A Market-Based Taylor Rule for Monetary Policy¹ William Poole² WPoped@earthlink.net

Introductory note. I recognize that this paper is somewhat repetitive. I have concentrated on getting key ideas right and will eventually clean up the presentation.

As of this writing, the U.S. economy and numerous others are mired in the middle stages of Great Inflation II. The Federal Reserve and the Nation desperately need a new monetary policy framework to stop this inflation and assure that another never happens again. This paper draft is the first to explore an idea I am throwing against the wall to see if might stick.

The gold standard was a system that grew, largely spontaneously, to prevent the sovereign from abusing the power to create paper money. The gold standard worked successfully for centuries but ultimately failed because it had a built-in defect. Banks offered deposits convertible to gold in greater amount than the amount of gold in existence. After 1929, the Federal Reserve failed to support banks facing deposit runs but even if the Fed had not failed that test it is probable that the inherent instability of the gold standard would have brought down the system eventually.

The Federal Reserve managed a fiat-money standard as remnants of the gold standard disappeared over the years. Paul Volcker and Alan Greenspan demonstrated that discretionary management could be successful in keeping inflation down to a reasonably low rate. Today, nevertheless, the United States is suffering the ill effects of another Great Inflation less than a half century from the end of the previous one. Although Volcker and Greenspan demonstrated that an FOMC dominated by a single person can be successful, Arthur Burns and Jerome Powell have demonstrated that a single leader may perform miserably.

Discretionary management of money has failed once again. That, of course, is why Milton Friedman long advocated a legislated monetary rule. He was unsuccessful in his quest, in part because so many economists were unconvinced that his proposed monetary rule would be successful. The ambiguities concerning the definition of money were substantial. After Paul Volcker's success in bringing down inflation, Congress was content with managed money. Moreover, Congress and the majority of economists thought that managed money could stabilize employment at a high level as well as control inflation. The Volcker-Greenspan era seemed to support that proposition.

Sadly, sustained success was not to be.

John Taylor, in his important and well-known 1993 Carnegie-Rochester Conference paper, outlines a policy rule that he contends, convincingly, would prevent monetary policy mistakes. However, he essentially gives up on the idea of an enforceable monetary policy rule. At the very beginning, in the second sentence of his paper abstract, he says this: "An objective of the paper is to preserve the concept of such a policy rule in a policy environment where it is practically impossible to follow mechanically any particular algebraic formula that describes the policy rule."

"Mechanically" is a killer word here, its lethality multiplied when it becomes "simplistic mechanical procedure" in the paper. Yet, the ideal of a foreign exchange market without material government intervention *has* been realized. To my knowledge, the last direct U.S. Government

¹ References to be added to next version of paper.

² President, Federal Reserve Bank of St. Louis and FOMC participant March 1998-January 2008.

intervention in the dollar-euro market was 2000.³ Given the precedent of a successful international monetary system based on markets that set exchange rates, the question ought to be whether it is possible to design a monetary standard for the United States that yields low inflation but does not depend on discretionary management.

In this paper I present a proposal for a Market-Based Taylor Rule to control monetary policy—the MBTR. The proposal is to establish a genuine, binding and therefore "mechanical," policy rule. Of course, as with a statute enacted in the usual democratic fashion, the rule could be amended or changed. The MBTR depends on the impersonal, competitive market and not on authorities. I outlined my abstract framework for thinking about these issues in a 1999 speech, "Synching, Not Sinking, the Markets," which is available on the St. Louis Fed's FRASER website. [https://fraser.stlouisfed.org/title/statements-speeches-william-poole-485/synching-sinking-markets-18839]

An alternative approach would be for Congress to set a formal inflation target for the Federal Reserve. That seems to me to be inadequate to the problem because there is no satisfactory way for Congress to enforce an inflation target. The Environmental Protection Agency can enforce a rule in the courts. Courts can assess penalties and mandate that covered entities do certain things. And, not do certain other things. That approach is not feasible in enforcing a rule against the central bank. A different approach is needed.

In the first section I outline the specifics of the MBTR proposal. For now, I assume that the reader is generally familiar with the Taylor rule, which sets the federal funds rate based on targets for inflation and a measure of real activity. I will make the specifics more precise shortly.

The MBTR Proposal

It is essential to understand that the problem of a monetary rule is a problem of political economy and not just economics. A sustainable policy rule requires not only that the economics be correct but also that rules, if you will, of politics be respected.

I choose the unemployment rate, U_N , as the measure of target real activity, rather than potential or trend GDP, which was the measure Taylor used. The unemployment rate is the most visible and generally recognized measure of the state of the real economy. Thus, $100-U_N$ is the recognized standard of "full employment." Congress can enact a rule defining a target value for U_T that differs from the value the market would produce. However, in the Taylor-rule framework a value for U_T that is too low will yield an inflation rate somewhat above the specified target, but not an inflation rate that will be unstable in an upward direction.

Define the percentage employment gap-EGAP-as

(1) $100*(100-U)/(100-U_T)-100.$

³ See ECB press release, 22 September 2000 and the Federal Reserve Bank of New York press release No. 2223, November 8, 2000. See also the transcript for the FOMC meeting of October 3, 2000. A substantial number of words have been redacted from the transcript, indicating that sensitive information was presented to the FOMC. What *is* disclosed in the transcript is that information about the prospective intervention was apparently leaked in advance, which led to some front-running transactions. Note also that the FOMC *Minutes* for this meeting, released November 16, 2000, mentioned the intervention but were silent as to the front-running. The *Minutes* report that, "In ratifying these [foreign exchange] transactions, members emphasized that the action was not intended to signal an increased willingness by the Committee to intervene in foreign exchange markets. In the current instance, the intervention transactions were undertaken in a spirit of cooperation with the international financial community and at the express request of the European Central Bank (ECB). Members commented that historical experience suggested that foreign exchange market interventions generally had not had lasting effects when not accompanied by supporting changes in macroeconomic policies."

(1a) Example: 100*(100-5)/(100-4)-100 = -1.042

The unemployment rate U and the target unemployment rate U_T are both in percent. If we were to use the Taylor coefficient of 0.5 on the EGAP, the fed funds rate target would be lowered by $0.5 \times 1.042 = 0.5208$ or 52 basis points from where it otherwise would be.

Acceptance of the Taylor-rule framework for monetary policy in a prescriptive, and not simply descriptive sense, requires acceptance of a target for the real economy. Taylor's formula for setting the federal funds rate depends on the difference between actual and target inflation but also the difference between actual and potential GDP. Because Taylor's recommended federal funds rate depends on the difference between actual and potential GDP, the higher is the estimate of potential GDP the lower is the recommended federal funds rate. Therefore, what the Taylor formula calls an "estimate" is operationally the equivalent of a policy target. In the MBTR framework that follows, if primacy is given to the inflation target, then operationally the objective for the real economy becomes partially market-determined as will be explained. However, the goal of full employment remains visible and operationally important.

In what follows, I will use the unemployment rate as the measure of the status of the real economy; one reason is that the unemployment rate is published monthly and is the most visible of various measures of the status of the real economy. In the spirit of Taylor's empirical work, what follows will depend on the concept of the employment gap defined in terms of the unemployment rate. Please interpret the employment gap as the proxy for whatever measure of the real economy you prefer, such as the GDP gap. That said, I reemphasize my view that the political part of a policy rule points to the unemployment rate as the key indicator.

My purpose is to design a system that is enforced by trading in a competitive market economy and not by administrators. After all, that is essentially what the gold standard was. Congress determined the rate of exchange between the dollar and a troy ounce of gold and the rest was up to the market. In an effort to make the monetary system more stable, Congress passed the Federal Reserve Act in December 1913.

Commercial banks held dollar reserves in the Federal Reserve banks to support their contractual commitment to exchange deposits for gold coins. Congress set a gold reserve requirement on the Federal Reserve in an effort to limit the Fed's discretion in creating the reserves banks held in Federal Reserve banks. It was the central bank's responsibility to administer the gold standard but the Fed had no authority to define the ratio of the dollar to a certain weight of gold.

The Taylor rule is based on both theory and experience. If the FOMC were to set the federal funds rate as specified in MBTR rule to be defined below, the inflation rate could not rise to the level observed today, except temporarily. The reason is that under the rule the federal funds rate would respond to observed inflation so that interest rates would settle above the inflation rate. Moreover, the basis-points margin *above* the inflation rate would rise as inflation rose. The zero lower bound on interest rates is potentially a problem. I will address that issue briefly at the end of the paper.

Contractual Design

Before getting deep into details, it is helpful to think about the MBTR proposal as creating, in effect, a security with a contractual design that yields stable inflation at 2% if the target U equals the natural rate of unemployment. Market trading in this security brings the federal funds rate to a level consistent with the Taylor rule specified with a 2% inflation target (or any other target rate that could be specified). Market expectations of possible future inflation

above 2% are brought forward to increase the federal funds rate today while expectations of future inflation below 2% are brought forward to reduce the fed funds rate today.

In the contractual arrangement, the unemployment rate plays a role for two reasons. One is that unemployment is a valid objective and the other is that stabilizing employment helps to stabilize inflation. The contract is drawn in such a way that inflation is the primary and overriding objective but unemployment enters as a secondary objective for the reasons indicated.

It is important to recognize that monetary stability cannot be realized without the state playing a role. Or, at least we have no modern example in which a purely privately created money yields the efficiency advantages of an economy based on monetary exchanges of goods, labor and assets for money. What we do know is that money created and controlled by the state has too often become disorderly.

The state defines legal tender satisfactory for payment of taxes, for example. The law of contract defines the legal tender that satisfies the duty of payment in accord with private contracts. Of course, legal contracts can be written in barter terms, where the contracting parties agree as to what bartered goods define satisfactory payment under a contract. However, the efficiencies in using money are so great that almost all payments are made in money with characteristics defined by the state.

The goal is to create a contractual design that depends on intertemporal arbitrage. Under the Taylor rule, anticipated higher inflation X months in the future will yield a higher fed funds rate X months in the future *and* in the present given a properly designed security. The challenge is to design this security, or security-like arrangement, that will depend on market judgments and not FOMC judgments. The challenge is not just a technical one but to create a framework that the general public can understand. Public understanding is essential if market trading is to have the desired outcome and if the system is to survive politically.

What keeps my proposed rule from being "mechanical" is that it is enforced by judgments arising in the competitive market and not by the Federal Reserve. The problem with Fed management is that the FOMC makes mistakes. Moreover, the Committee is necessarily aware that the markets are always watching. The FOMC has the nearly impossible task of getting the analysis right and convincing both politicians and markets that the analysis is right. Markets are constantly reversing and modifying judgments on individual securities. Many participants are well-capitalized and can be patient.

Acting in advance, reversing direction and being patient are all very difficult for the FOMC.

The MBTR

Using the following definitions:

- a) CFF is the central federal funds rate MBTR target in percent;
- b) U is the most recently observed monthly unemployment rate in percent;
- c) U_T is the natural/equilibrium/target rate of unemployment; the precise value chosen is not critical, as will be seen later.
- d) EGAP (in percent) is the expression in (1) above. The value of U_T is set in a statute but as with any statute may be changed by Congress.
- e) π is the most recently observed 12-month percent change in the Consumer Price Index (CPI) not seasonally adjusted;

- f) r* is the assumed fixed real rate of interest, also set by statute. Alternatively, and perhaps preferably, the statute sets the constant term in the rule without specifying separately how much of the constant should be regarded r* and how much the target inflation rate.
- g) r^* , α , β and Δ are parameters fixed by Congress in a statute, preferably fixed "permanently" until changed after careful review. In what follows, Δ is initially assumed to equal 100 basis points.
- h) Congress instructs the Fed to maintain a corridor system for the federal funds rate by standing ready to lend reserves at a rate of CFF + Δ and to borrow reserves at CFF Δ through reverse repurchase agreements.

Then, based on Taylor's argument and evidence, and assuming an inflation target of 2% per year,

(2)
$$CFF = r^* + 2.0 + \alpha(\pi - 2.0) + \beta(EGAP)$$

The FOMC, under the statute, adjusts CFF, and therefore the corridor range, once per month after receiving the latest reading on the CPI. In this sense the inflation rate is the primary target of monetary policy but EGAP plays a fully coordinate role because it enters (2) in the same way the inflation rate does.

Although the statute might provide that the Fed reset CFF after the release of unemployment rate data and the CPI, my preference is to limit the reset to once per month after the CPI data release. That approach would emphasize that the principal reason for the statute is to control inflation.

In this system, Congress has legislated a target inflation rate of 2.0 and a target EGAP of zero. With this simple formula, and once we observe the most recent readings on π and U we can *calculate* CFF.

CFF is to be the center of the federal funds rate target range the FOMC calculates under the rule. For reasons long understood, most macroeconomists have been opposed to setting a target for the real economy to be pursued as a policy goal. I will return to this point shortly.

Taylor made the case for $\alpha = \beta = 0.5$. With regard to implementation of the MBTR, note that the Bureau of Labor Statistics publishes the CPI once every month. At present, BLS practice is to release the employment report for a particular month on the first Friday of the following month and then the CPI report during the following week. The Fed's job as an administrative agency is simply to announce the calculation of CFF and to administer the corridor system of CFF $\pm \Delta$. To reiterate, I propose that all the parameters be specified in the statute and that they not be under discretionary control. Market participants are familiar with the statute and can calculate CFF within seconds of the data releases.

Suppose something considered anomalous in either the unemployment or inflation data pushes CFF up (down). That may push the federal funds rate up (down) because the corridor will shift up (down), but so what? Market experts can detect the anomaly and expect that the strange reading will disappear in future data releases. When we look at data on the yield curve on Treasury and other securities we observe a consistent pattern that shorter-term rates fluctuate more than longer-term rates, *except* for the fed funds rate. Market participants have no problem absorbing these short-run disturbances.

The fed funds rate is as stable as it is because it is an administered rate set by the Fed. The Fed administers it this way in an effort to avoid confusing the market as to its longer run monetary policy. There is an active and unavoidable "game" between the Fed and the financial markets. There is no game whatsoever between the millions of households and firms that determine prices and employment that in turn determine CFF. The determinants of prices and employment are truly atomistic. No single entity can expect to influence the employment and price indexes.

I trust the statisticians at the Bureau of Labor Statistics who construct price indexes and employment data. And, I believe that it would be fully appropriate to maintain a robust audit process to ensure that no one manipulates the data. That is no doubt already the case but installing even more robust internal controls might be appropriate.

In contrast to the market-based and thoroughly decentralized system I propose, the decisions of the Federal Reserve have been almost entirely dependent on one person—the Fed chair. We have ample experience to know that mistakes of that one person can be and have been disastrous. We do not permit decisions of one person—the President of the United States—to make decisions of this magnitude outside of decisions to go to war. Congress under the Constitution has the power to declare war, but has let that power slip away. Vesting war power in a single person is why we had wars in Vietnam and Iraq that many experts—perhaps a majority—believe were unwise.

Without reform, why should we not expect future Fed mistakes to yield from time to time another, and another and another, Great Inflation?

Under the proposed MBTR, I propose—at this point in the analysis—that Congress set $U_T = 4\%$ permanently, or perhaps re-estimated every five years. It is important to emphasize that this proposal is designed to make monetary policy as non-discretionary and predictable as possible. To use a Taylor-rule model, we cannot escape setting a value for U_T.

The FOMC sets the primary credit rate (discount rate), interest rate on reserves, repo and reverse repo rates such that the federal funds rate will trade on any given day somewhere in the range between $CFF - \Delta$ and $CFF + \Delta$. These two rates—an upper and lower bound on the federal funds rate trading range—are not a matter of FOMC discretion meeting by meeting but set according to the parameters set by statute. The banking system can transact with the Fed without limit at the rates $CFF - \Delta$ and $CFF + \Delta$. If the calculations call for a negative interest rate on reserves, it is set at zero. Collateral requirements may constrain some individual banks in their transactions with the Fed but they can buy and sell fed funds as needed with other banks.

The FOMC, or the statute controlling it, also instructs the Open Market Desk to reset CFF according to (2) after every monthly CPI report.

Here is the key to understanding how this proposal would work. The *actual* fed funds rate would not necessarily settle at CFF. The 1-year T-bill rate, for example, will be determined by economic fundamentals, including market assessments of future readings on inflation, unemployment, inflation expectations, fiscal policy, covid advances/retreats and other such variables. If the arrival of the latest report on the CPI does not change these forecasts, then most likely there is no reason for the actual fed funds rate to trade at a different level than before the CPI report. Provided that Δ is large enough, the range CFF $\pm \Delta$ can move without the federal funds rate itself changing. Similarly, the fed funds rate can change within the range determined by the latest CPI report as new information arrives even if the range itself does not change.

On any given day, the fed funds rate is tied to market expectations about the future because banks can borrow in the fed funds market to finance purchases of longer term securities, such as 91-day Treasury bills. Market participants can deal in the T-bill futures market. If market experts see inflation storm clouds on the horizon, they will bid up rates on fixed income assets knowing that observed inflation will increase the corridor range the Fed sets under the monetary

policy statute. This proposal ties monetary policy directly to observed inflation, and market expectations as to future inflation, and not to a money growth target as Friedman proposed.

The range CFF $\pm \Delta$ needs to be wide enough that the Fed and the banking system can absorb idiosyncratic short-run disturbances without throwing the basic stance of monetary policy off track. For many years the primary discount rate was 100 basis points above the Fed's target for the fed funds rate. Subject to additional considerations discussed below, my instinct is that $\Delta = 100$ bps is about right. Before the financial crisis, the primary credit rate was set at 100 bps above the Committee's fed funds rate target. The Fed now pays interest on reserves and has regularized repo and reverse repo operations. There is more automaticity to Fed operations to absorb temporary shocks than there was before the 2008 crisis. At this point in the analysis, assume $\Delta = 100$ bps.

For market forces to work effectively, Δ needs to be large enough that banks have an incentive to trade in the fed funds market based on their expectations as to future changes in inflation and unemployment. The whole point of the MBTR system is to provide a mechanism by which likely *future* levels of inflation and unemployment can be brought forward through standard expectational processes and speculation on security prices. At the same time, Δ needs to be small enough that the Federal Reserve will automatically make funds available to cushion short-run disturbances in the banking and money markets.

In the discussion so far I have assumed that $\Delta = 100$ bps, but my gut feeling from experience is that it would be easy to argue for 150 bps. The critical point is that Δ be set by statute so the market can plan trading activity on the basis of known parameters. Through the corridor system, the Fed absorbs shocks, such as the 20+% one-day stock market decline in 1987 or the LTCM disturbance in 1998, *automatically*. Looking back on these disturbances, the Fed actually did respond by changing the fed funds rate target but in each episode by 150 bps or less.

A bank can increase its reserves by selling assets and will earn extra interest at the rate of interest on reserves calculated automatically as $CFF - \Delta$. Similarly, a bank can use Treasury securities as collateral and borrow from the Fed at the repo rate calculated automatically as $CFF + \Delta$. Under a standing Federal Reserve policy, a bank may also post other collateral but with a higher haircut for a repo loan, or discount window loan, from the Fed using non-Treasury collateral.

To illustrate, suppose $\alpha = \beta = 0.5$ as per the original Taylor rule. The data release schedule for many years has been that the unemployment rate for the previous month precedes the release of the CPI for that month. Consider the first week of month t₀. On the day of release of the unemployment rate for the month t₋₁, typically the first Friday of month t₀, CPI data are available for month t₋₂. Suppose that the most recent reading on inflation, as of month t₋₂, was 2% and the most recent reading on unemployment was equal to its target rate. Suppose also that the market expected both rates to remain unchanged in the near-term future.

Then, after release of the unemployment rate for month t–1, market forces from arbitrage would keep the federal funds rate near the center of the range CFF $\pm \Delta$. Assuming that the market's future expectations matched its current ones, transactions in markets such as fed funds futures and treasury bills would, by principles of arbitrage, bring the current fed funds rate close to a level equal to the most recent CFF. New data on the unemployment rate would not change either CFF or the federal funds rate unless the new data were associated with expectations of future changes in inflation and/or unemployment.

If the inflation rate were expected to increase, then the fed funds rate would trade above CFF because the market would anticipate that in the future the range CFF $\pm \Delta$ would rise, and

that increase would affect, say, the 91-day Treasury bill rate. More precisely, rather than "affect" we should say "be consistent with" the new information. The parameters of the system are laid down in advance. We suppose that the Fed simply administers the system as specified by law.

Under a clear Federal Reserve policy based on the Taylor rule, the market would produce the Taylor-rule outcome. The Nation would not have to depend on the Federal Reserve's judgment in evaluating current data. Fed judgmental errors were responsible for Great Inflation I and now Great Inflation II. The Fed's judgmental errors were responsible for the Great Depression. I believe also that Fed errors had much to do with the 2008 financial crisis, but arguing that point would take me off subject.

Suppose Δ is set at 100 basis points, and not changed from one FOMC meeting to the next. Consider the day of release of the unemployment rate at 8:30 AM, Eastern time; the CPI on that day is the CPI reading for month t-2. Later in month to the BLS will publish the CPI for month t-1. Based on these reports and a continuing stream of other data the market will continually adjust the federal funds rate. The market will bid up the funds rate when the unemployment rate is expected to fall and/or the inflation rate to rise. Today, the FOMC meets discontinuously, about every six weeks, but can act between scheduled meetings if it decides to do so. In contrast, market processes are continual during the day while trading is open. The proposed system provides an orderly way for new information to affect the federal funds rate every minute of every day.

The Federal Reserve does not even have to define a response, or reaction, function to arriving new information. The market decides how the information is likely to affect inflation and unemployment. Understanding the importance of the Fed's response function, I have long puzzled about how to specify the function. The MBTR solves that puzzle.

Critically Important Details

I have emphasized that the Fed must set CFF in a *mechanical* fashion to provide the certainty in a contractual sense upon which the market can rely in its trading. This trading is what brings expectations about the future to bear in the present on the federal funds rate and the yields on longer-term securities.

It is also critically important that the market have confidence that CFF will depend on unemployment and price index statistics that are understood to be as reliable as possible. It is up to the market and not the Fed to interpret possible anomalies in the data, and make projections as the future courses of these data. At present, the market must focus on what the Fed is likely, or may, do rather than on what the economy may do. The Fed is a dominant trader over a period of a calendar quarter or more. Market professionals cannot take positions against the Fed because the Fed, with the power to create money, has more capital at hand than all the rest of the market put together.

Rates of change are routinely less stable than levels. Thus, the one-month rate of inflation at an annual rate is less stable than is the price level itself. The 12-month inflation rate change from one month to the next is typically relatively stable because the two observations have 11 months in common. To avoid ambiguities created by adjustments in seasonal factors, it would be best to use not seasonally adjusted data for the 12-month change. How many market participants—indeed, how many economists—really understand the computer programs statistical agencies use to make seasonal adjustments? How many observers understand how this month's data can change the previous month's seasonal factor? These perturbations should not

distract the market from its primary function under the MBTR to focus on longer-run developments.

Although market participants today focus heavily on the change in establishment employment, the proposed MBTR runs off of the monthly *level* of unemployment. That statistic has a large seasonal in it. For clarity in controlling inflation, it would be best to use the seasonally-adjusted unemployment rate published by the BLS. Because the seasonally adjusted unemployment rate enters the MBTR formula, market participants will have to deal as best they can with the statistical issues.

Finally, the size of Δ is critically important. If Δ is too small, then the Fed's corridor range one month may not even overlap with the range the previous month. A lack of overlap will force the Fed funds rate to change in response to data anomalies. The proposed MBTR design has the Fed administer the system by resetting CFF once per month—neither more nor less often. If Δ were only 12.5 basis points—as it is now given that the Fed sets its target range only 25 basis points wide—then the market could not absorb short-run shocks. Indeed, suppose there were a disturbance similar to the one created by LTCM, which might justify a lower fed funds rate. And suppose that the next CPI release contained an anomalous increase. Then, the Fed would be increasing CFF at a time when the market needed extra liquidity support.

Thus, if Δ is too small, the system will be incoherent.

It is this reasoning that leads me to believe that Δ might best be set at 150 bps rather than 100 bps. It is important to understand that the corridor system I propose permits the corridor to change without the federal funds rate itself having to change. The "mechanical" system I propose to constrain monetary policy over the longer term permits current and future to be connected through the term structure of interest rates. I prefer to think of the system not as mechanical but as a system under law. Adequately capitalized banks can adjust their liquidity positions by transacting with the Fed at one side of the corridor or the other and can in turn support firms that need to adjust their short-run liquidity positions.

In short, it is critical that a policy to control inflation over the longer run be consistent with needs to respond to disturbances flowing from fiscal policy, covid surprises, 9-11 shocks and the like; and, to data anomalies. Our most recent experience is that covid and supply-chain disturbances knocked the Fed off a path consistent with price stability, much the way that the Vietnam War, wage-price controls and the OPEC oil embargo knocked the Fed off the path consistent with price stability 1965-80.

Ever since the Federal Reserve was established, monetary policy has been subject to the rule of the men and women in charge. Since its establishment, FOMC decisions have been ultimately dependent on the judgment of a single person, the Committee chair. In contrast, decisions in the highly competitive financial markets are the outcomes of millions of intelligent economic agents interacting in atomistically competitive markets. The efficient-markets literature is strongly supportive of the proposition that competitive financial markets process available information accurately. That does not mean "perfectly" but "accurately" in that it is very difficult to outperform the market on a risk-adjusted basis. Why should we expect that the FOMC chair can outperform the market?

Suppose, for example, in a given month the unemployment rate came in at 3.8%, or 20 bps below the 4% target. With that unemployment rate news, market participants would know that the Fed would automatically adjust CFF up by 10.4 bps⁴ after receiving the next CPI report, assuming that inflation came in at target and that $\beta = 0.5$. That would be below the usual FOMC

⁴ To understand where the 10.4 bps comes from, review the definition of EGAP.

fed funds target adjustment of 25 basis points but completely predictable given the employment report and the parameters of the system. However, the rise in the range $CFF \pm \Delta$ would not automatically increase the *actual* fed funds rate. The effect on the actual rate would depend on market judgments about the durability of the just-observed decline in the unemployment rate and the effects of the new employment report on all sorts of expectations about the future.

As emphasized, fed-funds rate adjustments in the market would be dependent on new information in the context of forward-looking market judgments made hour by hour. If the market thought the trend toward lower unemployment, for example, would continue but the inflation rate would remain at 2%, then the change in the market fed funds rate after the new unemployment report would be larger. Similarly, the market would expect CFF to rise if it expected the inflation rate to rise.

At first glance, it might seem that this system would have a risk of dynamic instability in which the market would over-react to new information. However, for anyone familiar with John Muth's 1961 paper on rational expectations, the risk of dynamic instability ought not to exist. Dynamic instability is *more* likely to exist with an FOMC in charge and concerned about its inflation-fighting credibility. A Fed campaign against inflation is likely to last too long because actual inflation tends to lag behind the impulses that create it. Few politicians and journalists understand this fact.

As Muth demonstrated, a market characterized by rational expectations will implicitly solve the relevant equations to ensure that prices reflect available information in a way such that the current price is consistent with information known about the future, or rationally and efficiently expected about the future. Muth's paper ended decades of confusion about the theory of expectational processes, such as "self-enforcing" speculation and "inherently destabilizing" speculation.

If desired, a side constraint could limit the change in CFF to 100 basis points per data release. My own preference would be not to have a side constraint any smaller.⁵ My reading of Federal Reserve history is that its behavior is more often characterized by "too little, too slow" than by "too much, too soon, too long." Only after inflation has taken hold can we characterize typical Fed behavior as "too much, too long;" the context historically for "too much, too long" is that the Fed has lost credibility and must persevere to restore credibility.

The actual fed funds rate would not necessarily change as much as CFF changed because market judgments could be that the most recent data on inflation and unemployment might reverse next month. What is needed is a forward-looking system that changes the Fed's policy setting rapidly, and automatically, when the data call for that outcome. Monetary policy that changed too slowly—was not responsive enough to changes in the data—was responsible for the historic monetary policy errors that created an inflation problem in the 1970s and again 2021-20xx.

The parameter Δ provides assurance to banks suffering liquidity strains, or simply caught flat-footed by developments, that they can obtain support from the Fed as needed. For all sorts of reasons, automatic, predictable support is preferable to "targeted, discretionary" support.

We can calculate the effect on long-run inflation in this system of an error in setting U_T . Think of (2) as providing a Taylor recommended federal funds rate FF on the left-hand side but not one actually pursued. Instead, the FOMC uses its traditional judgmental approach and is successful in obtaining an average inflation rate of 2%.

⁵ Indeed, my preference is not to have any such limit. Daily change limits in the stock market do not seem to stabilize the market.

Now suppose the FOMC digs in its heals and follows the Taylor rule. The Committee is firm in its belief that the unemployment rate target should be U_T while the true value of the natural rate is U_N instead. If the Fed is insistent on setting the federal funds rate at FF according to the Taylor rule, equation (2) becomes (2a) below. Despite the Fed's best efforts, the economy will settle at (or average) U = U_N and the new inflation rate π_1 and new FF₁ must satisfy FF₁ – π_1 = r^{*}. In equation (2), if the average actual *real* fed funds rate is independent of the rate of inflation for a range around U = U_N, then that will require an inflation rate enough higher on average to offset the error in estimating the correct value for U_N. Thus, starting from (2) and adding subscripts 0 and 1 to distinguish between initial situation and new situation,

(2a)
$$FF_1 = r^* + \pi_1 + \alpha(\pi_1 - 2.0) + \beta(EGAP_1)$$

By assumption, $FF_0 - r^* - \pi_0 = \alpha(\pi_0 - 2.0) + \beta(EGAP_0)$

and $FF_1 - r^* - \pi_1 = FF_0 - r^* - \pi_0$ [equilibrium real fed funds rate unaffected by modest inflation] Thus, $\alpha(\pi_0 - 2.0) + \beta(EGAP_0) = \alpha(\pi_1 - 2.0) + \beta(EGAP_1)$ Following Taylor, assuming $\alpha = \beta = k$, and noting that $\pi_0 - 2.0 = 0$

- (1) $\beta(EGAP_0) = \alpha(\pi_1 2.0) + \beta(EGAP_1)$
- (2) $\alpha(\pi_1 2.0) = \beta(EGAP_1) \beta(EGAP_0)$
- (3) $\pi_1 = 2.0 + EGAP_1 EGAP_0$
- (4) $\pi_1 = 2.0 + 100 [(100 U_N) (100 U_T)] / (100 U_N)] 100 [(100 U_N) (100 U_T)] / (100 U_N)$
- (5) $\pi_1 = 2.0 + 100[U_T U_N] / (100 U_N) = 2.0 + [100/(100 U_N)](U_T U_N)$
- (6) $\pi_1 \approx 2.0 + (U_T U_N)$. Remember that the FOMC believes $U_N < U_T$.
- (7) To understand what is going on here, keep in mind that the FOMC believes that the natural rate is U_T and sets the federal funds rate (or otherwise behaves) accordingly in period 1, but the true rate is U_N and the unemployment rate settles at U_N; whereas in period 0 the actual unemployment rate settles at U_N and is consistent with an inflation rate of 2% because the FOMC is in practice ignoring the Taylor rule term involving the unemployment rate.

Given these assumptions, π must settle, on average, at a rate that is enough higher than 2% to offset the error in estimating the value of U_T. Plugging in recent numbers, U_N = 5% seems reasonable and the FOMC seems to have behaved as if U_N \approx 3.5%. These figures imply a steady state inflation of about 3.5%; transitional effects have taken inflation considerably higher in 2022.

The MBTR system yields a better result because the rule does not set the fed funds rate itself but instead a band around CFF. The MBTR fixes the band and not the fed funds rate itself. If $\Delta = 100$ bps as suggested earlier, in the example just discussed the rule could set CFF and the actual fed funds rate could trade, on average, at the lower end of the band. This line of argument might suggest that $\Delta = 150$ bps. The issue in setting Δ is not only one of stabilizing the money market against short-run disturbances but also of allowing the market to offset Fed, or congressional, errors in estimating U_N. And, keep in mind the importance of designing a system

that minimizes central-bank discretion in the interest of establishing a super-robust long-run monetary regime.

Monetary base. What determines the monetary base in the MBTR system? Consider first the Taylor rule interpreted simply as rough guidance to the FOMC. The Fed fixes the federal funds rate approximately as suggested by the Taylor rule. The Fed does so through open-market operations as required to hold the fed funds rate at the selected level. That level changes as the unemployment and inflation rates come in above or below target values.

In the short run, however, the monetary base and other monetary magnitudes such as the money stock and bank credit are entirely demand-determined *given* the federal funds rate. Considering the Taylor rule by itself, the rule contains no guidance as to how observed changes in money growth, say, should feed back to affect the Fed's target federal funds rate. Money growth is nonetheless demand-determined as changes in the fed funds rate caused by inflation and unemployment deviations from their targets lead the Fed to change the funds rate target. That monetary magnitudes are demand-determined in Taylor's system could not be otherwise because they depend on the federal funds rate set by federal reserve experts rather than by a "mechanical and simplistic" rule.

This simple fact about the Taylor rule helps to explain why the Fed has not implemented the Taylor rule, or have been much influenced by it in practice. It seems illogical to wait to change the fed funds rate until gaps open up between target and actual inflation and unemployment. Efforts to implement a Taylor rule approach to monetary policy by using forecasts of inflation and unemployment make the approach entirely discretionary and not as rule-like as Taylor would like, or as I would like.

In mid-2021, the FOMC decided that what was happening was "transitory," a word that will go down in Federal Reserve history like Arthur Burns's frequent claim in testimony that the Fed would "undernourish" inflation. In Burns's Per Jacobsson Lecture after leaving office:

"By and large, monetary policy came to be governed by the principle of undernourishing the inflationary process while still accommodating a good part of the pressures in the marketplace. ... As the Federal Reserve, for example, kept testing and probing the limits of its freedom to undernourish the inflation, it repeatedly evoked violent criticism from both the Executive establishment and the Congress and therefore had to devote much of its energy to warding off legislation that could destroy any hope of ending inflation. This testing process necessarily involved political judgments, and the Federal Reserve may at times have overestimated the risks attaching to additional monetary restraint." (p. 16)

Many observers have quoted the same sentences in Burns's lecture. He went on to offer another bad forecast.

"My conclusion that it is illusory to expect central banks to put an end to the inflation that now afflicts the industrial democracies does not mean that central banks are incapable of stabilizing actions; it simply means that their practical capacity for curbing an inflation that is continually driven by political forces is very limited." (p. 21.) ... "But whatever the virtues or shortcomings of central banks may be, the fact remains that they alone will be able to cope only marginally with the inflation of our times. The persistent inflation that plagues the industrial democracies will not be vanquished—or even substantially curbed—until new currents of thought create a political environment in which the difficult adjustments required to end inflation can be undertaken." (p. 22)

Noteworthy is the fact that Burns presented the Per Jacobsson Lecture on September 30, 1979. A few days later, in an historic FOMC meeting on Saturday, October 6, 1979, Paul Volcker took the FOMC in a new direction.

Further Discussion

It is important to recognize that the changes in the fed funds rate in the MBTR system would be driven by market judgments within the parameters laid down in advance by Congress. The whole point of this system is to remove from the FOMC the option to make disastrous mistakes as with Great Inflation I, Great Inflation II and the sickening slide into the Great Depression.

There is an analogy with indexed mutual funds. For decades we have known that these funds on average outperform stock-picking mutual funds run by a chief portfolio manager with several assistant managers. Shouldn't we expect that a monetary policy rule soundly designed to respect experience and fundamental economic theory, and dependent on millions of market judgments, will outperform an FOMC with a chief manager and 17 assistant managers? The FOMC has a large, expert staff. So also does a large stock-picking mutual fund. Besides Warren Buffet and Alan Greenspan, what is the evidence that expert managers can beat the market over a sustained period characterized by regular and irregular—and therefore unpredictable—challenges?

Another analogy to consider is that of a governing constitution. The Constitution of the United States is concerned with how to select, and constrain, officials who write, administer, enforce and interpret law. The proposal for a market-based Taylor Rule is concerned with how to establish a monetary policy that will be operated by an impersonal, competitive market. In a sense, it goes beyond Milton Friedman's long campaign to have Congress command a money growth policy that the Fed would administer. Friedman's approach certainly depended on market forces to set interest rates, but that was not obvious unless the observer had studied monetary economics. The MBTR contains explicit inflation and unemployment targets and connects monetary policy to those targets, which should make it more understandable to non-economists who, perfectly appropriately, want policy connected to goals they understand.

Congress could leave the Federal Reserve in control but weigh in by instructing the Fed to set parameters of the MBTR system to be consistent with congressional goals for employment and inflation over the long run. In 1974, Congress instructed the Fed to report money growth targets. The Burns Fed dodged that discipline by adopting a system of quarterly targets and then never correcting for "base drift" that occurred as the Fed rebased the targets every quarter and never corrected for past money growth errors.

During the Bernanke era, Congress implicitly accepted the FOMC's 2% inflation target but said nothing when the FOMC gutted that target in August 2020 by turning it into a vague target of 2% on average over an unspecified period of years. The current inflation is directly attributable to the Federal Reserve, but Congress shares the responsibility as it was silent when the Fed gutted the inflation target. Following that, Congress pumped billions into the economy in its covid response. The Fed proceeded to fully accommodate that inflationary fiscal action. Congress, Administration and Federal Reserve have been well-meaning but their tender sentiments have unleased Great Inflation II and considerable hardship on lower-income citizens. Under a MBTR statute, the FOMC could present its expert analysis at the conclusion of each meeting and through speeches and testimony between meetings. Whether the FOMC as a body *should* present its expert analysis deserves careful consideration. However, the MBTR framework would not allow the FOMC to redefine the fed funds rate determination system set in advance. The FOMC's analysis may indicate that the readings on unemployment and inflation are anomalous in some respect or another. All that said, the final judgment would rest with the market based on its interpretation of data on the unemployment and inflation rates, and numerous other scraps of information. The most recent inflation and unemployment rates would set the federal funds rate within the market's interpretation of all available information.

Would it be helpful to have an official agency opine on a statute every six weeks? I suspect not.

Why the CPI?

For many years the FOMC's preferred inflation measure has been the consumption price index excluding food and energy prices—so-called "core" inflation. The idea of filtering out temporary price changes has obvious appeal, but has not worked well in practice. Consider the 2001-2008 period. Energy prices increased every year. The root cause was China's rapid GDP growth accompanied by voracious energy demand. The *same* phenomenon—China's rapid growth—produced *both* worldwide rising energy prices *and* declining prices for many manufactured goods. China's growth continued year after year and was not temporary.

Secondly, the CPI would seem to be a better measure for household welfare than the consumption price index. The major difference in weighting is that the CPI has a much higher weight on shelter than the consumption price index and much lower weight on health care. A major share of health care costs is covered by government and employer programs. In the inflation following mid-2021 the rising cost of shelter, food and fuel created major problems for many households. These items have been reported on TV news programs almost every day.

In the figure below, I have deliberately left the line widths fairly narrow. Otherwise, the red and blue lines would not be distinguishable. In the grand scheme of things, the difference between the total CPI and the core PCE price index does not amount to a hill of beans.



Put another way, try to explain to your father-in-law and mother-in-law, both of whom are still commuting to work, why it makes sense to concentrate on the blue line in the figure. Or, try to explain to your local representatives in Congress and in your state legislature. But if the

MBTR is established you can serve as an expert consultant to a financial firm and explain why it should run an arbitrage transaction one way or the other.

Thirdly, households and Congress understand the CPI in a way they do not understand the PCE price index. The BLS derives the CPI in a way that is relatively easy to understand. The purpose of the MBTR is to create a process that is readily understandable and that can retain political support. Market decisions within this rule can do the fine tuning. A number of wage contracts are indexed to the CPI, as is Social Security and the federal tax system. To my knowledge, nothing is indexed to the PCE price index. For an innovation such as the MBTR to adopted and survive, it must have broad political support.

Rules versus Discretion, Again

Do economists know enough to offer the MBTR as a recommendation to Congress? The answer must be relative to what alternative. The evidence of Federal Reserve mistakes, and similar mistakes by other central banks, is in hand. That evidence and economic theory underpin the Taylor rule framework. If Congress were to put the MBTR framework into a statute, that statute could be amended in the future.

The rules v. discretion debate over monetary policy ultimately comes down to two considerations. Do we have adequate mechanisms to revise statutes that are not yielding the desired outcomes? Do we have adequate mechanisms to support emergency actions when necessary?

As for the second question, the MBTR framework has built-in support mechanisms for banks in trouble, and for multiple banks in trouble at the same time. MBTR does not displace traditional bank regulation. In the face of a generalized flight to safe assets, as in 2008, I believe that it may make sense to leave the Federal Reserve with emergency powers of the sort invented and exercised during that financial crisis. I believe that the current Dodd-Frank mechanisms of joint Federal Reserve and Treasury actions provides adequate emergency powers in our democracy. Maintaining current Federal Reserve discretionary powers because they *might* be needed in an emergency does not make good sense. By way of analogy, the President and Congress have war-time emergency powers that they do not exercise as a routine manner.

As for the first consideration, Congress has the power to revise statutes and notinfrequently does so. The process typically involves substantial public debate, hearings, commissions and the like. Monetary policy does not differ from other areas of public policy that require detailed professional input. A clear example is nuclear energy. Few economists have the knowledge of physics to be experts in nuclear energy, but we can have the knowledge of decision processes that permit formation of sensible views on nuclear energy. The same is true, I submit, across all areas of public policy.

Without question there will be many reasons to favor the status quo over the MBTR. I for one refuse to accept that my children and grandchildren must live from time to time with vast monetary disruptions. If you do not like the MBTR idea, I challenge you to come up with a better one.

The Zero Lower Bound

I have next to nothing to add to the extensive literature on this subject. However, I want to emphasize, as I have on several occasions in the past, the importance of Martin Bailey's observation in his 1962 textbook that the present value of a capital investment with an indefinite

life becomes indefinitely high as the interest rate approaches zero. Thus, the value of such an investment will at some point exceed any finite cost of making the investment.

An example is cleaning up contaminated land to create usable land. The land, once created, lasts forever. The reason we did not observe large-scale investment in such projects after the 2008 financial crisis is that the federal government would not itself engage in such investment and would not provide the permits for others to make such investments.

Empirical Analysis

There is a substantial literature, to which I was an early contributor with my coauthor Robert Rasche, on the accuracy of forecasts in the federal funds futures market of upcoming FOMC decisions. There is also a substantial literature on the response of the bond market to data releases. In both literatures, the conclusion is that the market does a pretty good job in evaluating new information relevant to future FOMC monetary policy actions.

What could now be done quite readily is to examine the history of market responses to employment and CPI releases, based on the vintage data available on the St. Louis Fed website. The original releases are the most important for the topic at hand. Without a genuine, real-life trial, it would not be possible to forecast with a high degree of confidence how the MBTR proposal would work.

What could be done, though, is to examine how determination of CFF might look relative to what in fact happened. My hypothesis is that the artificial CFF series would look pretty good relative to the actual record of Fed actions. My reading of the data since early 2021 is that the artificial CFF series would have begun to respond to employment and CPI data many months in advance of the actual FOMC response, which did not take place until a baby step in March 2022.

This one episode, even if I am correct, is not sufficient to make the case. What needs to be done is to examine the entire history since the Korean War. Such a study would be a good project for a grad student.