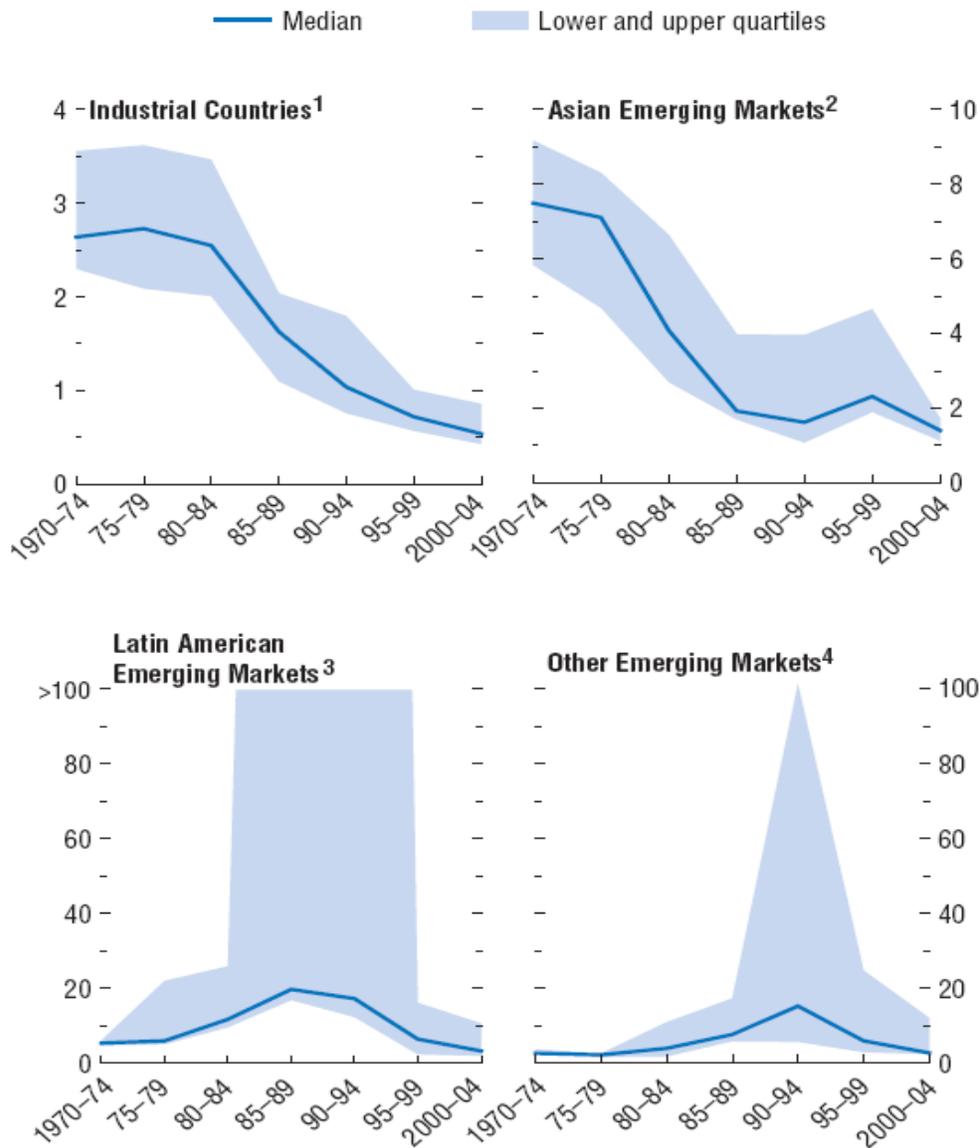
Figure 4. Standard deviations of CPI inflation, 5-year moving averages
Source: IMF *World Economic Outlook,* April 2006, Figure 3.2
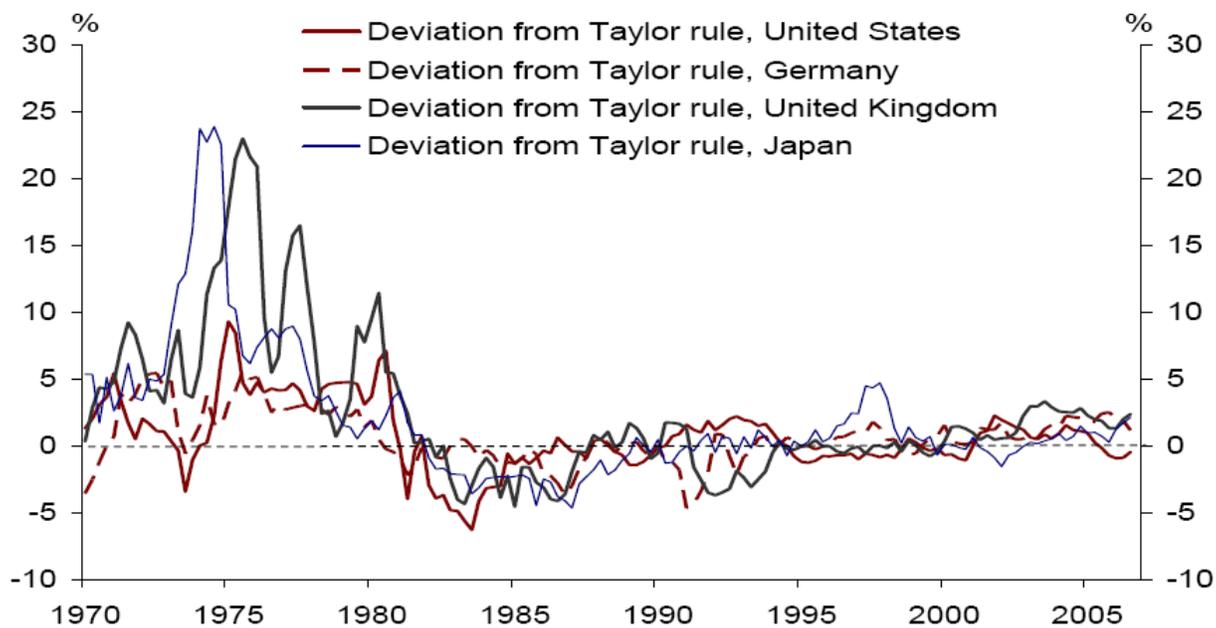
Figure 5. Evidence of a Regime Shift in the Early 1980s
Source: Cecchetti, Hooper, Kasman, Schoenholtz, Watson (2007)

Median of Standard Deviation					
	Full Sample	1970-79	1980-89	1990-99	2000-06
Canada	2.30	2.32	2.56	1.58	1.32
France	1.41	2.69	2.00	1.12	0.66
Germany	2.18	2.70	2.08	2.33	2.23
Italy	1.64	3.55	1.89	1.52	1.33
Japan	2.34	1.69	1.41	1.31	1.25
United Kingdom	1.95	2.50	2.20	1.60	1.20
United States	2.11	2.78	1.81	1.43	1.32
Median	2.11	2.69	2.00	1.52	1.32

Table 1. Standard Deviation of Real GDP Growth in the G7 economies.
Source: Cecchetti, Hooper, Kasman, Schoenholtz, Watson (2007)