RULES VERSUS DISCRETION:
ASSESSING THE DEBATE OVER THE CONDUCT OF MONETARY POLICY

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ABSTRACT

This paper reviews the state of the debate over rules versus discretion in monetary policy, focusing on the role of economic research in this debate. It shows that proposals for policy rules are largely based on empirical research using economic models. The models demonstrate the advantages of a systematic approach to monetary policy, though proposed rules have changed and generally improved over time. Rules derived from research help central bankers formulate monetary policy as they operate in domestic financial markets and the global monetary system. However, the line of demarcation between rules and discretion is difficult to establish in practice which makes contrasting the two approaches difficult. History shows that research on policy rules has had an impact on the practice of central banking. Economic research also shows that while central bank independence is crucial for good monetary policy making, it has not been enough to prevent swings away from rules-based policy, implying that policy-makers might consider enhanced reporting about how rules are used in monetary policy. The paper also shows that during the past year there has been an increased focus on policy rules in implementing monetary policy in the United States.

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Introduction

  The purpose of this paper is to assess the state of the debate about rules versus discretion in monetary policy, an issue I have been researching for a long time and which now seems more crucial than ever as monetary policy normalizes in the United States and other countries. I organize the assessment along the helpful line of questions by which the staff of the Federal Reserve Bank of Boston Fed defined the scope of the debate.[1] These delve into (1) changes in suggested policy rules over time, (2) the idea of tying the hands of central bankers, (3) the difficulty of demarcating discretion, (4) the influence of policy rule research on the practice of central banking and (5) the purpose of recently proposed legislation on monetary strategies.

  1. How have the various rules suggested for monetary policy changed over time?

  In addressing this question, it is important to note first that economists have been suggesting monetary policy rules since the beginnings of economics. Adam Smith (1776) argued in the *Wealth of Nations* that "a well-regulated paper-money" could improve economic growth and stability in comparison with a pure commodity standard, as discussed by Asso and Leeson (2012).   Henry Thornton (1802) wrote in the early 1800s that a central bank should have the responsibility for price level stability and should make the mechanism explicit and "not be a matter of ongoing discretion," as Robert Hetzel (1987) put it. David Ricardo (1824, pp.10-11) wrote in his *Plan for the Establishment of a National Bank* that government ministers "could not be safely entrusted with the power of issuing paper money" and advanced the idea of a rule-guided central bank. Knut Wicksell (1907) and Irving Fisher (1920) in the early 1900s proposed policy rules for the interest rate or the money supply to avoid the kinds of monetary induced

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[1] Conference Agenda, Session Details, https://www.bostonfed.org/discretionmonpol2017/agenda/

disturbances that led to hyperinflation or depression. Henry Simons (1936) and Milton Friedman (1948, 1960) continued in that tradition recognizing monetary policy rules—such as a constant growth rate rule for the money supply—would avoid such mistakes in contrast with discretion.

The goal of these reformers was a monetary system that prevented monetary shocks and cushioned the economy from other shocks, and thereby reduced the chances of inflation, financial crises, and recession. Their idea was that a simple monetary rule with little discretion could avoid monetary excesses whether due to government deficits, commodity discoveries, or mistakes by government. The choice was often broader than the modern distinction in "rules versus discretion" as explained in Taylor and Williams (2011); it was "rules versus chaotic monetary policy" whether the chaos was caused by policy makers' discretion or simply exogenous shocks like gold discoveries or shortages.

Over time economic research on monetary policy rules has expanded greatly and the design of rules has improved. To understand and appreciate how the suggestions for policy rules have changed it is necessary to examine the changes in econometric models used to design rules. Moreover, a brief historical review of how policy evaluation methodology and research have developed offers important insights.

Recall that the first macroeconomic model, built about 8 decades ago by Jan Tinbergen (1936), was designed to answer a monetary policy question: Whether the devaluation of a currency of a small open economy would stimulate the economy. The currency was the guilder, the country was the Netherlands, and the model was of the Dutch economy. The model had 32 stochastic equations and was based on the ideas of John Maynard Keynes. To answer the question, Tinbergen simulated the model and examined how a change in the *policy instrument*—the exchange rate—affected the *target variables*—employment and output. Soon after the paper

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was circulated, the guilder was devalued by about 20% (in September 1936) suggesting that the econometric model influenced the decision.

Tinbergen's model-based simulations of instruments and targets put economists and statisticians on to a new line of research: building, estimating, and simulating policy models. The common framework involved calculating the impact of alternative *paths* for policy instruments on target variables, which stimulated research on structural models in the 1940s and 1950s at the Cowles Commission and Foundation. Lawrence Klein took the research further by building more complex models in the 1950s.

Research departments at central banks began to adopt these models and this approach to policy evaluation. In the 1960s the MPS (MIT-PENN-SSRC) model with 75 stochastic equations was adopted for use by the Federal Reserve. Papers by de Leeuw and Gramlich (1968) and by Ando and Rasche (1971) tell the story, and it was the same story at many other central banks.

After a few years—about half way through this eight-decade history—there was a major paradigm shift. Views changed about how models should be used for monetary policy evaluation. It was a shift from policy evaluation in "path-space" to policy evaluation in "rule-space." In "path-space" one estimates the impact of a one-time change in the path of the policy instrument on the target variables using an econometric model. In "rule-space" one estimates the impact of a policy rule for the instruments on the dynamic stochastic properties of the target variables.[2]

The shift had many antecedents. One was the realization that Milton Friedman's arguments regarding predictability and accountability applied to steady feedback rules as well as

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[2] I reviewed the shifts and used this terminology in talks at the Dutch National Bank (September 29, 2016), the Bank of Canada (November 17, 2016), and the Bank of Korea (May 10, 2017).

to the constant money growth rate rules. Moreover, it was discovered that a natural way to evaluate policy in the new dynamic or stochastic models of the economy was by simulating policy rules. This is how engineers had been designing servo-mechanisms to stabilize dynamic stochastic systems. The early work by A.W. Phillips (1954) on proportional, derivative and integral control is an example. Another factor leading to analysis with rules is that they simplified difficult problems such as joint estimation and control as shown by Anderson and Taylor (1976). In addition, newer rational expectations models led to a serious critique by Lucas (1976) and Kydland and Prescott (1977) of conventional "path-space" approaches. Moreover, the incorporation of sticky wage and price dynamics into these forward-looking models meant that many of the problems confronting monetary policy makers could be approached by monetary policy rules—rather than by one-time changes in the policy instrument.

Difficult computational tasks with the larger rational expectations models needed by central banks created a significant barrier, but algorithms and computers soon improved, and change eventually happened. The Brookings Model Comparison program in the late 1980s and early 1990s helped. In the book by Bryant, Hooper and Mann (1993), I noted the change saying that "Whereas previous model-comparison exercises conducted by the Brookings Institution have looked at the effects on the economy of one-time changes in the instruments of monetary and fiscal policy—that is policy multipliers—this exercise has emphasized comparisons of the response of the economy to monetary policy regimes that are simplified policy rules." So, in the early 1990s, the MPS model at the Federal Reserve was replaced by the FRB/US model. As stated by Brayton and Tinsley (1996), in the FRB/US "expectations of private sectors are explicit, and these expectations, especially market perceptions of policy, constitute a major

transmission channel of monetary policy." Brayton, Levin, Tryon, and Williams (1997) provide a good history.

Volker Wieland's macro model data base (MMB) provides a broader perspective on this change in monetary policy research by including models at other central banks and by tracing developments over time. Wieland, Afanasyeva, Kuete, and Yoo (2016) classified models into first, second, and third generation new Keynesian models. While these models were different in structure there was a surprising amount of consensus in what the models implied about the impact of monetary policy rules on the economy, as was shown by Taylor and Wieland (2012)

As with earlier research the main policy objective was to find monetary policy rules which cushioned the economy from shocks and did not cause their own shocks. But the models were getting complex, and thus the policy rules were getting complex, and this raised serious doubts about the practical applicability of the whole "rule-space" framework. The question then became whether simple practical rules consistent with the economic models could be found. The answer turned out to be "yes," and this led to a huge change in the type of policy rules suggested for monetary policy.

It turned out that rules in which the policy interest rate reacts to real GDP and inflation worked well in these models. Research showed that the interest rate reaction to inflation should be greater than 1, the interest rate reaction to the GDP gap should be greater than 0, and the interest rate reaction to other variables should be small. For the Taylor (1993a) rule the inflation target was 2% (taking in to account inflation measurement bias and the zero lower bound on the interest rate), and the equilibrium interest rate was 2% in real terms and 4% in nominal terms. The rule was not the result of a curve fitting exercise in which various instruments of policy were

regressed on other variables. This simple rule was derived from first generation policy models operating in "rule-space."

To this day people say that such rules are too simple because they omit certain variables. Well, they were simple, because they were made to be simple. At the time people were coming up with all sorts of complex rules that included many types of variables, including asset prices. These rules were too complex to be workable in practice. It was amazing that they could be simplified. Rules from which certain variables were removed gave just as good a performance in many models as more complex rules. Simple rules were more robust than optimal rules over a wide range of models, and they were certainly something more practical for policy makers to work with.

Levin and Williams (2003) and Orphanides and Williams (2008) found that more complex fully optimal policies performed poorly in some models, while simple rules performed well in a wide variety of models. Optimal policies can be overly fine-tuned to a specific model. That is fine if that model is correct, but not if it is incorrect. Simple monetary policy rules incorporated basic principles such as leaning against the wind of inflation and output. Because they were not fine-tuned to specific assumptions, they were more robust.

The new rules that were suggested led in other directions which helped to reinforce their use. Economists learned that policy rules helped them explain unusual phenomena, such as the positive correlation between inflation surprises and exchange rate movements (see Engel and West (2006)). Interest in policy rules also grew beyond academia and central banks: Wall Street economists found them to be useful rules of thumb for predicting central bank actions as explained by Lipsky (2012). Also, policy rules affected other equations in models because with them it became more reasonable to assume that "economic agents" develop their own rules of

thumb when monetary policy becomes more predictable. And it enabled economists to consider policy robustness in a rigorous way, as emphasized by McCallum (1999) and continued today as reviewed by Wieland, Afanasyeva, Kuete, and Yoo (2016).

The "rule-space" approach was also applied internationally. See Taylor (1993b). Research with the models demonstrated the near global optimality in rule-space of a Nash equilibrium in which each central bank followed an optimal policy for its country assuming other central banks would do the same. Thus, the research showed that rule-based monetary policy would lead to good macroeconomic performance in the national economy and in the global economy. This has in turn led to suggestions for designing a rules-based international monetary system based on policy rules in each country. (See Taylor (2016)).

That the simple rules appeared to work well in practice also helped to reinforce confidence in the rules that were being suggested. Central banks appeared to be moving toward more transparent rules-based policies in 1980s and 1990s, including through a focus on price stability, and economic performance improved. This connection between the rules-based policy and performance was detected by Clarida, Gali, and Gertler (2000). There was an especially dramatic improvement compared with the 1970s when policy was highly discretionary, and the models were used in a "path-space" mode. Mervyn King (2003) called it the NICE period for non-inflationary consistently expansionary, and there was also a near internationally cooperative equilibrium (another NICE) among most developed countries as there were few complaints about spillovers. By the year 2000 many emerging market countries joined the rules-based policy approach, usually through inflation targeting. Their improved performance contributed to global stability.

Unfortunately, it did not last. The Great Moderation ended, and the Global Financial Crisis came. There has been debate about why the better performance ended, and this has led to further debate and suggested additional changes in policy rules. I have argued that the Fed turned away from the policy rule that had been working well. The departure began before the crisis when interest rates were set too low for too long. Kahn (2010) and Ahrend (2010) have provided evidence of monetary policy swinging away from rule-like policies. Kohn (2012) questioned using simple policy rules to make that judgement. More recently Lane (2016) cites evidence in an IMF Report (2015) that both "macroeconomic gaps" and "financial gaps" were large in several countries suggesting that interest rates should not have been so low.

Hofmann and Bogdanova (2012) show that there has been a "Global Great Deviation" from policy rules. One reason that the deviation has become global is that central banks followed each other. For example, in many countries, estimated central bank reaction functions have a significant coefficient on foreign policy rates or on deviations from rules-based policy in other countries; see Gray (2013), Carstens (2015), Edwards (2017).

While there is an issue of causality versus correlation, econometric and historical evidence points to a close temporal connection between this deviation in policy and deteriorating performance. Following the Great Global Deviation, NICE ended in both senses of the word. Nikolsko-Rzhevskyy, Papell, Prodan (2014) provide econometric evidence for the United States and Teryoshin (2017) for nine countries including the United States.[3] Allan Meltzer (2012) provides historical evidence. There are also concerns about international spillover effects, and emerging market countries have been impacted with increased exchange rate and capital flow volatility.

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[3] I will return to these studies later in the presentation.

The other view is that the onset of poor economic performance was not due to a deviation from policy rules that were working, but rather to other factors. For example, Carney (2013) argues that the deterioration of performance in recent years occurred because "… the disruptive potential of financial instability—absent effective macroprudential policies—leads to a less favourable Taylor frontier." Carney (2013) illustrated his argument with a shift in the tradeoff frontier as did King (2012). The view I offer here is that the deterioration was due more to a move off the efficient policy frontier due to a change in policy. That would suggest moving back toward the type of policy rule that described policy decisions during the Great Moderation period.

In any case this experience has led to more suggestions for changes in policy rules. There has been a great deal of renewed interest in nominal GDP targeting as suggested by Sumner (2014). Beckworth and Hendrickson (2015), for example, have examined interest rate rules where the central bank reacts to nominal GDP rather than to the inflation rate and GDP separately. They stress that such a rule has the advantage that the central bank does not have to estimate potential GDP, reflecting concerns raised by Orphanides (2003).

Another way in which suggested rules are changing over time is the reconsideration of money growth rules. Belongia and Ireland (2014) show that the Divisia index of the money supply has effects on the economy over and above the effects of the short-term interest rate. Their research suggests that central bankers should consider money growth rate rules. Another example is due to Fagan, Lothian, and McNelis (2013) who examine monetary rules for the monetary base. In my early work on policy rules in the 1970s, I began by suggesting money growth rules, but the models showed that interest rates rules would work better, at least with the range of shocks observed in the United States. Nevertheless, I argued that interest rate rules need

to be placed within a band: Outside that band the central bank should rely on money growth

rules. In situations where the interest rate hits the lower bound, I have argued that central banks

need to focus on a policy rule which keeps the growth rate of the money supply steady. In Taylor

(1996), for example, I recommended that "Interest rate rules need to be supplemented by money

supply rules in cases of either extended deflation or hyperinflation."

Another suggestion is to use forecasts of variables in the policy rule rather than actual

values. If that is not done, then people say that a rule is not forward-looking because it includes

current variables rather than forecasts of those variables. But the Taylor (1993a) rule, for

example, was designed to deal explicitly with forward looking agents, and it is therefore

forward-looking. Note that when a central bank indicates that it will predictably follow a strategy

in which the interest rate reacts to the current inflation rate, it automatically says that next

period's interest rate will react to next period's inflation rate. That's forward-looking. Moreover,

the current level of inflation and output are key factors in any forecast of inflation, and the

coefficients of existing policy rules take that into account. If one replaced current inflation with a

forecast of inflation, the coefficients would most likely have to be different. And the approach

raises the question of whose forecast to use and how to evaluate the rule. Forecasts—including

central bank forecasts—are not always that good. Also rules with forecasts of inflation and

output on the right-hand side tend to be less robust.

Other suggested changes in policy rules in recent years are due to the effective lower

bound (ELB) on the interest rate, which was reached during and for a while after the crisis. At

the least, the standard monetary policy rule should be truncated to account for the ELB. But the

ELB also has other implications for the design of the monetary policy rule. Reifschneider and

Williams (2000) find that increasing the response to the output gap helps reduce the effects of the

ELB. However, this could increase the variability of inflation and interest rates. Reifschneider and Williams (2000) also suggested other changes. In one suggestion, the policy rule is modified to lower the interest rate more aggressively than otherwise when close to the ELB—for example by cutting the interest rate to zero if the unconstrained interest rate falls below 1 percent. This adds monetary stimulus near the ELB which can offset the constraining effects when the ELB hits. In a second suggestion, the interest rate is kept extra low following an ELB incident; for example, the interest rate is kept at zero until the absolute value of the cumulative sum of negative deviations of the actual interest rate from the ELB equals what occurred during the period of that ELB. These approaches mitigate the effects of the ELB according to model simulations.

This second suggestion is a form of forward guidance, and more generally such communication about future interest rate changes is a frequently suggested change in monetary policy rules in recent years. However, forward guidance should be consistent with the policy rule or strategy of the central bank. If it is purposely meant to promise interest rates in the future that are inconsistent with the strategy, then it is time-inconsistent which leads to uncertainty and confusion. If forward guidance is consistent with the policy strategy, then it is simply a matter of being transparent about the strategy. Frequent changes in forward guidance cause problems for monetary policy.

Another recent suggested change in policy rules is to adopt a price-level target, rather than an inflation target. Reifschneider and Williams (2000) find that such price-level targeting rules reduce the costs of the ELB. As with their second suggested policy rule, it promises more monetary stimulus than a standard inflation-targeting policy rule. This anticipation of lower rates in the future boosts the economy even when the economy is at the ELB.

It is worth noting that the ELB was not a reason to have deviated from rules-based policy in 2003-2005 because even the zero lower bound was not binding. The zero-bound appears to have been binding in 2009, but by then suggestions based on the research of Reifshneider and Williams (2000) were available and widely discussed.

Another suggested change in policy rules, motivated in part by the ELB, is a higher target inflation rate. If the target inflation rate is sufficiently high, the ELB will rarely constrain monetary policy and the macroeconomy. In the past, a 2 percent inflation target was viewed as sufficient to avoid these constraints; that is why 2 percent is close to the inflation target of many central banks today, but that view has been questioned recently.

Looking toward the future, changes in technology are likely to affect suggestions for policy rules. The advent of sophisticated now-casting has mitigated the limitation that central bankers do not know much about the current quarter. And the development of digital currency may enable central banks to have a wider range of flexibility in setting the policy instruments as discussed by Bordo and Levin (2017).

Perhaps the most important suggested change in policy rules in recent years is to adjust the intercept to accommodate the lower estimate of the equilibrium real interest rate (r*). For example, in the Taylor rule the equilibrium real interest rate was set to equal 2 percent, meaning that with the 2 percent target inflation rate in the rule, the equilibrium nominal rate would be 4 percent. But according to members of the FOMC the average estimate is at least one percentage point lower now. Laubach and Williams (2003, 2016) and Holston, Laubach and Williams (2016) have provided evidence for this, though Taylor and Weiland (2016) have shown there is a great deal of uncertainty, and that the low interest rates set by central banks make it difficult to estimate the equilibrium real rate. In any case, there is no reason why a moving equilibrium rate

could not be incorporated into a policy rule. Debates about the implications of changes in the equilibrium interest rate are more productive if they are conducted within the framework of a policy rule rather than in the abstract.

2. Have the reasons given for why we might want to tie a central banker's hands evolved?

Several years ago, I was asked to list the reasons for a rules-based approach rather than a discretionary approach to monetary policy. Though I would not characterize the list as reasons why we might want to tie central banker's hands, they are nonetheless reasons why central banks would want to choose to run monetary policy in a rule-like fashion. Here are the reasons.[4]

(1) Time inconsistency. The time inconsistency problem calls for the use of a policy rule in order to reduce the chance that the monetary policy-makers will change their policy after people in the private sector have taken their actions.

(2) Clearer explanations. If a policy rule is simple, it can make explaining monetary policy decisions to the public or to students of public policy much easier. It is difficult to explain why a specific interest rate is being chosen at a specific date without reference to a method or procedure such as would be described by a policy rule. The use of a policy rule can mean a better educated public and a more effective democracy. It can help to take some of the mystique out of monetary policy.

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[4] See Taylor (1998). Similar views can be found in McCallum (1999) in the *Handbook of Macroeconomics* and by Taylor and Williams (2011) in the *Handbook of Monetary Economics*. There are also technical reasons for rules, such as the fact that the economy is a dynamic stochastic evolving entity and requires analysis in rule-space as discussed in the previous section. And there are also political reasons: Like the rule of law, a predictable policy that applies without exception preserves individual freedom.

(3) Less short-run political pressure. A policy rule is less subject to political pressure than discretionary policy. If monetary policy appears to be run in an ad hoc rather than a systematic way, then politicians may argue that they can be just as ad hoc and interfere with monetary policy decisions. A monetary policy rule which shows how the instruments of policy must be set in a large number of circumstances is less subject to political pressure every time conditions change.

(4) Reduction in uncertainty.   Policy rules reduce uncertainty by describing future policy actions more clearly. The use of monetary policy rules by financial analysts as an aid in forecasting actual changes in the instruments would reduce uncertainty in the financial markets.

(5) Teaching the art and science of central banking. Monetary policy rules are a good way to instruct new central bankers in the art and science of monetary policy. In fact, it is for exactly this reason that new central bankers frequently find such policy rules useful for assessing their decisions.

(6) Greater accountability. Policy rules for the instrument settings allow for more accountability by policy-makers. Because monetary policy works with a long and variable lag, it is difficult simply to look at inflation and determine if policy-makers are doing a good job. Today's inflation rate depends on past decisions, but today's settings for the instruments of policy—the monetary base or the short-term nominal interest rate—depend on today's decisions.

(7) A useful historical benchmark. Policy rules provide a useful baseline for historical comparisons. For example, if the interest rate was at a certain level at a time in the past with similar macroeconomic conditions to those of today, then that same level would be a good baseline from which to consider today's policy actions.

Many of these reasons would be the same if the word strategy was used rather than policy rule, and if we were referring to any other policy rather than monetary policy. It is not that we want to tie central banker's hands as much as we want a policy that works well, and that is the case when a clear strategy is in place. George Shultz (2014) explained the importance of having a strategy. He wrote that "…it is important, based on my own experience, to have a rules-based monetary policy…. At least as I have observed from policy decisions over the years in various fields, if you have a strategy, you get somewhere. If you don't have a strategy, you are just a tactician at large and it doesn't add up."

A related point is that a policy rule or strategy does not mean that that policy maker can't do things that need to be done. Any reasonable law enforcement strategy will require actions by law enforcement officials. And sometimes not acting is violating a strategy: A decision by government financial regulators, for example, not to act when an institution takes on risk beyond the limits of the regulations is inaction and clearly poor policy. Policymakers need to explain that a policy strategy involves a series of actions.

In my view, the reasons stated here *for* monetary policy rules have not evolved much over the years. However, reasons *against* policy rules have evolved, and deserve some discussion in this assessment. They are sometimes characterized as why we should not tie central banker's hands.

At the 2013 American Economic Association meetings, Larry Summers and I had a debate about rules versus discretion. Summers started off by saying:[5] "John Taylor and I have, it will not surprise you…a fundamental philosophical difference, and I would put it in this way. I think about my doctor. Which would I prefer: for my doctor's advice, to be consistently

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[5] Transcript published in the *Journal of Policy Modeling*, Issue 4, Volume 36, 2013

predictable, or for my doctor's advice to be responsive to the medical condition with which I present? Me, I'd rather have a doctor who most of the time didn't tell me to take some stuff, and every once in a while said I needed to ingest some stuff into my body in response to the particular problem that I had. That would be a doctor who's [advice], believe me, would be less predictable."

Thus, Summers argues in favor of relying on an all-knowing expert, a doctor who does not perceive the need for, and does not use, a set of guidelines, but who once in a while in an unpredictable way says to ingest some stuff.

But as in economics, there has been progress in medicine over the years. And much progress has been due to doctors using checklists, as described by Atul Gawande.[6] Of course, doctors need to exercise judgement in implementing checklists, but if they start winging it or skipping steps the patients usually suffer. Experience and empirical studies show that checklist-free medicine is wrought with dangers just as rules-free, strategy-free monetary policy is.

Another recent development also appears as an argument for not wanting to tie hands. At a recent Brookings conference,[7] Ben Bernanke argued that the Fed had been following a policy rule—including in the "too low for too long" period. But the rule that Bernanke had in mind is not a rule in the sense that I have used it in this discussion, or that many others have used it.

Rather it is a concept that all you really need for effective policy making is a goal, such as an inflation target and an employment target. In medicine, it would be the goal of a healthy

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[6] "The Checklist: If Something So Simple Can Transform Intensive Care, What Else Can It Do?" *The New Yorker*, Dec 19, 2007, http://www.newyorker.com/magazine/2007/12/10/the-checklist
[7] "Objections to Federal Reserve accountability bill" video https://www.youtube.com/watch?v=KJmA5JDNpKg&t=37 of remarks at the Conference on The Fed in the 21st century: Independence, governance, and accountability, Brookings Institution, March 2, 2015

patient. The rest of policymaking is doing whatever you as an expert, or you as an expert with models, thinks needs to be done with the instruments. You do not need to articulate or describe a strategy, a decision rule, or a contingency plan for the instruments. If you want to hold the interest rate well below the rule-based strategy that worked well during the Great Moderation, as the Fed did in 2003-2005, then it's ok, if you can justify it in terms of the goal.

Bernanke and others have argued that this approach is a form of "constrained discretion." It is an appealing term, and it may be constraining discretion in some sense, but it is not inducing or encouraging a rule as the language would have you believe. Simply having a specific numerical goal or objective function is not a rule for the instruments of policy; it is not a strategy; in my view, it ends up being all tactics. I think there is evidence that relying solely on constrained discretion has not worked for monetary policy.

Another evolution of the policy rule concept is also related to concerns about tying central bankers' hands. This is the idea of "inflation forecast targeting" or simply "forecast targeting" as developed by Svensson (1998) and Woodford (2012). Woodford entitled his 2012 paper "Forecast Targeting as a Monetary Policy Strategy," emphasizing that this alternative approach is a strategy. There is a close connection between "inflation forecast targeting" and policy rules for the instruments. In Taylor (2012b) I argued that they were the dual solution to the same problem, much like first-order conditions and decision rules provide dual and complementary answers to the same optimization problem. One can learn from both approaches.

According to this approach the central bank would choose its policy interest rate so that a linear combination of its forecast of different variables would fall along a given path. Woodford (2012) suggested a linear combination of the h-period ahead forecast of the inflation rate $\pi_{t+h,t}$ relative to the target inflation rate π^* and the h-period ahead forecast of the output gap $x_{t+h,t}$

follow the following path $(\pi_{t+h,t} - \pi^*) + \phi x_{t+h,t} = 0$ over a range of h where interest rate policy can affect these variables.

While an interest rate path can be calculated using this approach it need not yield a simple policy rule for the instruments. The central bank would have the job of deciding on the instrument setting, and this might cause tension with some of the reasons for policy rules given above. Qvigstad (2005) showed how charts and other diagnostic tests could be used to describe the intended path for the interest rate. In addition, with examples from the Norges Bank policy decisions, he showed how policy rules could be used as a cross-check, emphasizing the connection between proposals for policy rules for the instruments and forecast targeting.

Although this paper is focused on monetary policy and not on other activities of central banks, such as lender of last resort and financial supervision and regulation, it is appropriate to also mention that economic research implies that there are reasons to limit the scope of a central bank. In granting independence to a government agency in a democracy, one needs to make sure that the agency has a well-defined limited purpose with strong accountability.

When central banks drift too far from being limited-purpose institutions and become independent multi-purpose institutions, they escape the checks and balances needed in a democratic system. This can lead to inappropriate interventions which may not have been approved by a legislative process or a vote of the people. It can also lead to poor economic performance. Research shows that central bank independence is necessary for good monetary policy and thus good macroeconomic performance, but it is not sufficient.

3. **How should we think about discretion, and what is the line demarcating a rules-based policy and a discretionary policy when the latter already features a large systematic component?**

This is a fundamental and highly practical question. McCallum (1999) devoted the first section of his comprehensive *Handbook of Macroeconomics* review of monetary rules to the distinction between rules and discretion admitting that "When it comes to practical application to the behavior of actual central banks, however, the distinction cannot be easily drawn." He argued that in my paper "Discretion Versus Policy Rules in Practice," (Taylor (1993a)), I "explicitly addressed the problem" by saying that rule-like behavior is systematic in the sense of "methodical, according to plan, and not casual or at random." Indeed, the stated purpose of that paper was "to study the role of policy rules in a world where simple, algebraic formulations of such rules cannot and should not be mechanically followed by policymakers."

I elaborated on the demarcation later, saying in Taylor (2012a) that: "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. Policymakers 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."

It was by using this definition, that I found that the period from 1985 to 2003 was rule-like while the years before and after that interval were discretionary. As already noted, economic performance was far better in the 1985-2003 period. Using an historical approach, Meltzer (2012) also identified the years from 1985 through 2003 as rules-based rather than a discretionary, and he noted that this was also a period of relatively good economic performance.

To apply more rigorous statistical tests to the rules versus discretion issue, Nikolsko-Rzhevskyy, Papell, and Prodan (2014) and Teryoshin (2017) have had to be more specific and directly face the questions addressed here. In evaluating rules versus discretion, Nikolsko-Rzhevskyy, Papell, and Prodan (2014) decided to consider well- known policy rules—similar to the Taylor rule—as the definition of rule-based policy, and deviations from that as the demarcation of discretion. As Teryoshin (2017), who followed a similar approach in the United States and other countries, puts it, he calculated "the absolute deviation between the policy-rule recommendation using real-time data and the actual central bank rate. Higher values are times of greater discretion relative to the rule, while smaller values suggest a more rule-like monetary policy."

In this way, they provided a more formal statistical foundation for the results of Meltzer (2012) and Taylor (2012a). The papers used various statistical techniques to determine when in history monetary policy was rule-like, and they showed that the rule-like periods coincide remarkably well with periods of good economic performance. By taking a stand and measuring deviations from policy-rules, Nikolsko-Rzhevskyy, Papell, and Prodan (2014) made an important contribution to the large empirical literature on policy rules. Teryoshin (2017) established the robustness of their results and usefully extended the analysis to other countries using data available to policymakers at the time. A difficulty with this approach, of course, is that the definition of discretion depends on the policy rule.

It would be possible to envisage, as an alternative, a complicated rule that fits the data very well, where discretion would therefore be very small, and where the periods of rule-like performance are quite different. For example, if you put in a lagged dependent variable (interest rate) into the policy rule—as with an inertial rule—you would have smaller deviations. In reality, one cannot usually distinguish between lagged dependent variables and serially correlated errors, so the lags will be there. By putting a lagged dependent variable in, the econometrician is effectively saying "policy is good now, and if it moves just a little bit, it's still pretty good" even though it may be bad, based on the rule without inertia.

Dotsey (2016) argues that the "optimal" policy rule would also have inertia terms, as in Giannoni and Woodford (2005), so it is not just an arbitrary lagged dependent variable. The optimal policy approach uses an intertemporal optimization problem. In Giannoni and Woodford (2005), the optimal policy can be written as a single equation in terms of leads and lags of the objective variables, such as inflation and output. An advantage of the optimal policy approach is that it incorporates all relevant information unlike simple monetary policy rules.

However, this informational advantage has been found to be surprisingly small in model simulations, even when the central bank is assumed to have perfect knowledge of the model. Williams (2003) used the FRB/US model, and he found that a simple policy rule gives outcomes close to those with the optimal policy.

A related complication is that monetary policy may not follow a rule, but may seem to have a systematic component in the sense that there are small deviations from that component with small effect, as Ramey (2016) shows.[8] In some cases, these are deviations from vector auto-regressions which may be combining rule-like and discretionary regimes. In other cases, the systematic part may be based on a narrative which does not consider regime changes as defined here. In either case, the results indicate the importance of extending existing results to a wider array of policy rules.

Another issue is that deviations from policy rules can be designed to be rule-like in ways that the econometrician does not know. The adjustment to the interest rate that I suggested in Taylor (2008) is an example of how a seemingly discretionary development can be incorporated into a policy rule in a systematic way. At that time, my research suggested that there was increased counterparty risk between banks, related to concerns about securities derived from sub-prime mortgages. Based on this research, I testified in Congress that, as a first line of defense, central banks should reduce their policy interest rate by the increased spread between Libor and the overnight index swap (OIS), which was about 50 basis points at the time, and then do more research to find out the reasons for the higher credit risk. This adjustment is an example of why the Taylor rule should not be used mechanically as I emphasized that in the original Taylor rule paper (1993a), but the adjustment was meant to deal in a systematic way with a problem in the

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[8] See Table 1, p. 99 of Ramey (2016).

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money market when the spread between Libor and OIS widened significantly. I argued that the

models that were used to find the Taylor rule in the first place implied such an adjustment.

4. How is the practice of central banking being influenced by the current debate on the optimal conduct of monetary policy?

In the first section of this paper, I showed how suggestions for policy rules have changed

over time and that swings toward and away from rules-based policy are associated with swings

in economic performance. The question I address in this section is how the research on optimal

monetary policy rules and the resulting suggestions *directly* affect the analysis and decisions of

monetary policy makers and their committees. The question is difficult to answer, though

increased central bank transparency will aid future investigations.

Kahn (2012) provides much useful detail about how policy rules have been the subject of

discussion at the Federal Reserve, using transcripts and records of the Federal Open Market

Committee (FOMC) meetings starting in the 1990s. He also considers the proceedings at other

central banks, including the European Central Bank (ECB), the Bank of Japan and the Bank of

England. When I first read his paper, I was surprised to see a great deal of discussion related to

policy rules through the 1990s.[9] This corresponds to the time-period when actual policy

decisions were rule-like.[10] There was also much mention of policy rules in the deliberations at

other central banks during the Great Moderation period. I have used records of deliberations at

the Norges Bank to assess the contagion of deviations from policy rules (the degree to which

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[9] The first reference to the Taylor rule in the FOMC transcripts is in 1995 in a statement made by Janet Yellen.

[10] Alan Greenspan gave a talk at Stanford in 1997. His title was "Rules vs. Discretionary Monetary Policy." He discussed the Taylor rule and commented positively on the usefulness of monetary policy rules in general.

central banks follow each other) in recent years. I have also benefited from informal discussion with many central bankers in other countries over the years, and found that they are all familiar with policy rules and understand their value. I see no indication in these discussions that committee decision making is incapable of handling discussions of a monetary policy strategy or that such an approach eliminates the need for a strategy.[11]

An important research question is how discussions of policy rules evolved in more recent years at the FOMC, especially during the period in 2003-2005 when we saw more of a deviation from policy rules. To be sure, the records of the meetings and discussions may miss informal conversations and other key elements of any decision process at central banks, so some "investigative reporting" may be needed. Mallaby (2016) writes about the FOMC decision to keep interest rates low and to say that they would be low "for a considerable period," and does not indicate one way or the other whether there was discussion that the rate was too low based on policy rules. Later, Bernanke (2010) argued that they were not too low based on policy rules if one used forecasts of inflation rather than actual inflation. As I pointed out in Taylor (2010), however, the Fed's forecasts were lower than actual inflation at the time, and the forecast turned out to undershoot inflation over the forecast horizon.

Much of the policy changes in the 2009-2013 period were "balance sheet" operations as the Fed purchased Treasury securities and mortgage-backed securities in large-scale. I would classify these actions as discretionary rather than rule-like in the sense I have used the terms in this paper. The uncertainty and market disruption associated the so-called "taper-tantrum" in

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[11] Such are issues raised by Fischer (2017b) and discussed in the context of proposed legislation below.

2013 is an illustration of the dangers of too much discretion in balance sheet operations, and more recent Fed decisions seem to be steering clear of such actions.

Following this experience, the normalization process designed and described in the Fed's "Policy Normalization Principles and Plans" of September 2014 is consistent with a more rule-like approach, in which the FOMC "intends to reduce the Federal Reserve's securities holdings in a gradual and predictable manner…." The "Addendum to the Policy Normalization Principles and Plans" issued earlier this year provides useful details about how the FOMC intends to gradually reduce the Fed's securities holdings by decreasing its reinvestment of principal payments to the extent that they exceed gradually rising caps.

Recently Janet Yellen (2017a, 2017b), as Federal Reserve Chair, broke new ground in describing how monetary policy rules are used at the Federal Reserve. A follow-up presentation by Stanley Fischer (2017a), as Federal Reserve Vice-Chair, and a new section of the June 2017 Monetary Policy Report continue in this vein.

Yellen (2017a) summarized the Fed's strategy for the policy instruments, saying that "When the economy is weak and unemployment is on the rise, we encourage spending and investing by pushing short-term interest rates lower. As you may know, the interest rate that we target is the federal funds rate, the rate banks charge each other for overnight loans…. Similarly, when the economy is threatening to push inflation too high down the road, we increase interest rates to keep the economy on a sustainable path and lean against its tendency to boom and then bust." She then described "price stability" as a level of inflation of "2 percent a year," the maximum level of employment that can be sustained in the longer run as an unemployment rate of around 4-3/4 percent, and a "longer-run neutral rate" of the federal funds as a rate of "3 percent." One could certainly add more detail, but the statement includes the signs of the

responses by the policy instruments, though not the magnitudes. It mentions key factors driving the responses. And it gives numerical values for three key parameters. It could be usefully added to the Fed's *Statement on Longer-Run Goals and Monetary Policy Strategy*, which, despite its name, now has no strategy for the instruments.

In a speech the following day, Yellen (2017b) provided charts and references to the specific policy rules. The purpose was to compare actual Fed policy with the Taylor rule and other rules, and then explain any differences. I think people found that useful, and it was good to see clarification of how the FOMC uses such policy rules in a constructive manner. An algebraic way to summarize the words in the presentations would be: $r = p + ay + b(p – 2) + 1$ with $a > 0$ and $b > 0$, where r is the federal funds rate, p is the rate of inflation, and $y = 2.3(4.75\text{-}u)$ where u is the unemployment rate. (The 2.3 comes from Yellen (2012)). In contrast the Taylor rule is: $r = p + .5y + .5(p – 2) + 2$. This clearly provided context for a candid discussion. Fischer's (2017a) recent talk takes a similar approach; he referred to decisions made in 2011 and more generally, explaining how a rules-based analysis feeds in to the discussions and is evaluated by the FOMC to arrive at a policy decision.

This year's Federal Reserve Board's semi-annual Monetary Policy Report (2017) contains a whole new section called "Monetary Policy Rules and Their Role in the Federal Reserve's Policy Process." The section also breaks new ground. It lists three "key principles of good monetary policy" that the Fed says are incorporated into policy rules; it then lists five policy rules, including the Taylor rule and four variations on that rule that the Fed uses, with helpful references in notes.

The three principles sound quite reasonable: For one of them, sometimes called the "Taylor Principle," the Fed is quite specific in that it gives the numerical range for the response of the policy rate–the federal funds rate–to the inflation rate.

More information, including some algebra, is given in the Report. It is good that one of the five policy rules, which the Fed calls the "Taylor (1993) rule, adjusted," is based on the economic research of Reifschneider and Williams (2000) which I discussed earlier in this paper. The Fed describes these rules using the unemployment rate rather than real GDP, relying on Okun's Law, the empirical connection between the real GDP/potential GDP gap and the unemployment rate. One of the rules, what the Fed calls the "balanced-approach rule," is the Taylor rule with a different coefficient on the cyclical variable.

The Report compares the FOMC's settings for the federal funds rate with the policy rules. It shows that the interest rate was too low for too long in the 2003-2005 period according to the Taylor rule, and that, according to three of the rules, the current fed funds rate should be moving up now. The Fed makes these calculations using its estimate of time varying neutral rate of interest. However, aside from being positive about the three principles, it does not say much about its own policy strategy in the document.

The Report focuses on differences, rather than similarities, in the policy rules, and on the differences in inputs to the policy rules. The differences in measures of inflation, the equilibrium neutral interest rate, and other variables are part of monetary policy making and always will be. They are a reason to use policy rules as a means of translating these differences in measurement into differences about policy in a systematic way. As I mentioned earlier in this paper, such differences do not imply that policy rules or strategies are impractical.

It is also worth noting that the concept of policy rules is affecting practical thinking on the international front. Paul Volcker (2014) argues that "the absence of an official, rules-based, cooperatively managed monetary system has not been a great success." Raghu Rajan (2016) writes that "what we need are monetary rules that prevent a central bank's domestic mandate from trumping a country's international responsibility." And Mario Draghi (2016) states that "We would all clearly benefit from…improving communication over our reaction functions…" All are suggesting a more rule-based approach to the international monetary system.

5. **How does the recently proposed Congressional legislation on conducting monetary policy fit into this debate?**

Several years ago, I discussed legislation which would require the Federal Reserve to establish and report on a policy rule for the interest rate or other instruments of policy. (Taylor (2011). The idea was based on economic research, including historical experience with prior legislative changes regarding the monetary aggregates. The legislation would not require that the Fed choose any specific rule, only that it establish some rule and report what the rule is. If the Fed deviated from its chosen strategy, the legislation would call on the Fed to provide an explanation and answer questions at a public congressional hearing.

In Taylor (1993a), the paper in which I discussed a simple policy rule as a guideline for monetary policy, I made no suggestion that the rule should be written into law, or even that it be used to monitor policy, or hold central banks accountable. As I described in this paper, the objective was to help central bankers make their interest rate decisions in a less discretionary and more rule-like manner, and thereby achieve the goal of price stability and economic stability.

Why does legislation fit into the debate now? Because, as the debate reveals, there is evidence that, starting around 2003-05, monetary policy became more discretionary and less

rule-like than it was in the 1980s and 1990s. This historical experience suggests that a legislated rule could help restore rule-like monetary principles and help prevent deviations in the future. It could also provide a catalyst for international monetary reform. In other words, the debate over such legislation fits directly into the debate about monetary policy rules versus discretion.

A proposal along these lines has now been written into legislative language in a bill which passed the House Financial Services Committee and the House of Representatives. The legislation is entitled "Requirements for Policy Rules of the Federal Open Market Committee," which is Section 2 of the Fed Oversight Reform and Modernization Act (FORM). This bill would require that the Fed "describe the strategy or rule of the Federal Open Market Committee for the systematic quantitative adjustment" of its policy instruments. It would be the Fed's job to choose the strategy and how to describe it. The Fed could change its strategy or deviate from it if circumstances called for a change, but the Fed would have to explain why.

Precedent for this type of legislation appeared in sections of the Federal Reserve Act from 1977 to 2000 requiring the Fed to report the growth rate ranges of the monetary aggregates. The legislation did not specify exactly what the numerical settings of these ranges should be, but a greater focus on the money growth ranges was part of the disinflation efforts of the 1980s. When the requirement for reporting ranges for the monetary aggregates were removed from the law in 2000, nothing was put in its place.

A "Statement on Policy Rules Legislation" (2016) by a number of economists discusses reasons for the legislation which would change how the Senate Banking Committee and the House Financial Services Committee oversee monetary policy. Allan Meltzer argued in

Congressional testimony that[12] "We need change to improve the oversight that this Committee and the House Committee exercises over the Fed. You have the responsibility. Article I, Section 8 gives that to you. But you do not have the ability to exercise authority. You are busy people. You are involved in many issues. The Chairperson of the Fed is a person who has devoted his life to monetary policy. There is not any series of questions that you can ask on the fly that they are not going to be able to brush aside….So you need a rule which says, look, you said you were going to do this, and you have not done it. That requires an answer, and that I think is one of the most important reasons why we need some kind of a rule."

Janet Yellen, as Federal Reserve Chair, expressed concerns about the legislation, however. Testifying at the House Financial Services Committee[13] she said that "I don't believe that the Fed should chain itself to any mechanical rule." The legislation could be modified to address such concerns, and it is sensible to seek out compromises in which the Fed would choose, describe and change its strategy, with no requirement that it be mechanical. The Fed would still serve as lender of last resort or take appropriate actions in the event of a crisis.

Some commentators say that the House monetary strategy bill would require the Fed to follow the Taylor rule, but this is not the case. The bill requires the Fed to describe how its strategy or rule might differ from a "reference rule," which happens to be the Taylor rule. While this could be modified and compromises should be examined, describing the difference between specific policy rules and this reference rule is a natural and routine task for the Fed. In fact, many at the Fed already make such comparisons including Yellen (2012, 2017a, 2017b).

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[12] Transcript, Hearing before The Committee on Banking, Housing, and Urban Affairs United States Senate, March 3, 2015
[13] Hearing entitled "Monetary Policy and the State of the Economy," February 25, 2015

Some argue that the zero bound on the interest rate means policy rules are no longer useful. But as I described in this paper there are many ways for policy rules to deal with the effective lower bound on the interest rate. Some argue that the decline in the equilibrium interest rate means policy rules cannot be used. But one can easily adjust the equilibrium interest rate in the rule, as I also described in this paper. Some argue that uncertainty about the output gap or the inflation rate renders useless rules that depend on the gap or the inflation rate. But that uncertainty is just as much a problem for discretion as it is for policy rules. Some argue that there are so many variants of policy rules, that you can't use rules in practice. It is true that some rules are better than others, and it makes perfect sense for researchers and policy makers to be looking for new and better rules. I think research indicates the dangers of adding housing prices or the stock market to policy rules, but it is the job of the Fed to decide.

As I discussed above, a possible problem with policy rules is that a monetary policy committee, such as the FOMC, might find it difficult to select a single rule when there are many differences of opinion on the committee about the rule. It might be particularly hard for the chair of the committee to forge a consensus. However, the possibility of dissents within the FOMC, as with decisions about setting the policy interest rate, alleviates this problem, because unanimity would not be required.

Finally, there are different ways to meet the requirements of the legislation. For example, rather than using a rule for the instruments of policy the Fed might state a monetary strategy in terms of "inflation forecast targeting" or simply "forecast targeting." As I described earlier, according to this approach the central bank would choose its policy interest rate so that a linear combination of its forecast of different variables would fall along a given path. While an interest rate path can be calculated, this approach does not yield a simple policy rule. According to the

policy rules legislation the central bank would have the job of deciding on the strategy. While experience suggests that focusing on the decision rule for monetary policy works better in practice, this alternative approach could possibly meet the terms of the proposed legislation.

Conclusion

Several take-aways emerge from this review of the debate over rules and discretion in monetary policy.

First, by and large, the different suggestions and proposals for policy rules over time have been based on specific economic models, robust methodologies, and empirical findings. That is an attractive feature of the policy evaluation, and it implies that high quality economic research on monetary policy should be continued both inside and outside central banks.

The research has led to a lot of policy rules for central bankers to choose from, and to an understandable debate about the proposals and between the proposers. However, this is not a criticism and does not imply that central bankers should discard a systematic approach to policy. By analogy, in foreign policy, virtually all agree that it is crucial to have a strategy, so that policy is not all tactics. But in any realistic situation, there are many proposed foreign policy strategies to choose from. It is the job of the policy maker to choose the strategy and make it work.

Second, while policy rules are often cast as ways to tie central bankers' hands, in reality, rules or strategies are simply ways to help central bankers improve monetary policy as they operate and communicate with markets and citizens in a democracy, and interact in a global monetary system. Experience over time in different countries shows that they do improve economic performance and thereby improve people's lives.

Third, while quantitative, empirical, and historical methods are used in research to distinguish discretionary policy from rules-based policy, the line of demarcation is difficult to establish in practice. This makes comparing and contrasting the approaches difficult. Although important progress has been made, there is a need for further research. In the meantime, there are many ways that policy makers can internalize the principles of a clear and consistent strategy as they formulate their day to day decisions.

Fourth, research on policy rules has had a clear impact on the practice of central banking even as the debate continues and enthusiasm for the ideas has waxed and waned. Detailed investigations based on transcripts and other documents show increasing impacts over time, as does informal conversations with policy makers. Research shows that this has occurred in central banks with varying degrees of committee decision making. During the past year or so there has been an increased focus on policy rules and strategies in speeches and commentaries by central bankers in the United States and other countries.

Fifth, while research shows that central bank independence is crucial for good monetary policy making, it has not been enough to prevent swings away from rules-based policy. In the United States where Congress has responsibility under the Constitution, this research suggests the value of considering some legislation that would enhance reporting and discussions with Congress and the public about the strategy of monetary policy.

This paper has addressed the key questions that define the scope of the debate between rules and discretion. The economic research described in the paper shows why it is important that U.S. monetary policy and the international monetary system have a rules-based strategy. By considering each of these questions, I have tried to contribute to a rational discussion through which we can move onward to the goal of a better performing economy.

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