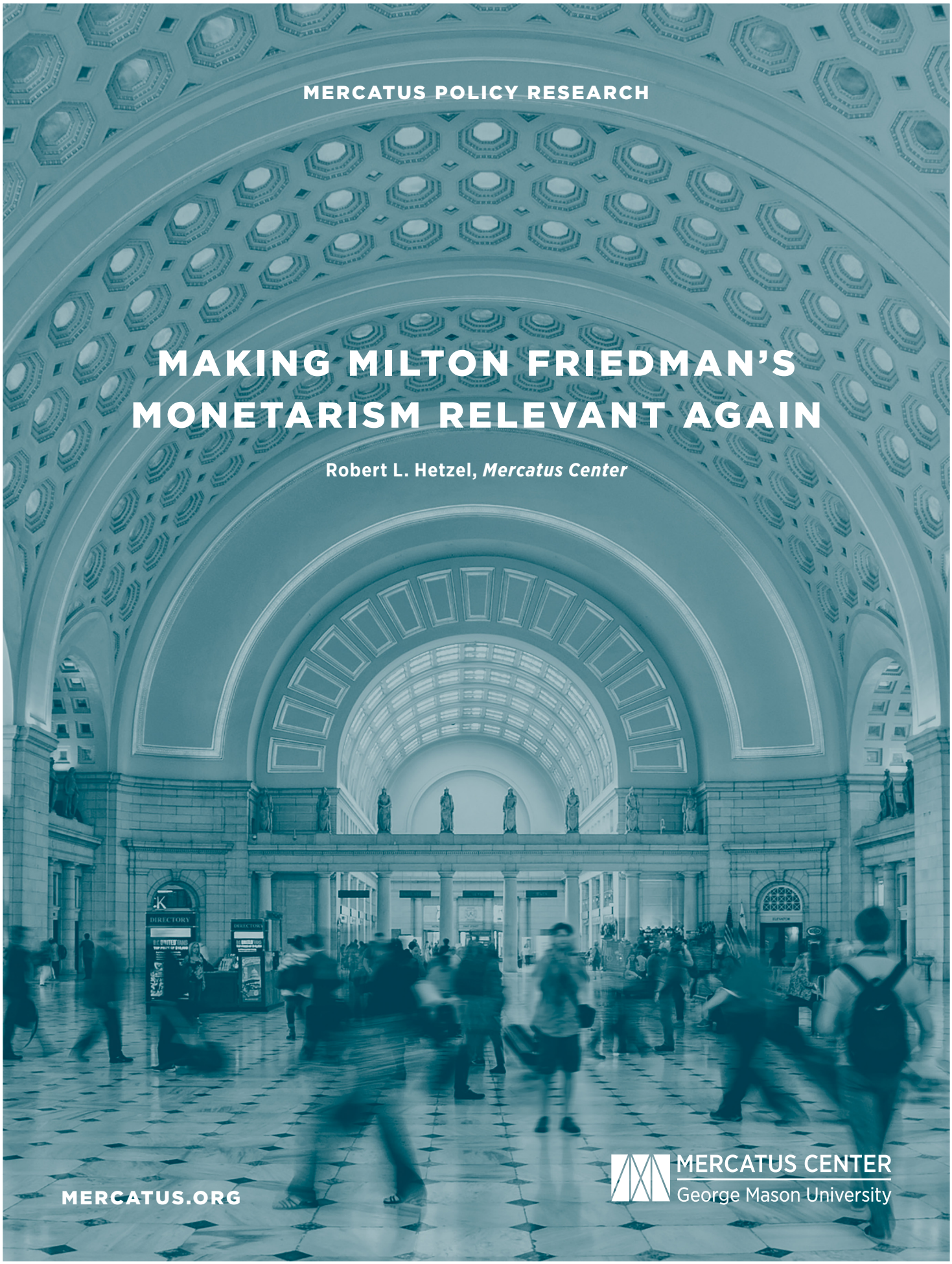

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MAKING MILTON FRIEDMAN'S MONETARISM RELEVANT AGAIN

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Abstract

Starting in the 1960s, economist Milton Friedman's monetarism defined the macroeconomic debate. His greatest victory occurred at the end of the 1970s when the Federal Reserve led by Paul Volcker accepted responsibility for inflation rather than blaming it on cost-push inflation. The Volcker–Greenspan monetary policy concentrated on restoring price stability and succeeded without the recurrent spells of high unemployment predicted by Keynesian economists, who considered inflation a nonmonetary phenomenon driven by cost-push inflation. This monetarist success, which demonstrated that inflation is a monetary phenomenon, was obscured when high rates of money growth in the early 1980s failed to predict an increase in inflation. This paper re-exposits the quantity theory of money and monetarism in an attempt to re-establish the relevance of Friedman's arguments for a rules-based monetary policy and for an understanding of how, in actual practice, central banks control inflation when they assume it to be a monetary phenomenon. This exercise is essential for learning the lessons of the great experiment that took place when the Fed went from the activist policy of the 1970s to the nonactivist policy focused on price stability that followed.

JEL codes: E00, E4, E5, E42, E51, E52, E58

Keywords: monetary policy; monetarism; Federal Reserve System; Milton Friedman

In the 1960s and early 1970s until the emergence of rational expectations, Milton Friedman's monetarism—basically, the theory that "money matters" for inflations and recessions—largely defined macroeconomic debate. With monetarism, Friedman challenged the Keynesian view, which was also the dominant view within the Federal Reserve System (Fed), that inflation is a nonmonetary phenomenon that is determined by aggregate-demand shocks and by cost-push shocks (Nelson 2005). He also challenged the associated belief that a monetary policy of ongoing discretion was required to achieve socially acceptable trade-offs between low inflation and low unemployment. Instead, Friedman argued that maintaining steady growth in the money supply would keep the price level predictable. The stabilizing properties of the price system would then ensure full employment. However, with the disappearance of the predictive value of the monetary aggregates, especially M1, in the early 1980s, Friedman's money-growth rule became irrelevant.

What then, if anything, remains of monetarism? The argument in this paper is that a monetary policy based on the underlying principles of monetarism remains optimal. Namely, the price level (inflation) is a monetary phenomenon, and, given price stability, the stabilizing properties of the price system work well to maintain full employment. Specifically, the Federal Open Market Committee (FOMC) should follow a rule that provides a stable nominal anchor in the form of the expectation of price stability and that allows the price system to determine real variables with procedures that cause the funds rate—the target interest rate set by the FOMC—to track the natural rate of interest. Such a rule characterized the monetary policy regime pioneered by FOMC Chairs Paul Volcker and Alan Greenspan. That rule is referred to in this paper as "leaning against the wind with credibility" (LAW with credibility), or, alternatively, LAW with preemptive changes in the funds rate (Hetzel 2022). Seemingly contradicting this claim about the character of the optimal monetary policy regime, however, the FOMC emphasizes the importance of discretion and neglects any mention of monetary control in its public communication.

Section 1 challenges the FOMC's use of the language of discretion. The argument here is that markets are forward looking, and they therefore base expectations on the systematic component of monetary policy (the FOMC's reaction function or rule). In order to assess whether the FOMC's implicit reaction function is optimal, it is necessary to solve the issue of simultaneity bias, that is, how to disentangle the one-way causation going from the behavior of the FOMC determined by its reaction function to the behavior of the economy.

Section 2 addresses the issue of why monetarism lost currency and whether it can be re-exposited in a way that makes it relevant. As explained in section 3, fulfilling this requirement necessarily starts with empirical generalizations about the historical behavior of monetary policy. They are organized here into the two broad categories that have divided the FOMC's application of the underlying policy of leaning-against-the-wind (LAW): LAW with credibility and LAW with trade-offs.

Section 4 provides a model applicable to LAW with credibility. That policy effectively provides for monetary control without relying on targets for money supply or bank reserves. The model used is the Goodfriend–King (1997) framework, which is given empirical content through the rule of LAW with credibility. The key empirical insight necessary to support this model is that a policy of price stability, implemented by allowing the price system to maintain a steady rate of resource utilization, sustains full employment. It achieves this by ensuring that real output grows in line with potential real output. These procedures control the price level indirectly rather than through a feedback rule, to eliminate misses in a target for the price level.

Sections 5, 6, and 7 review monetary policy in the Great Recession (December 2007 to June 2009) and in the post-pandemic period to demonstrate how policy was destabilizing by departing from procedures for maintaining price stability. Section 8 criticizes arguments for discretion. Section 9 provides a counterfactual monetary policy for the FOMC's pandemic monetary policy based on a policy of maintaining price stability. The remainder of the paper argues that the FOMC should defend its independence by placing monetary policy actions in the context of a rules-based policy.

1. The FOMC and the Language of Discretion

In its public communication about monetary policy, the FOMC uses the language of discretion rather than of rules. By doing so, the FOMC conveys the message that, given uncertainty about the future, discretion allows it to respond to the

economy's most pressing problem. The FOMC uses this flexibility to vary monetary policy between expansionary and restrictive stances depending on which objective of the dual mandate—"stable prices" or "maximum employment"—poses the greater threat.

The FOMC's characterization of its monetary policy as discretionary raises questions. What about the Friedman's (1960) long-and-variable-lag critique? Friedman (*Newsweek*, 1/9/1967, 59) wrote:

> The Fed's erratic policy reflects also its failure to allow for the delay between its actions and their effects on the economy. Said Governor Robertson of the board in a recent speech: "Monetary policy will be formulated by the Federal Reserve, day by day, in the light of economic conditions *as they emerge*." This is a formula guaranteed to produce bad policy. If it is followed, the Fed will continue to step too hard on the brake until the recessionary effects are clear and unmistakable, and then will step too hard on the accelerator." (italics in original)

Another way to phrase Friedman's critique is as a challenge to the FOMC to explain how it solves the identification problem caused by simultaneity bias. That is, how can the FOMC disentangle the one-way causation that occurs when the behavior of the FOMC affects the behavior of the economy, and the behavior of the economy affects the behavior of the FOMC? The FOMC must somehow solve this problem not only to understand how the current monetary policy regime affects the economy, but also to learn from various past monetary policy regimes. That is, the FOMC must somehow assign causation to the reduced-form correlations in the data between the behavior of the funds rate and the behavior of the economy.

If the FOMC were explicit about how it solves the identification problem, it would fill a gap in its communication. Noticeably missing from FOMC communication is any explanation of how the funds rate—an overnight rate of interest—controls both spending (by firms and households) and price setting (by firms) to achieve the FOMC's goals. In the absence of a command-and-control economy, such influence must operate through the FOMC's effect on the signals sent by the price system as intermediated by the yield curve, as well as through the consistency of its policy in shaping public expectations. The framework for such a discussion would necessarily follow the approach of economists who have studied the issue of identification.

Economists who have tackled the identification issue use a model that (1) explains how monetary policy works through the price system to affect the behavior of agents (households and firms) and (2) contains a reaction function that disciplines how the FOMC responds to new information about the economy (incoming "news"). The forward guidance provided by the FOMC in the form of speeches by FOMC participants and the quarterly Summary of Economic Projections (SEP) outlines a reaction function for the behavior of the funds rate *given* a particular forecast of the economy (and assuming markets can infer an FOMC consensus from the median values of the SEP forecasts). However, forward guidance does not substitute for the reaction function of a model that explains how the projected funds rate path will change in response to new information about the evolution of the economy.

An answer to the puzzle of how the FOMC can solve the identification issue—required to predict the impact of its actions on the economy in the absence of a model that economists find essential—is that the FOMC in fact communicates on two tracks. One track, aimed at the public, communicates that discretion gives the FOMC the flexibility to manage the economy. The other track is an informal communication to markets that conveys the underlying consistency of policy. That is, the FOMC informally communicates a reaction function, necessarily derived from an assumption about the structure of the economy, that transmits its influence on the yield curve to the behavior of firms and households. The informal communication consists to a significant degree in consistent behavior.

FOMC participants often talk about the "long lags" of monetary policy. However, as Friedman (1960, 88) argued, the existence of such lags would be destabilizing unless the FOMC had an ability to accurately predict the future. However, given the difficulty in predicting the future, discretionary actions based solely on near-term forecasts of the economy would end up as "long and variable lags" (Friedman 1987). Actually, for monetary policy to be stabilizing, markets must understand its underlying consistency. Markets must be able to place individual policy actions, funds rate changes, in the context of a consistency in how the FOMC will react to new information in the future. With an optimal rule (consistency), markets assume that nominal and real stability will prevail in the future.

The observations of economist Robert Lucas, although made in 1980, can still guide a discussion of why the FOMC finds the language of discretion useful. Lucas (1980 [2013], 500–503) wrote:

> Keynesian economics is dead. . . . Keynesianism *mattered*—it filled a central ideological function. Now that it is gone, some-

> thing is going to have to take its place—and we need to think about what that something is likely to be. . . .
>
> The *central* lesson of economic theory is the proposition that a competitive economy, left to its own devices, will do a good job of allocating resources. . . . This is the basic message of 19th century economics, continued into the 20th century. . . . Now in the 1930s, all this went out the window. . . . Try asking people "Do you think our private economy, left to its own devices, could be trusted to do a good job at maintaining full employment?" . . . If you ask a normal literate, he will say "Of course not. Just think of the 1930s." . . . As a result, the view that the economy needs to be managed on a year in, year out basis is almost universal.
>
> In academic circles, it is total chaos. . . . The collapse of the center means the end of consensus economics. . . . I expect public debate to grow increasingly more ideological. . . . What will the outcome be? Who knows? But it is certain that it won't be settled by a few dozen academic experts. If the general reading of the 30s as the "failure of capitalism" continues to prevail, I see one outcome. If some combination of counter-arguments . . . overcomes this, I see brighter prospects. (italics in original)

The insights of Lucas suggest that the FOMC has found the language of discretion useful in conveying to the public and to Congress the message that it is fulfilling the central function of managing (stabilizing) the economy given the—implicitly assumed—inherent instability of a market economy. The message that monetary policy is stabilizing because it is conducted with a rule that allows the stabilizing properties of the price system to work would contradict that message. Also, the language of discretion allows the FOMC, in its public communication, to focus on the complexities involved in the forecasting of the economy while remaining silent on the basic principles (made explicit in a model) of a stabilizing policy. That complexity largely obscures the underlying consistency of monetary policy to the public and largely limits debate to the near-term forecasting of the economy, where the FOMC has an advantage.

As expressed by Lucas, the "central ideological function" of Keynesianism was that it appealed to the popular belief that to ensure stability the economy needed to be "managed." The language of discretion, which focuses on how the FOMC changes its forecasted funds rate path in response to incoming informa-

tion on the economy, suggests to the public that the FOMC is offsetting destabilizing forces and that any interference with its independence would prevent it from stabilizing the economy. The FOMC makes no reference to following a rule that allows the price system to work to stabilize economic activity. Conveying the message that the FOMC follows a rule would be problematic for it. The FOMC would have to admit that in the past some rules have destabilized the economy rather than stabilizing it. If in fact the optimal rule stabilizes the economy by allowing the stabilizing properties of the price system to work, then it would be harder for policy makers to defend their rhetoric that they are managing the economy.

2. Why Did Monetarism Lose Currency and Can It Be Revived?

The comments of Robert Lucas are relevant here in that there is a lack of consensus within the academic community about what model to use in determining the optimal monetary policy regime and how to compare it to the actual monetary policy regime. The FOMC's use of the language of discretion exacerbates the problem. Nevertheless, given the collapse of the Keynesian consensus, why has the monetarist school of thought largely disappeared?

Lucas (1972) himself offered a rational-expectations critique of Keynesian activist monetary policy in the monetarist spirit. As with monetarism, a stable nominal anchor allows the stabilizing properties of the price system to work. By eliminating the need for agents to distinguish between nominal (dollar) prices and real (relative) prices, price stability permits the stabilizing properties of the price system to work. As Adam Smith described in *The Wealth of Nations*, the price system then works to allocate resources to their most productive uses.

Why then did not a version of monetarism replace the Keynesian consensus, albeit a version organized around a monetary policy of price stability that allows the stabilizing properties of the price system to work? Also, within the academic community, there is a consensus in favor of models with forward-looking household and firms. Within such models, a rule-based monetary policy is a prerequisite for the FOMC to constructively shape its forward-looking expectations.

While it is true that one cannot usefully organize an updated version of monetarism around the equation of exchange as Friedman did, there now exist dynamic stochastic general equilibrium (DSGE) models with forward-looking agents. Such models should work to capture the actual forward-looking nature of markets. To rephrase the question: The change from the activist policy of the

1970s based on the assumption that inflation is a nonmonetary phenomenon to the nonactivist policy of the 1980s and 1990s based on maintenance of price stability constituted a dramatic experiment. Keynesian economists focused on upward shifts in a Phillips curve as a manifestation of cost-push inflation. They argued strenuously that the Volcker policy of returning to and then maintaining price stability would require regular large, socially unacceptable increases in unemployment. They were clearly wrong.

The Volcker–Greenspan policy of restoring the nominal anchor lost by the end of the 1970s required taming the inflationary expectations of the bond market vigilantes who were burned by the 1970s inflation (Goodfriend 1993). In response to any evidence that the FOMC might allow sustained growth of real output to persist, the vigilantes raised bond rates before inflation developed. The FOMC, given its effort to restore the expectation of price stability and render it invariant to inflation shocks and to strong output growth, had to abandon any attempt to exploit Phillips curve trade-offs. Contrary to the expectations of Keynesians, the emergence of the period of Great Moderation after the initial Volcker disinflation carried the implication that inflation is a monetary phenomenon. Why then has monetarism with its assumption that inflation is a monetary phenomenon largely disappeared as a school of thought? Why then do economists not understand price stability in terms of FOMC procedures that provide for monetary control? The answer must lie in the confusion created by the disappearance of the predictive power of the monetary aggregate M1 in the early 1980s.

An understanding of the disappearance of the predictive power of M1 requires distinguishing between the concept of a stable demand function for the liquidity desired by the public in its asset portfolio and empirical measures of that liquidity. Starting in the early 1980s with M1 and in the early 1990s with M2, these empirical measures ceased to capture the appropriate conceptual measure of that desired liquidity. However, the monetarist exposition had not made that distinction. Nevertheless, stability in the demand function for liquidity in the public's asset portfolio can remain even though the measured monetary aggregates (M1 and M2) no longer serve as adequate empirical measures of that liquidity.

What occurred in the early 1980s that caused M1 to cease to be a useful empirical measure of the liquidity in the public's asset portfolio? The answer is that large changes in money-market interest rates combined with advances in computer technology created an incentive for transferring funds between money-market instruments and bank deposits. Also, when money-market interest rates changed, banks adjusted their deposit rates, only with a long lag. Because

of the lag and the resulting flow of funds between money-market instruments and bank deposits by investors seeking higher yields, the composition of bank deposits would change in that they would reflect different degrees of liquidity. The reason is that money-market instruments are used for savings purposes and are less liquid than bank deposits, which are used for transactions purposes. These flows robbed bank deposits of their ability to measure overall liquidity.

Consider what happens when money-market interest rates decline because of weakness in the economy. Given that the interest rates paid on bank deposits remain largely unchanged, inflows to banks of relatively illiquid money-market instruments used for savings combine with relatively liquid bank deposits used for transactions to increase M1. However, the increase in liquidity measured by M1 is less than the increase in the quantity of M1. In the early 1980s, as a result, the behavior of M1 changed from being procyclical to being countercyclical. That is, M1 growth increased when the economy weakened. M1 then ceased to be a useful measure of the stance of monetary policy and of when to change the funds rate. The measured monetary aggregates no longer offered an accurate measure of the stance of monetary policy.

Semantics adds to the confusion. According to monetarism, the public desires to hold a well-defined amount of liquidity in its portfolio. Before, but not after, the early 1980s, the measured monetary aggregate M1 worked well as an empirical measure of this desired liquidity. For this reason, the distinction required now between "money" as an empirical measure and the relevant conceptual counterpart "money" as the "moneyness" of the liquid assets in the public's portfolio was not made in the monetarist literature.

An additional reason for the apparent disappearance of monetarism as a relevant framework for understanding monetary policy was the monetarists' failure to reformulate the framework for monetary control given the irrelevance of the standard equation of exchange.[1] As long as M1 and M2 predicted recessions and inflations, there seemed to be no need to go beyond the equation-of-exchange framework for criticizing the FOMC's failure to control money. The organizing principle of Friedman's exposition of monetarism remained useful, namely, that nominal money is determined independently of nominal income and that either stable or reinforcing changes in velocity in response to changes in money ultimately require changes in output initially, and then inflation when money changes. That framework worked for the monetarist critique.

1. The standard formula is MV=Py, where M is money, V is velocity (the rate at which money turns over against nominal spending, the right-hand-side, Py), P is the price level, and y is real income or output.

However, in evaluating the relevance of the standard equation of exchange, there is another issue completely apart from the predictive power of the measured monetary aggregates (M1 and M2). Given the use by the FOMC of an interest rate target (the funds rate), money is endogenously determined. The reserves-money multiplier analysis monetarists used, which is based on the assumption of exogenously given bank reserves, is irrelevant. In order to express the monetary character of nominal income and inflation in a world in which the instrument used by the FOMC to implement monetary policy is an interest rate, it is useful to think of the monetary control required for price stability in terms of a rule for monetary policy that aligns the growth of nominal income with the growth of potential real output. That rule disciplines money creation by controlling the demand for money to be consistent with price stability. (See section 4, "Monetary Control in the Volcker–Greenspan Era.")

To understand the nature of the required rule, it is necessary to go beyond the equation of exchange and to express monetarist principles in terms of a model. To be empirically relevant, the model needs to explain the Great Moderation that occurred in the Volcker–Greenspan era when the FOMC focused on price stability and rejected the organization of policy around Phillips curve trade-offs. In addition, the monetary policy regime (the rule) that endows monetary control with empirical content should respect the long-and-variable-lags critique of Friedman (1960). Namely, an attempt to control the price level with a feedback rule in which the funds rate moves to eliminate contemporaneous differences between the actual price level and its targeted value will destabilize the economy. The model used here to re-exposit monetarism is the New Keynesian (NK) model of Goodfriend–King (1997).

The following section summarizes the empirical generalizations used to test the predictive content of the model. Specifically, what accounted for the success in moving from the activist policy of the 1970s, with its concentration on Phillips curve trade-offs, to the nonactivist policy of the 1980s, with its concentration on price stability?

3. Organizing the Relevant Empirical Generalizations that Characterize Monetary Policy

Another facet of monetarism beyond its theoretical principles is its methodology for testing a model. The issue here is whether one can organize a historical narrative guided by the Goodfriend–King (1997) model that highlights historical episodes offering evidence on causation. What historical events bring informa-

tion outside of the model to bear on whether monetary instability is the cause of real instability or merely a reflection of that instability? The historical episode used here is the change from the activist monetary policy of FOMC chairs Arthur Burns and G. William Miller, who focused on Phillips curve trade-offs, to the neutral policy of Paul Volcker and Allan Greenspan, who focused on the restoration, then maintenance, of price stability. The FOMC operated in an environment of public opinion that went from a consensus on the need for full employment represented by an unemployment rate of 4 percent to a consensus on the desirability of price stability. What were the results of the experiment offered by this radical change in policy?

Organization of the empirical generalizations that define monetary policy usefully starts in the post-1951 Treasury–Fed Accord period when FOMC chair William McChesney Martin and his assistant Winfield Riefler invented the modern central bank.[2] The organizing principle prior to World War II had been the real bills belief that monetary policy should be directed toward the preemption of speculative excess, the collapse of which was presumed to cause recession and deflation. When depression did not follow the end of World War II despite the basis for bank credit creation being government debt rather than real bills, a policy based on real bills principles became untenable. Instead, the Martin FOMC, supported by the Eisenhower administration, concentrated on price stability.

Explicitly targeting price stability would have committed the FOMC to an untried policy with a clear criterion for failure. In the intellectual environment of the time, there was no understanding of the price level as a monetary phenomenon. The near universal assumption, held outside of the University of Chicago, was that monetary policy influenced the economy by influencing credit market conditions. At the same time, so that the Treasury would not pressure the FOMC to again become a residual buyer of the Treasury securities offered to the market, Martin never admitted that the FOMC used the interest rate as its policy variable.

Based on the assumption that persistent growth above trend would create credit market imbalances leading to inflation and, conversely, that persistent growth below trend would create credit market imbalances leading to deflation, Martin developed the operating procedures he called "leaning against the wind" (LAW). The FOMC implemented them through operating procedures termed "free reserves," which measured the difference between the excess reserves of banks and their reserves borrowed from the discount window. This presumed measure of the stance of monetary policy, which was relatively low (negative) in

2. This section draws on Hetzel (2008, 2012, and 2022).

booms and relatively high (positive) in recessions, in effect, provided cover for targeting short-term money market interest rates.

Under LAW procedures, the FOMC raises short-term interest rates to offset unsustainable strength in real output growth. In the absence of direct knowledge of the growth rate of potential real output, the criterion becomes whether the economy's resource utilization rate is increasing in an unsustainable way (whether the unemployment rate is persistently declining). The opposite is true for unsustainable weakness in real output growth (whether the unemployment rate is persistently increasing). Given the inability to associate particular changes in the funds rate with the behavior of the economy, however, the FOMC needs some criterion for stopping persistent small changes in its target for short-term interest rates (the funds rate). In practice, the adopted criterion divided LAW procedures into the two types illustrated below. For example, when focused on unsustainable weakness in the economy, when does the FOMC go from reducing the funds rate to ceasing the reductions and then to increasing the funds rate?

The first type of LAW procedure is termed here "LAW with credibility," under which the FOMC preemptively increases the funds rate when prompted to prevent inflation. When the Greenspan FOMC had finally reestablished FOMC credibility with the bond markets for pursuing a policy of price stability—a credibility it secured after it raised the funds rate in 1994 despite no evidence of increased inflation—the FOMC began to use signs of overheating in the labor market as the criterion for raising the funds rate. The second type of LAW procedure implements a contrasting activist policy. After lowering the funds rate to offset unsustainable weakness in the economy, the FOMC reverses course and starts raising the funds rate only when a rise in inflation occurs. This class of LAW is termed here "LAW with trade-offs."

The difference between LAW with credibility and LAW with trade-offs can also be characterized as LAW without cyclical inertia in the funds rate and LAW with cyclical inertia in the funds rate (Hetzel 2022). LAW with credibility can be characterized by a difference Taylor rule (Orphanides 2003a, 2003b, 2004, 2018 and Orphanides and van Norden 2002). LAW with trade-offs can be characterized by a gap Taylor rule (Taylor 1993, 1999).

To understand the characterization of LAW with credibility as a difference Taylor rule, one needs to appreciate that with a policy of LAW with credibility the objective is to stabilize the economy's rate of resource utilization. Doing so transfers the determination of real output and employment to the stabilizing properties of the price system. The FOMC is allowing the price system to elimi-

nate slack in the economy's rate of resource utilization. It does not use a gap Taylor rule to manipulate slack to balance off twin objectives for low inflation and low unemployment as the policy of LAW with trade-offs attempts to do, with its focus on the Phillips curve.

The reason that LAW with credibility procedures allow the price system to work is that sustained growth above potential (sustained reductions in the economy's rate of resource utilization) implies that the real rate of interest lies below the natural rate of interest. The real rate must rise. (The natural rate of interest is the interest rate that distributes aggregate demand intertemporally to make contemporaneous aggregate demand equal to potential output.) Sustained growth above potential implies that the real rate of interest must rise. Households need to save more as an offset to the optimism about the future that causes households to want to smooth (even out) consumption by moving it from the future to the present (Goodfriend 2004). Stability in the economy's rate of resource utilization implies that the funds rate is aligned with the natural rate of interest.

In contrast, LAW with trade-offs attempts to implement a monetary policy in which the FOMC overrides the operation of the price system in order to juggle the competing goals of low inflation and low unemployment. The resulting policy is necessarily discretionary because of the FOMC's inability to forecast shifts up or down in the Phillips curve, and also because of the necessity for the FOMC to make a political judgment about the amount of unemployment to allow to control inflation. Inflation in this case is assumed to be a nonmonetary phenomenon in that price stability would require periods of relatively high unemployment to offset upward shifts in the Phillips curve.

LAW with credibility, on the other hand, is consistent with a rule that provides a stable nominal anchor and then allows the price system's stabilizing properties to ensure full employment. In this case inflation is a monetary phenomenon in that price stability requires monetary control. The next section explains how the Goodfriend–King (1997) model, in which a policy of price stability is optimal, is consistent with inflation being a monetary phenomenon and with the monetary control required for price stability despite the absence of money in the model.

4. The Monetary Control Required for Price Stability

FOMC chairs Volcker and Greenspan focused on restoring a stable nominal anchor in the form of the expectation of price stability with financial markets

being the canary in the coal mine. It follows that a relevant model should possess forward-looking agents whose behavior is conditioned by the rule implemented by the FOMC. The obvious choice is a DSGE model with rational expectations. However, such models do not contain money. The following explains how the Goodfriend–King (1997) model, despite the absence of money, is consistent with procedures that provide for the monetary control required for price stability without the need for explicit targets for money or reserves. With price stability, because money is not a source of disturbance and therefore lacks predictive power, money need not appear in the model.

In their exposition of the NK model, Robert B. Barsky et al. (2014, 38) summarized the core of the Goodfriend–King model:

If we write the Euler equation in terms of the output gap, $\tilde{y}_t \equiv y_t - y_t^n$, i.e., the difference between actual and natural output, we can also see that

$$y_t = -s \sum_{k=0}^{\infty} E_t (r_{t+k} - r_{t+k}^n). \tag{2}$$

The last expression makes clear that the output gap is the sum of all future interest rate gaps, defined as the deviations of the ex-ante real rate, r_t^n, from the natural rate, $i_t - E_t\pi_{t+1}$. Finally, from the NK Phillips curve,

$$\pi_t = \beta E_t[\pi_{t+1}] + \mathrm{k}\tilde{y}_t, \tag{3}$$

closing the output gap $\tilde{y}_t$ also stabilizes inflation.[3]

It is useful to give empirical content to the Goodfriend–King (1997) model using the NK model of Kosuke Aoki (2001), which divides firms into one of two sectors. Firms in the sticky-price sector set dollar prices for multiple periods, while firms in the flexible-price sector set prices in auction markets. The FOMC should stabilize sticky-price inflation while allowing flexible-price inflation to pass through into headline inflation. Only inflation in the former distorts the allocation of resources by interacting with price stickiness. Underlying price stability emerges because the credibility of the rule causes forward-looking firms in the sticky-price sector to set prices for multiple periods without building in an inflation premium. The FOMC is then free to follow a rule that causes the funds rate to track the natural rate of interest, thereby allowing the price system's stabilizing properties to keep real variables (output and employment) equal to their natural or full employment values.

3. y_t^n is the natural rate of output expressed in logarithms; β the discount factor; s is the intertemporal elasticity of substitution in consumption. The ex-ante real rate is r_t.

As shown in equation (2) in the Barsky et al. excerpt, if the FOMC follows a rule that maintains the expectation of the future interest rate path such that the actual real rate of interest equals the natural rate of interest, it keeps the output gap equal to zero. An output gap equal to zero, as shown in equation (3), provides price stability. How does LAW with credibility implement equations (2) and (3)? Necessarily, implementing such a policy of price stability requires maintaining an equality between growth in nominal spending (output) and growth in potential real output. However, that outcome arises indirectly through implementation of the LAW with credibility policy rather than through direct targeting of nominal spending. LAW with credibility avoids the Friedman (1960) critique of long and variable lags. That is, a simple feedback rule that relates changes in the funds rate to misses from target of a macroeconomic variable like the price level is destabilizing.

LAW with credibility does not contravene the Friedman critique because it conditions the yield curve to respond continually to incoming, new information on the economy, thereby offsetting unsustainable weakness or strength in economic growth. Deviations of the real-term structure of interest rates from its natural rate counterpart are continually self-correcting and prevent significant departures from full employment. Markets understand the objective of the rule, which is to maintain a stable rate of resource utilization. The profit motive entailed in estimating the required yield curve incentivizes market players to continually seek to move the yield curve in a way guided by achievement of the North Star of a stable rate of resource utilization.

When the FOMC initiates a cycle of raising the funds rate, it typically starts with a quarter point increase, or a half point if it wants to signal that it is "behind the curve," in other words, that it should have started earlier. The FOMC is not attempting to move the funds rate directly to an estimate of the natural rate of interest. However, financial markets adjust immediately in search of the term structure consistent with the natural rate of interest without any constraint imposed by the initial size of the change in the funds rate.

How can one understand monetary control in terms of the Goodfriend–King model? Given the FOMC's interest rate target, the nominal quantity of money is determined by demand. That is, banks accommodate the public's demand for money through deposit creation. If the public's demand for money increases, for example, the public sells an illiquid asset to banks and banks create the desired liquid deposits. To achieve the monetary control required to stabilize the price level, the FOMC must follow a rule that disciplines the demand for money to be consistent with price stability.

In a regime of fiat money, the central bank possesses a monopoly on the creation of bank reserves through its bookkeeping operations. Even in a monetary policy regime in which the policy instrument is the funds rate (the marginal cost of bank reserves), that monopoly power remains central. Consider first the pre-October 2008 operating procedures in which bank reserves were noninterest bearing. The FOMC set a target for the funds rate, which the Open Market Desk (Desk) implemented by creating an amount of reserves through open market operations that placed banks on their reserves demand schedule corresponding to the targeted value of the funds rate. As the demand for bank deposits by the public, say, increased and the demand by banks for reserves increased correspondingly, the Desk created those reserves to prevent the funds rate from rising above its targeted value. That is, the Desk created reserves as a consequence of defending its interest rate target.

Consider next the subsequent operating procedures in which the Fed pays interest on bank reserves (IOR). Banks still possess a well-defined demand function for bank reserves for clearing transactions. (See figures 27.1 and 27.2 in Hetzel 2022, chapter 27.2, 604). What is distinctive about these operating procedures is that at the given funds rate target, the Desk provides the reserves that banks demand for clearing transactions, plus an additional amount determined by the size of the Fed's asset portfolio. The additional amount of reserves does not depress the funds rate because they are effectively sterilized by the IOR payments. The banks want to hold the additional reserves, without using them to buy assets, because of the interest received on holding them. In both cases, however, it is the ability to create reserves that allows the FOMC to use a short-term interest rate as the policy variable. Without IOR, that power allows the Desk to create the reserves required to move banks along their demand for reserves schedule. With IOR, that power allows the Desk to buy the assets that provide the interest payments to banks and still maintain the funds rate target.

The rule that provides for the monetary control required for price stability will necessarily comprise two parts because the price level is a nominal variable, and the natural rate of interest is a real variable. With respect to the nominal part, the FOMC must implement a credible rule that causes firms that set prices for multiple periods to do so based on the expectation of price stability. With respect to the real part, what gives content to a monetarist view of the world is that the price system works well to determine a unique natural rate of interest. To ensure price stability, the FOMC must follow a rule, even if unarticulated, that causes the funds rate to track the natural rate of interest. Consequently, the price system

keeps real output growing in line with potential output. The demand for nominal money then is consistent with price stability and grows in line with growth in potential real output.

What about the supply of nominal money? Procedures that keep the funds rate equal to the natural rate of interest maintain equilibrium in the goods market. Equilibrium in the goods market prevents excess demand or supply in the bond market. (Patinkin 1965 explains how excess demand in the goods market creates excess supply in the bond market.) In the bond market, excess supply would lead to money creation (bond purchases by the New York Desk with the accompanying creation of bank deposits) while excess demand would lead to money destruction (bond sales by the New York Desk with the accompanying extinguishing of bank deposits).[4] Those purchases or sales are required to maintain the FOMC's interest rate target. Given the expectation of price stability and procedures that maintain the funds rate equal to the natural rate of interest, money creation results entirely from banks accommodating money demand through deposit creation consistent with price stability and with potential real output growth.

To give practical content to the rule required for monetary control given an interest rate instrument, consider how the organization of the Board staff Tealbook would structure FOMC debate.[5] For simplicity, assume that the FOMC's inflation target is zero. Furthermore, there is no bias in the measure of inflation (presumed here to be the GDP deflator) used by the FOMC. (Such bias could arise from the difficulty in adjusting the price level for quality improvements.) An average inflation rate of zero then requires that over time monetary policy maintains the growth rate of nominal output equal to the growth rate of potential real output.

For the economy's estimated rate of growth of potential real output, the Tealbook would feature a rising, straight line (drawn on a logarithmic scale). The staff would also include on the graph a line representing the forecast for nominal GDP growth. Transitory inflation forecasted by the staff would cause a divergence in the two lines, but only for a limited period. Similarly, there could

4. The appendix, "Money Creation and Destruction in a Regime With and Without IOR" explains the technical mechanics.

5. The Tealbook is officially titled "Report to the FOMC on Economic Conditions and Monetary Policy." It is produced by the staff at the Board of Governors and distributed to the Committee prior to each regularly scheduled FOMC meeting. The "Tealbook" name was given when the Bluebook and Greenbook were merged in June 2010. For more information see the Board of Governors of the Federal Reserve System website, "Transcripts and other historical materials," https://www.federalreserve.gov/monetarypolicy/fomc_historical.htm.

be transitory noise in the nominal GDP line caused, for example, by a major strike or weather disruption. Again, the divergence in the two lines would be only for a limited period. These divergences would not entail any change in the existing funds rate path.

However, a forecast of nominal output growth that deviates persistently from the estimated potential real growth rate, with no change in the existing funds rate path, calls for a response. If the nominal GDP growth rate, which incorporates the growth rate of real output, exceeds the estimated potential output growth rate and is accompanied by a forecast of a persistent decline in the unemployment rate, the Board staff would project a higher funds rate path. That divergence indicates that the real rate of interest lies below the natural rate of interest. Moreover, adjustment of the funds rate path made before any sign of persistent inflation, that is, before preemptive increases in the funds rate, will maintain zero growth in inflation on average. Converse statements hold for persistent weakness in estimated nominal GDP growth.

With these procedures, the FOMC remains faithful to the dual mandate. However, the procedures do not entail a feedback rule in which the FOMC responds directly to misses in the inflation target.[6] The rule relies on the stabilizing properties of the price system. Socially costly trade-offs occur only with loss of credibility and, say, the need for increased unemployment to force a reduction in positive expected inflation.

When the empirical measure of liquidity (moneyness) in the public's asset portfolio, M1, ceased predicting inflation, monetarists ceased to influence debate. In the equation of exchange, they did not make the change from money being determined exogenously to money being determined endogenously in a way disciplined by a rule for determining the funds rate consistent with price stability. Consider the Marshallian version of the equation of exchange: M=(ky) P, where M is nominal money, k is the fraction of real income, y, that the public wants to hold in terms of real money balances, and P is the price level. If the rule is credible, monetary policy maintains the price setting of firms in the sticky price sector consistent with price stability. P remains constant (apart from noise originating in the flexible-price sector). Real income, y, is then determined by the economy's underlying real business cycle core and the public determines the fraction k of real income held in the form of money (liquidity). (In principle, that amount is measured by a Divisia index, which measures the liquidity not

6. With the LAW with trade-offs policy, FOMC procedures entail a feedback rule in which the FOMC responds directly to target misses in inflation and in unemployment with changes in the target misses assumed connected structurally by a Phillips curve.

only of bank deposits but of money market instruments as well.)[7] Given a rule that determines the right-hand-side variables of the equation of exchange in a way consistent with price stability, money, M, is determined endogenously, not exogenously as in classic expositions of the quantity theory such as Friedman's (1969 [1968]).

What happens if the FOMC departs from such a rule? In particular, monetary policy fails to maintain the funds rate equal to the natural rate of interest, say, by introducing cyclical inertia into the funds rate as occurred in the 1970s Burns-Miller era. Policy then creates destabilizing changes in money. With the activist policy of the 1970s, the FOMC attempted to supersede the operation of the price system by controlling the real economy. That is, in its attempt to exploit a Phillips curve trade-off, it tried to control a real variable: slack in the economy. Money then became a source of disturbances. The attempt to control slack created either an excess supply of bonds or an excess demand for bonds. To defend its interest rate target, in the first case the Open Market Desk engaged in purchases and monetized the excess supply. In the second case it sold bonds to meet the excess demand for bonds and extinguished money (bank deposits). The resulting excesses or deficiencies in the moneyness (liquidity) in the public's asset portfolio set off destabilizing changes in prices.

In principle, the kind of activist policy the FOMC followed in the 1970s could work if the FOMC had a structural model of the economy. To understand why, note that, say, the unanticipated excess money creation in the 1970s affected the economy through a portfolio balance effect. When the Fed purchased an illiquid asset such as a long-term Treasury bond, it replaced the asset with a liquid bank deposit in investors' portfolios. The price of illiquid assets had to rise to reconcile investors to holding a more liquid asset portfolio. The price of illiquid assets (such as equities, houses, commodities, and durable goods) rose relative to their service flows and stimulated expenditures (Friedman 1961 [1969], 255–6 and Tobin's Q).

Eventually, the price level rose to restore the amount of liquidity that investors desired in their portfolio. However, the process illustrates the long-and-variable-lag phenomenon of Friedman (1960). Initially, despite the increased demand due to the money creation, firms did not raise prices. Without coordination, each individual firm feared that being the first to raise their product price would cause their customers to shop elsewhere. When labor markets had tight-

7. See the explanation of the construction of such monetary indices on the website for the Center for Financial Stability (https://www.centerforfinancialstability.org/index.php).

ened to the point at which firms were no longer fearful that other firms would increase production by hiring more workers and drawing away their customers, they raised their prices. However, because other factors affect aggregate real demand, the process was long, drawn out, and hard to predict.

The structural model of the economy required to predict the consequences of an activist monetary policy with its destabilizing emissions of money and its associated portfolio balance effect on the economy does not exist. Proponents of activist monetary policy use an empirical Phillips curve relationship to substitute for such a model. However, as illustrated in the 1970s, the reduced form of the Phillips curve robs it of its value for policy. In sum, the NK model of Goodfriend–King serves to illustrate the ideal policy of price stability and the required monetary control; however, the model loses relevance when monetary policy is activist and organized around a Phillips trade-off. Ironically, a policy of price stability implemented with a rule that provides the required monetary control means that money is not a source of disturbances and thus does not appear in the model.

The fundamental issue in the design of an optimal monetary policy is whether the price level is a monetary or a real phenomenon. Stated alternatively, does price level stability require a rule that provides for monetary control, although not with actual money targets? The argument here is that the instability of the 1970s came from a lack of monetary control while the stability after the Volcker disinflation came from monetary control. The next section generalizes that conclusion in terms of the rule that provided for monetary control in the latter period.

5. Adhering to and Departing from Price Stability in the Post-Volcker-Greenspan Era

The implications for optimal monetary policy of the transition from Arthur Burns and G. William Miller to Paul Volcker and Alan Greenspan as FOMC chairs would seem straightforward. It would appear that LAW with credibility (LAW with preemptive changes in the funds rate to preserve price stability) would dominate LAW with trade-offs (LAW with cyclical inertia in the funds rate intended to produce alternating stances of expansionary policy to lower unemployment or restrictive policy to lower inflation). A model capable of explaining this conclusion would treat the price level as a monetary phenomenon rather than a real phenomenon.

The choice of such a model, however, is just the first step. The next step is to test the robustness of the model in a variety of different time periods. The

empirical correlations in the data that are consistent with LAW with trade-offs in the 1970s and LAW with credibility in the Volcker–Greenspan era can in principle be explained by different models. One could argue that the shocks changed between the two monetary policy regimes. In the first, one could argue that inflation was driven by supply shocks, especially oil and food, which produced upward shifts in the Phillips curve. LAW with trade-offs then at least mitigated the real and monetary instability by producing a socially optimal combination of unemployment and inflation (Burns 1979 and Blinder 2022). In the subsequent period, in the absence of inflation shocks, LAW with credibility was optimal. Given this ambiguity, confidence in a permanent policy of price stability requires a model that predicts in other times and situations.

An argument for the monetary character of the price level and a policy of price stability is that before the early 1980s, when M1 constituted a good empirical measure of the liquidity in the public's asset portfolio, there were an extraordinary number of episodes that can be used to test the predictive power of money. Often, the simple equation of exchange could serve as an analytical framework. However, the challenge is to give a model in the monetarist spirit empirical content after the early 1980s when the measured monetary aggregates ceased being good measures of the moneyness (liquidity) desired by the public.

To pursue the usefulness of a model like the Goodfriend–King model in recent time periods, it is necessary to give the reaction function of the model an explicit formulation. This section addresses that task. As discussed in section 3, the LAW rule used to implement a policy of price stability in the Volcker–Greenspan era took the form of a difference Taylor rule with which the funds rate moves to maintain a steady rate of resource utilization. Output then grows at its potential growth rate. With expected inflation consistent with price stability, the rate of growth of nominal output is then aligned with the rate of growth of potential real output. Practical implementation of the LAW rule requires that the FOMC move the funds rate routinely to align its forecast of nominal output growth with its forecast of potential real output growth.

Joshua Hendrickson did early work to give content to this idea. Using Greenbook (now Tealbook) forecasts, Hendrickson (2012, abstract) summarized: "The change in monetary policy beginning in 1979 is reflected in the Federal Reserve's response to expectations of nominal income growth rather than realized inflation." Athanasios Orphanides showed that for the periods of relative price stability starting in the early 1990s, the FOMC consistently moved the funds rate to maintain forecasts of nominal output growth equal to forecasts of potential real output growth. Orphanides (2023, 7, 9) described his "natural growth rule" rule as follows:

According to this rule, the change of the federal funds rate from the previous quarter can be guided by the difference between the projected growth of nominal income, n, and the natural growth rate, n^*, defined as the sum of the Fed's inflation goal, π^*, and the growth rate of real potential GDP, g^*. The rule takes the first-difference form:

$$\Delta i = \theta(n - n^*) \tag{4}$$

where is the rule's prescription for the quarterly change of the funds rate from the previous quarter, and θ is a parameter governing how responsive policy should be to the projected imbalance.

I rely on real-time data and forecasts from the Survey of Professional Forecasters that are published by the Federal Reserve Bank of Philadelphia (Croushore and Stark, 2001 and 2019). Specifically, I rely on the median survey responses to construct the forecast of nominal income growth over four quarters ending three quarters ahead. This is the "year-ahead" forecast starting from the quarter before the survey—the most recent quarter for which actual data are available in real time . . . . Since 1992, the survey conducted in the first quarter has also included a question on the 10-year annual-average real GDP growth. I use the median responses from this question as a real-time estimate of potential output growth. . . . The quarterly series for the natural growth rate . . . reflects the sum of this series and the Fed's 2% inflation goal.

Orphanides' estimated rule worked well to explain funds rate changes with two exceptions: the recession of 2008–09 and the inflation of 2021–22. In the 2021–22 episode, Tealbook forecasts of nominal GDP growth began to increase significantly in 2020/Q4. Although quarterly annualized nominal GDP growth rose from 4.0 percent in 2019/Q4 to 7.3 percent in 2020/Q4 and peaked at 15.1 percent in 2021/Q4, the FOMC maintained the funds rate at the zero lower bound (ZLB) until March 2022.

In the 2008–09 recession, the exception to the rule occurred after the April 2008 FOMC meeting when the FOMC ceased lowering the funds rate despite the continued weakening of the economy and the associated reduction in forecasts of nominal GDP (see Hetzel 2022, ch. 21, "The Great Recession"). Monetary policy was contractionary as indicated by the combination of a rise in unemployment

TABLE 1. Illustration of the natural growth targeting rule

	Forecasts	2008 Q4	
Tealbook date	Real private domestic final purchases plus core PCE inflation	Nominal growth target	Target miss
18 June 2008	(−4.4 + 2.6) = −1.8	4	−5.8
30 July 2008	(−3.9 + 2.6) = −1.3	4	−5.3
10 September 2008	(−2.1 + 2.6) = 0.5	4	−3.5
22 October 2008	(−4.4 + 2.2) = −2.1	4	−6.1
10 December 2008	(−6.6 + 1.2) = −5.4	4	−9.4

Source: Various issues of Board of Governors "Report to the FOMC on Economic Conditions and Monetary Policy," Book A, "Economic and Financial Conditions: Current Situation and Outlook."

and disinflation. Inflation (core PCE deflator) fell from 2.1 percent in 2008/Q3 to −0.3 percent and 0.0 percent in 2008/Q4 and 2009/Q1, respectively.[8]

Although the unemployment rate rose steadily from a cyclical low of 4.4 percent in May 2007 to 7.3 percent in December 2008, the FOMC only lowered the funds rate to the ZLB at its December 2008 meeting. Would the Orphanides natural growth targeting rule have removed this inertia in the funds rate? As shown in table 1, the answer is "yes." After the April 29–30 FOMC meeting, the FOMC stopped lowering the funds rate target. For the subsequent meetings through December 2008, in the spirit of the Orphanides' rule, table 1 shows a measure of the difference in forecasted growth in nominal output for 2008/Q4 and a measure of growth in potential nominal output given an assumption for the FOMC's inflation target.

The measure used for real output growth is real private domestic final purchases, which is the sum of personal consumption expenditures, residential investment, and business fixed investment. Because the series real private domestic final purchases removes changes in inventories, net exports, and government expenditures, it offers a less volatile measure of the spending of the public than GDP. The measure used for inflation is the core personal consumption expenditures (PCE) chain-weighted price index, which removes volatile food and energy inflation to give a better estimate of underlying inflation. The sum of the measures of output growth and of inflation is the proxy for forecasted

8. Since the establishment of the Fed, a consistent indicator for recession is inertia introduced by the Fed in reductions in money market interest rates (after 1970 known as the funds rate) when the economy weakens (Hetzel 2022, ch. 3).

nominal output growth. The figures reported in the table are forecasts for the particular FOMC meeting of the 2008/Q4 values.[9]

The measure used for nominal output growth consistent with the FOMC's target for price stability is the sum of the estimate of potential real output growth and an implicit FOMC objective for inflation. Consistently in 2008, the staff estimate of real potential output growth was 2.5 percent. Not until 2012 did the FOMC announce an inflation target. Economists Adam Shapiro and Daniel Wilson (2019) used textual analysis and found that before then the most common inflation target mentioned in FOMC discussions was 1.5 percent. Given the upward bias in price indices due to the difficulty of adjusting for quality improvements, measured inflation of 1.5 percent is approximately consistent with price stability. The nominal growth target is then the sum of the estimate for potential real output growth and the assumed inflation target (2.5 percent plus 1.5 percent equal to 4 percent).

The "target miss" is the difference between the proxy for nominal output growth and the value given by the natural growth targeting rule. After its April 2008 meeting, the FOMC's measure of the target miss was consistently negative. Only at its December 2008 meeting did the FOMC lower the funds rate to the ZLB. Not until early 2009 did the FOMC start quantitative easing (QE) purchases. The Orphanides natural growth rule would have offered a better guide to policy than the actual policy followed by the FOMC in 2008.

6. Why the FOMC Departed from the Orphanides' Rule in the Great Recession

Through the end of his tenure as FOMC chair, Greenspan followed the LAW with credibility policy or, equivalently, a difference Taylor rule. That is, given an expectation of price stability, the goal of monetary policy was to stabilize the economy's rate of resource utilization. That policy appeared in his congressional testimony. For example, Greenspan (US Congress, 1999b, 10) commented:

> By themselves, surges in economic growth are not necessarily unsustainable provided they do not exceed the sum of the rate of growth in the labor force and productivity for a protracted

9. With the exception of the FOMC's implicit inflation target, the forecasted series come from Board of Governors staff estimates circulated before FOMC meetings in the document now called the Tealbook, known as the Greenbook in 2008: "Current Economic and Financial Conditions, Summary and Outlook," Part 1, "Changes in Real Gross Domestic Product and Related Items," "Changes in Prices and Costs," and "Decomposition of Structural Labor Productivity."

> period. . . . Assessing conditions in the labor market can be very helpful in forming those judgments. Employment growth has exceeded the growth in working-age population this past year by almost ½ percentage point. This implies that real gross domestic product is growing faster than its potential. What is important is the information offered by changes in resource utilization for the difference between actual and potential growth.

Greenspan (US Congress, 1999a, 19) also commented, "We cannot tell . . . what the actual potential [growth rate] is. . . . But it shouldn't be our concern. Our concern should be the imbalances that emerge."

Greenspan (US Congress, 2000, 14) responded to a question about whether the Fed limited growth in raising interest rates:

> Senator, I do understand where you are coming from because I have been in the same place. . . . The question of how fast this economy grows is not something the central bank should be involved in. . . . What we are looking at is basically the indications that demand chronically exceeds supply. . . . The best way to measure that is to look at what is happening to the total number of people who . . . are unemployed. . . . What . . . we are concerned about is not the rate of increase in demand or the rate of increase in supply, but only the difference between the two. . . . In other words, we don't know whether the potential growth rate is 4, 5, 6, or 8 percent. What we need to focus on. . . is solely the difference between the two.

Monetary policy prior to the Great Recession starting in December 2007 was not expansionary and did not require the contractionary monetary policy of the Great Recession as a corrective to inflation. The FOMC's LAW with credibility policy following the 2001 recession ensured a neutral rather than an expansionary monetary policy. Compared to postwar recessions, the recovery from the 2001 recession was lackluster and earned the moniker the "jobless recovery." After the cyclical trough, from 2002/Q1 through 2006/Q4, the unemployment rate declined only slightly from 5.7 percent to 4.4 percent. Over the course of the recovery from 2001/Q1 through 2007/Q4, quarterly core PCE inflation averaged 2.0 percent. Although headline inflation increased after 2004/Q1, the reason was an enormous inflation shock that raised the price of commodities due to the integration of the BRICs (Brazil, Russia, India, and China) into the world economy.

Apart from two aspects, the Great Recession (December 2007 to June 2009) followed the typical pattern of other post-World War II recessions. The typical pattern was a prior increase in inflation produced by expansionary monetary policy. The FOMC then limited reductions in short-term interest rates while the economy weakened, postponing them until after the cyclical peak (Hetzel 2022, ch. 3). The first exception was in summer 2008 when an inflation shock produced by the integration of the BRICs into the world economy, not expansionary monetary policy, caused high headline inflation. In 2008/Q3, core PCE inflation was 2.1 percent while headline PCE inflation was 4.3 percent. The second exception was that the FOMC started reductions in the funds rate early on. It lowered the funds rate starting in September 2007 from 5.25 percent to 2 percent at its April 2008 meeting. However, the FOMC then limited reductions in the funds rate despite continued weakening in the economy out of a concern that high headline inflation would raise the public's expectation of inflation.[10]

The August 5, 2008, FOMC *Minutes* recorded (Board of Governors, 8/5/2008a, 6) the following:

> Participants expressed significant concerns about the upside risks to inflation, especially the risk that persistent high headline inflation could result in an unmooring of long-run inflation expectations. . . . Members generally anticipated that the next policy move would likely be a tightening." The unemployment rate, a lagging indicator, rose from a cyclical low of 4.4 percent in May 2007 to 6.1 percent in August 2008. Governor Kohn (Board of Governors *FOMC Transcript* 8/5/2008b, 76) stated, "About the output gap, the incoming information strongly suggests that we are on a trajectory that at least for some time will have the economy growing appreciably below the growth rate of its potential. The most obvious evidence is the persistence of a soft labor market.

Very likely the decline in housing wealth produced by the fall in house prices, a decline in real personal income from the inflation shock, and disturbances in the credit markets following the Lehman bankruptcy on September 15,

10. The FOMC did reduce the funds rate from 2 percent to 1.5 percent on October 6, 2008. However, FOMC Chair Ben Bernanke (Board of Governors FOMC Conference Call October 7, 2008c, 14–15) informed the FOMC that the reduction had a "tactical" objective to help the European Central Bank (ECB) achieve a consensus to lower its policy rate. A "coordinated" reduction in interest rates would provide "them an opportunity to get out of the corner into which they are somewhat painted."

2008, depressed the natural rate of interest to a value less than zero. Evidence that the natural rate of interest had turned negative became clear later. In the recovery from the recession, Tealbook estimates showed the real rate of interest averaging around –2 percent from 2009 through 2014 (Board of Governors 2016, 81). Over the same interval, inflation (12-month percentage changes in the core PCE, chain-weighted deflator) remained steady at 1.5 percent. If monetary policy had been expansionary because the real funds rate even at the ZLB lay below the natural rate of interest, inflation would have risen instead of remaining stable. Finally, given a funds rate at the ZLB, both forward guidance and quantitative easing were needed for economic recovery.

The turmoil in the financial markets caused by the Lehman bankruptcy on September 15, 2008, prompted the name "the Great Financial Crisis." The prevailing assumption until then had been that the Fed would never let a leveraged financial institution fail (too-indebted-to-fail). That belief had been reinforced by the bailout of the creditors of Bear Stearns in March 2008, Indy Mac in July 2008, and the government-sponsored enterprises (GSEs) Fannie Mae and Freddie Mac in September 2008. When the near failure of the insurance company AIG followed Lehman, FOMC Chair Ben Bernanke reversed course and bailed it out. At that point, the cash investors who had been providing the short-term funding for the investment banks holding illiquid, hard-to-value, mortgage-backed securities (MBS) understood that the Fed and regulators had retracted the financial safety net. However, they did not know the extent of the retraction. When the Fed bailed out AIG, the assumption was that too-indebted-to-fail had been eliminated, but not too-big-to-fail. Cash investors then fled the investment banks for government money market funds and the too-big-to-fail banks like JPMorgan Chase.

The name "the Great Financial Crisis" became standard because newspaper articles associated the financial turmoil with news arriving in early October 2008 that the economy had gone into severe recession. However, a moderate recession had already become a severe recession in summer 2008 when the temporary stimulus of the Bush rebates had worn off and when the business/inventory ratio rose sharply (Hetzel 2022, figure 21.3). In the October 22, 2008, Greenbook, the Board of Governors (2008d, I-1) staff reported: "The incoming data on consumer and business spending, industrial production, and employment suggest that aggregate output had already decelerated sharply during the summer—before the recent intensification of financial turmoil—and by more than we had earlier anticipated."

What policy should the FOMC have followed in fall 2008? It should have dealt with its concern that high-headline inflation would push expected inflation above the expectation of price stability through announcing an inflation target, a step not taken until January 2012. It then could have allowed headline inflation to decline to underlying inflation as commodity prices ceased increasing. It could have pushed the funds rate to the ZLB long before the December FOMC meeting and could have engaged in the quantitative easing that was not begun until early 2009. Although the emergency lending begun after the Lehman failure met the demand for additional liquidity, it was not quantitative easing, which works through a portfolio balance effect of replacing illiquid assets in investor portfolios with liquid bank deposits. The loans were short term, and the Fed charged market interest rates. When the Fed began to replace this creation of reserve-bank credit with securities held outright (Treasuries, MBS, and Agency debt), the monetary stimulus provided by QE initiated the recovery, which began in June 2009.

7. From Low Inflation in the Recovery to High Inflation in the Pandemic Monetary Policy

Recovery from the Great Recession was especially challenging for central banks in many countries with negative natural rates of interest requiring negative policy rates.[11] Even anemic growth in the world economy was threatened by a series of crises. In 2011 and 2012, the Euro crisis precipitated by concern for a debt doom loop in the southern economies threatened to break up the Eurozone. In August 2015, a devaluation of the Chinese renminbi prompted capital flight and threatened a Chinese housing crisis. In 2018 and 2019, US President Donald Trump raised tariffs threatening to initiate a trade war.

In the recovery from the Great Recession, QE purchases raised the natural rate of interest despite weakness in the world economy. Starting in December 2016, a positive natural rate of interest signaled by a revival in growth allowed the FOMC to begin raising the funds rate in a sustained way. The FOMC then restored the LAW with credibility policy it had abandoned in spring 2008. With these procedures, FOMC Chair Janet Yellen returned to the preemptive

11. Evidence for how global uncertainty produced negative interest rates is provided by graphs in Sløk (2019): "27% of bonds in the world trade at negative interest rates. All German bunds trade at negative yields. $15trn in negative yield bonds in the world. Excluding US from the global IG index shows that 45% of global bonds outside US trade at negative yields."

increases in the funds rate to prevent the emergence of inflation, which remained around 1.5 percent.

Yellen (2017b, 16) said:

> We should also be wary of moving too gradually. Job gains continue to run well ahead of the longer-run pace we estimate would be sufficient, on average, to provide jobs for new entrants to the labor force. Thus, without further modest increases in the federal funds rate over time, there is a risk that the labor market could eventually become overheated, potentially creating an inflationary problem down the road that might be difficult to overcome without triggering a recession. Persistently easy monetary policy might also eventually lead to increased leverage and other developments, with adverse implications for financial stability. For these reasons, and given that monetary policy affects economic activity and inflation with a substantial lag, it would be imprudent to keep monetary policy on hold until inflation is back to 2 percent.

More succinctly, Yellen (2017a) said, "If the economy ends up over heating and inflation threatens to rise well above our target, we don't want to be in a position where we have to raise rates rapidly, which could conceivably cause another recession. So we want to be ahead of the curve and not behind it." Although bank reserves increased significantly during the recovery period, real M2 grew moderately and steadily.[12] Again, as long as the FOMC follows procedures that cause the funds rate to track the natural rate of interest, money possesses no independent influence on the economy and is not a source of disturbance.

When the extent of the pandemic became evident in March 2020, the FOMC made a fateful decision.[13] Despite the fact that the virus was a negative productivity shock—for example, restaurants could not deliver safe meals—the FOMC believed it would have to counter a significant drop in aggregate demand with a highly expansionary monetary policy. Of course, as of March 2020, the FOMC had a traditional central bank responsibility to meet an increased demand for liquidity (the dash for cash). It also had to maintain aggregate demand to prevent the economy from falling into a deflationary spiral. It could have met the first responsibility of accommodating the increased demand for liquidity, however, through the purchase of short-term treasury securities, which would run

12. Real M2 is M2 divided by the CPI from St. Louis FRED.
13. The remainder of this section draws on the Mercatus Center Working Paper, Hetzel (2023).

off when the increased demand for liquidity abated. It could have met the second responsibility of maintaining growth in aggregate nominal demand through the kind of policy developed in the prior recovery. That is, it could have used a combination of forward guidance and quantitative easing (QE or the purchase of long-term treasury securities) to ensure positive growth in nominal spending sufficient to maintain price stability.

What the FOMC did, however, was to monetize to a significant degree the vast amount of government pandemic payments while promising to maintain the funds rate at the zero lower bound for a period long enough to raise inflation above 2 percent (known as FAIT, or flexible average inflation targeting). The high rate of money growth repeated the results of the high rate of money growth in the 1970s, namely, inflation. It is important to understand the relationship between money creation and growth in aggregate nominal demand and inflation. With a neutral policy (LAW with credibility), the FOMC moves the funds in line with the natural rate of interest, which is the interest rate that maintains aggregate demand equal to potential output. Given its interest rate target, the FOMC automatically accommodates a growth rate of money consistent with growth in potential output and expected inflation—ideally, consistent with price stability given a credible rule. Money creation becomes a veil and lacks predictive value.

In contrast, the pandemic monetary policy was inflationary because of the FOMC's commitment to forward guidance of a "lower for longer" funds rate. In a repudiation of the policy of preemptive increases in the funds rate implemented in the Volcker–Greenspan era, FAIT (flexible average inflation targeting) promised markets that the funds rate would remain at the zero lower bound even as inflation rose above 2 percent. (The term "flexible" in FAIT meant that the FOMC would offset undershoots of its inflation target from 2 percent but not overshoots.) From 1.6 percent in February 2021, 12-month sticky-price CPI inflation rose to 6.1 percent in August 2022 where it remained until May 2023. It then declined and reached 4 percent in September 2024. The rise followed a surge in M2, whose level rose by 40 percent from February 2020 through August 2022. As of September 2024, real M2 (M2 deflated by the CPI) had returned to a value consistent with growth in real M2 extrapolated from its post–Great Recession trend through the end of 2020.[14]

The 2021–22 rise in inflation followed by the subsequent decline have the hallmarks of a Friedman (1968 [1969]) helicopter drop. In the 1970s, the FOMC

14. Figures on sticky-price inflation are from the Atlanta Fed, and figures on M2 and real M2 are from Federal Reserve Bank of St. Louis FRED.

allowed inflation to rise during economic recoveries until inflationary expectations rose. Reducing elevated inflationary expectations required putting the economy through a recession. With the 2021–22 inflation, monetary policy benefitted from the long period of low inflation and near price stability that followed the Volcker disinflation. Throughout the 2021–22 inflation, inflationary expectations remained consistent with longer-run price stability. Although tardily, the funds rate rose off the ZLB starting at the March 2022 FOMC meeting and rose to 5.1 percent in July 2023. With the July 2023 increase, the funds rate likely increased somewhat above the natural rate of interest. Inflation persisted long enough to eliminate the excess money creation. With stability in expected inflation and the return of the funds rate to or somewhat above the natural rate of interest, inflation, like the increase in M2, was one and done.

The inflationary monetary policy of the FOMC undermined support for a free market economy because of the association of inflation with corporate profits. Inflation (quarterly data measured by the personal consumption expenditures chain-type price index) averaged 1.46 percent over the interval 2010/Q1 through 2020/Q1. From 2020/Q4 at 1.3 percent, it rose and peaked at 7.6 percent in 2022/Q2 and Q3. Corporate profits after tax averaged $1.9 trillion over the interval from 2012/Q1 through 2019/Q4. From $1.9 trillion in 2020/Q2 corporate profits rose to $3.1 trillion in 2022/Q2. The association of the rise in inflation and in corporate profits caused the widespread perception that inflation was caused by corporate greed. The expansion in aggregate nominal demand in the face of supply constraints and a reduction in potential output undoubtedly spurred corporate profits, but those profits did not arise independently of the monetary and fiscal expansion.

Carola Binder (2024, 268) wrote:

> Some Democrats in Congress used the geopolitical emergency and what they dubbed "greedflation" to motivate new calls for anti-profiteering or anti-price gouging legislation. In March Senator Sanders introduced the Ending Corporate Greed Act, which would "impose a 95 percent windfall tax on the excess profits of major companies." In May [2022], Senator Warren and two of her colleagues introduced the Price Gouging Prevention Act of 2022, and Representatives Kim Schrier, of Washington, and Katie Porter, of California, both Democrats, introduced the Consumer Fuel Price Gouging Prevention Act.[15]

15. The citations are from DePillis (2022), Sanders (2022), and Warren et al (2022).

8. Arguments Against and For a Rules-Based Monetary Policy

A critique of a rules-based monetary policy is contained on the Board of Governor's website.[16] The Board of Governors (2018) wrote:

> Some academic research on policy rules contends that tying monetary policy to a simple and unvarying policy rule can simplify the central bank's communications with the public and make monetary policy predictable and relatively easy to understand. . . . The conclusions of this academic research depend on **a number of assumptions that are unlikely to hold in the real world.** For example, this research assumes that the structure of the economy is well understood by policymakers and the public, and that the economy can be represented fairly accurately by a small number of equations. However, **the true structure of the economy is not known for certain;** it is highly complex, and the simple models used by researchers do not capture that complexity. Furthermore, in the real world, **the structure of the economy changes over time. . . .** The economic models that academic researchers typically use to study the implications of following a simple policy rule also assume that any unexpected events that will affect the economy in the future will resemble unexpected events that occurred in the past—that is, that the types and range of *shocks* affecting the economy in the future will not be all that different from the shocks that have hit the economy before. But **in practice, the nature and magnitude of the shocks hitting**

16. The Fed's message seems to dominate popular commentary. George Robertson (2024) received the following from Elon Musk's X.AI GROK when he asked, "What is the Fed's reaction function?" A small illustrative excerpt follows:

> The Federal Reserve's approach to monetary policy, especially post-2020, indicates a move towards a more nuanced, less formulaic strategy. . . . The Fed might avoid defining a strict reaction function to maintain flexibility in response to unforeseen economic shocks or shifts in economic theory and understanding. . . . By not defining a strict formula, the Fed can adapt its policy narrative and actions in response to public and market reactions, aiming for a Goldilocks economy where policy is neither too tight nor too loose. . . . The Federal Reserve's approach embodies a complex, adaptive strategy that doesn't fit neatly into a single formula but rather operates within a broad, dynamic policy framework. This approach might be seen as more effective in navigating the complexities of modern global economies.

> **the economy can and do change over time.** A simple policy rule that leads to good economic performance under one constellation of shocks is not guaranteed to lead to similarly good performance under a different constellation of shocks.
>
> Moreover, the academic research literature on policy rules typically assumes that households and businesses would fully and immediately understand what the rule would tell the central bank to do in all future economic scenarios as well as the implications of the central bank's policy actions for the economy. **If these assumptions do not hold in the real world, then the benefits that the models claim for simple rules will not be fully realized.** (boldface in original)

This statement raises several questions. In its rejection of a rules-based monetary policy, it appears to imply that with a discretionary monetary policy the behavior of the yield curve, which transmits the impact of FOMC behavior to the economy, reacts in a predictable way to stabilize the economy based only on the contemporaneous policy actions of the FOMC. Consider the example in which the economy begins to exhibit a sustained weakness evidenced by persistent declines in the rate of resource utilization. Based on policy in the Greenspan era after the FOMC had reestablished credibility for price stability in 1994, markets would expect that the FOMC would lower the funds rate over time in a persistent way but begin to raise it at signs of overheating in the labor market. That is, the yield curve would move in a way such that the decline in the funds rate did not prompt markets to expect inflation and build in a premium to account for higher inflation. That behavior depends upon a reaction function conditioning how the FOMC responds to future information on the economy not just to contemporaneous incoming information as implied by a policy of discretion.

One can accept the bold-faced assertions in the first paragraph of the above excerpt without accepting the bold-faced conclusion in the last paragraph of the Board's defense of discretion and rejection of rules. The logic connecting the assertions with the conclusion is missing. That is, given the FOMC's view of the world, how does it solve the identification issue discussed above without a broad characterization of the model of the economy? One can accept the claim that in some ways "the structure of the economy changes over time," perhaps by becoming more open to world trade or by becoming more of a service economy. Of course, models are abstractions rather than complete descriptions of the economy. However, the defense of discretion does not in itself explain how

the FOMC can predict the impact of individual policy actions on the yield curve and on the economy.

An example of how the FOMC does in fact communicate the consistency in its policy to markets despite any such context in its routine public pronouncement occurred with the change in its Statement on Longer-Run Goals and Monetary Policy Strategy originally formulated in January 2012 and reformulated again in September 2020. The first Statement reflected the contemporaneous composition of FOMC participants who were concerned to maintain the earlier focus of policy on price stability. Given the uncertainty over the vigorous QE program ongoing at the time and its possible effects on inflation, they wanted to institutionalize the policy of price stability not only by stating an explicit inflation target but also by accompanying it with the reinforcing language in the 2012 Statement. The Statement language distinguished sharply between inflation, a nominal variable, and employment, a real variable. Implicitly rejecting the concept of a Phillips curve, the FOMC could set an explicit target for the former but not the latter.

The second statement, in September 2020, reflected the contemporaneous Keynesian composition of the FOMC and a desire to reinstate a policy of strong stimulus organized around a Phillips curve with its two independent goals of low inflation and low unemployment. The message of the first Statement was that the FOMC would continue with the policy of preemptive increases in the funds rate to ensure continued price stability. The message of the second Statement was that the FOMC had abandoned preemptive increases in the funds rate in order to temporarily trade off price stability against pursuit of a low, "inclusive" unemployment rate.

Another criticism of the Board of Governors' public rejection of a rules-based monetary policy expressed in the above 2018 excerpt has to do with the Board's assertion that discretion is required in order to respond to unforeseen shocks impinging on the economy. FOMC spokespersons make that assertion as though it is self-evident, without any attempt to document successful past implementation. In fact, the FOMC's record reveals failures in its ability to respond to unforeseen shocks successfully. Examples include the FOMC's response to the October 1987 stock market crash and its response to the Asia crisis in fall 1998. Each time, the FOMC's and Board staff's forecast of recession did not materialize. The FOMC, however, responded with expansionary monetary policy, which increased inflation and then had to be offset by tightening (Hetzel 2008, 2012, and 2022). Another example happened in 1970 when inflation rose to 6 percent, but the unemployment rate remained at 6 percent, above the 4 percent taken

as full employment. The FOMC concluded that inflation was due to cost-push forces and needed to be dealt with by income policies rather than by moderate money growth.

In general, shocks continually impact the economy, and, by definition, they are all unforeseen. Given the credibility of maintaining price stability, the issue is always the same. How does the shock influence whether the resulting growth in output is above or below potential growth? LAW is always the bedrock of policy. Occurrence of an unusual shock is exactly when a rule is most important.

Characterizing a rule as "mechanical," which is a common practice, is disingenuous. With LAW with credibility procedures that preserve price stability, the FOMC is not manipulating aggregate demand to counter individual shocks but rather making certain that the price system works by moving the funds rate in a predictable way to maintain a steady rate of resource utilization in the economy. In making that judgment, it uses a variety of information such as the behavior of the labor market, inventories, anecdotal information about the economy gleaned by contacts with businesspeople and the boards of directors of the Reserve Banks, and so on. It is necessarily exercising judgment, albeit in a way that is disciplined over time.

An unfortunate aspect of monetary policy is the unwillingness to allow short-term reversals in movements of the funds rate. The willingness instead to make short-term reversals in response to new information would be facilitated by a rule. Such flexibility in the funds rate but not the rule would be especially important in times of extreme difficulty in forecasting the behavior of the economy. Instead, the pattern of changes in the funds rate is constrained to be unidirectional over significant periods of time. The reason is that the FOMC worries about the optics of a short-term reversal. Populist critics of the FOMC will charge that it made a mistake. If the FOMC raises the funds rate and then reverses it, they will charge that the FOMC mistakenly tried to slow down the economy and increase unemployment. A rule would act to offset this unfortunate feature of monetary policy.

The kind of serious debate between the FOMC and the economics profession, representative of the public debate required for transparency and accountability, should start with the FOMC putting its individual policy actions in the context of their underlying consistency as disciplined by a reaction function. By not making its reaction function explicit, the FOMC does not need to make explicit its understanding of the basic structure of the economy that causes the reaction function to stabilize the economy. An explicit specification would necessarily initiate a discussion over what monetary policy controls, and how it

exercises that control. The FOMC would then have to address its understanding of the structure of the economy that transmits its influence on the yield curve to the behavior of households and firms. It would need a model of the economy. There is no structural model of the economy that spells out the natural values of real variables such as unemployment and potential output. However, there are two distinct general characterizations of the structure of the economy, labeled here "traditional Keynesian" and "traditional monetarism," which imply very different reaction functions and optimal policy.

In the Keynesian tradition, the price level is a nonmonetary phenomenon. There is an inherent inflexibility in relative prices that causes them to move only slowly to clear markets in response to variations in aggregate demand. Given that stickiness, inflation is in part a result of aggregate real demand, and in part a result of cost-push and wage-push pressures. The formulation of monetary policy is necessarily organized around a Phillips curve. Because expectations are assumed to be adaptive, that is, formed entirely on the observed behavior of past inflation, the FOMC can take them as given in each period. It can then manipulate slack discretionarily, that is, on a period-by-period basis without commitment to a rule.

In contrast, in the monetarist tradition, the price level is a monetary phenomenon. Inflexibility in relative prices that prevents market clearing in recessions is due to monetary instability that causes the price level to evolve in an erratic and unpredictable manner. It is not an inherent feature of a market economy. To provide for price stability, FOMC procedures must provide for monetary control.

Provision of that discipline does not necessarily entail targets for money or bank reserves. Monetary control requires a rule that provides for a stable nominal anchor in the form of the expectation of price stability and that allows the price system unfettered control of the determination of real variables. The rule followed in the Volcker–Greenspan era—leaning-against-the-wind with preemptive increases in the funds rate to prevent the emergence of inflation or LAW with credibility—was such a rule. A rules-based monetary policy in this spirit would not be a venture into the unknown but rather a return to a proven, successful monetary policy.

What about monetary policy during the pandemic? To prevent the economy from falling into a deep recession, did the FOMC not need discretion to respond to the unprecedented shock of the pandemic? In the spirit of the Board of Governors' 2018 statement rejecting a rules-based monetary policy reproduced above, and also in the spirit of the above characterization of Keynesianism,

the pandemic monetary policy reflected LAW with trade-offs. That is, the FOMC conducted a discretionary monetary policy, for example, as appeared in the ambiguity about the extent to which it would allow an overshoot of its 2 percent inflation target. It organized monetary policy around Phillips curve trade-offs as it had in the 1970s. The question then arises: What if the FOMC had conducted policy in the Volcker–Greenspan spirit, as encapsulated in the 2012 Statement, based on preemptive changes in the funds rate to preserve price stability?

9. A Counterfactual Using LAW with Credibility During the Pandemic

If with its pandemic policy the FOMC had not abandoned LAW with credibility for LAW with trade-offs, how much sooner would it have started reversing the increase in its portfolio (started tapering) and started raising the funds rate off the ZLB? One way to answer these questions is to ask when the natural growth rule of Orphanides (2023) would have signaled growth in nominal GDP above the benchmark of 2 percent inflation plus trend growth in real output. Examination of nominal GDP growth suggests that with this rule the FOMC would have started reversing the increase in its portfolio (started tapering) in 2020/Q3 and would have raised the funds rate starting in 2021/Q1.

As a benchmark for nominal GDP growth consistent with price stability, over the interval of the recovery from the Great Recession from 2009/Q4 to 2019/Q4, a period associated with price stability, quarterly annualized nominal GDP growth averaged 4.2 percent. In 2020/Q2, with the onset of the pandemic, it fell to –29.1 percent. In 2020/Q3, however, the growth rate of nominal GDP recovered to 40.0 percent. The latter number indicates that a recovery was in place, and the FOMC should have begun to taper its QE purchases. From 2020/Q4 through 2022/Q2, the growth rate of nominal GDP averaged 10.5 percent, well above the 4.2 percent number for the post-recovery period of the Great Recession. (From 2022/Q3 through 2024/Q3, the number declined to 5.9 percent.) The FOMC should have begun to raise the funds rate off the ZLB in spring 2021, a year earlier than the March 2022 date when the liftoff actually occurred.

Ideally, one would have the Board staff's Tealbook forecasts of nominal GDP growth. However, these forecasts are made available to the public only after a lag of five calendar years. In the FOMC Minutes released after FOMC meetings, however, there is a summary of the staff forecasts. The forecasts indicate that a strong recovery began in fall 2020. They are consistent with the actual strength in nominal GDP reported above. At the September 15–16, 2020, FOMC meeting,

the Minutes (Board 2020a, 5–6) in the section entitled Staff Review of the Economic Situation reported:

> The information available at the time of the September 15–16 meeting suggested that U.S. real GDP was rebounding at a rapid rate in the third quarter. Labor market conditions continued to improve markedly in July and August. . . . Total nonfarm payroll employment expanded strongly in July and August. . . . The unemployment rate moved down further to 8.4 percent in August. . . . The labor force participation rate rose, on net, and the employment-to-population ratio increased further in July and August. Initial claims for unemployment insurance benefits continued to move down. . . . The trimmed mean measure of 12-month PCE price inflation constructed by the Federal Reserve Bank of Dallas was 1.8 percent in July. The consumer price index (CPI) increased 1.3 percent over the 12 months ending in August, while core CPI inflation was 1.7 percent over the same period. . . . The latest readings on survey-based measures of longer-run inflation expectations moved up a bit but remained within their ranges in recent years. . . . Real PCE [personal consumption expenditures] expanded strongly in July. . . . Housing-sector activity continued to expand. . . . Indicators of business fixed investment suggested that this sector was beginning to recover on balance. . . . The increase in factory output was broad based.

For the FOMC meeting during December 15–16, 2020, the Staff Review of the Economic Situation included in the Minutes (Board 2020b, 7) reported:

> Primarily in response to the recent favorable news on the development of COVID-19 vaccines, the staff revised up its projection of real GDP growth for 2021 as a whole, as social-distancing measures were expected to ease more quickly than previously assumed. With monetary policy assumed to remain highly accommodative, the staff continued to project that real GDP growth over the medium term would be well above the rate of potential output growth, leading to a considerable further decline in the unemployment rate. The resulting take-up of labor- and product-market slack was expected to lead to gradually increasing inflation, and, for some time in the years beyond

2023, inflation was projected to overshoot 2 percent by a moderate amount.

What about the Greenspan criterion for liftoff, that is, signs of overheating in the labor market? The Greenspan criterion for preemptive increases in the funds rate was met in spring 2021, consistent with the figures showing the strength in nominal GDP growth reported above. In the intervals preceding the two prior business cycle peaks, the total private quits rate averaged 2.5 (August 2005 to December 2007) and 2.6 (July 2018 to February 2020). The quits rate jumped to 3.1 in April 2021 and reached 3.3 from November 2021 to April 2022. In the intervals preceding the business cycle peaks, the total private job openings averaged about 4 million (August 2005 to December 2007) and about 6.5 million (June 2018 to February 2020). Job openings then jumped dramatically starting from about 6.1 million in December 2020 to 10 million in July 2021 with a peak of 11.2 million in March 2022.[17]

A rule focused on maintaining price stability, and keeping growth in nominal output aligned with growth in potential real output, would have caused the FOMC to begin raising the funds rate very probably a year before the actual rise. In doing so, it would have mitigated the rise in actual inflation in 2021 and 2022 by maintaining underlying inflation consistent with price stability.

10. An Explicit Rule Would Advance Transparency and Accountability

The argument made so far is that a policy consistent with maintenance of price stability is both a necessary and a sufficient condition for economic stability. A policy of price stability is a prerequisite for monetary policy to support the functioning of a market economy. During the history of the Fed, the departures from such a policy and the accompanying instability in the economy demonstrate the need for the FOMC to commit to the required rule and to educate the public as to its desirability. Current FOMC communication fails in these respects.

At present, FOMC communication with the public consists of forward guidance about what it believes is the likely path of the funds rate going forward. It seems intuitive that if the likely path is a decline of the funds rate the FOMC's

17. The quits rate measures the number of quits (workers leaving their jobs voluntarily) divided by employment multiplied by 100. Job openings measures positions for which work is available and for which the firm is actively recruiting. Data are from the Job Openings and Labor Turnover collected by the Bureau of Labor Statistics and reported in St. Louis FRED.

priority is to maintain a healthy labor market ("maximum employment"). Similarly, if the likely path is an increase, the FOMC's priority is to preserve price stability ("stable prices"). The chair highlights these priorities in the post-meeting press conference. Heuristically, in the spirit of this public communication, raising and lowering the funds rate acts like a throttle that the FOMC can push on to make monetary policy predictably expansionary when needed and pull on to make monetary policy predictably contractionary when needed. Forecasts of the near-term behavior of the economy guide the FOMC as to the need to push or pull the throttle.

Confidence in these procedures, however, requires an understanding of how they work through the price system to coordinate the behavior of firms and households, that is, an understanding of the structure of the economy? Does the FOMC really understand the structure of the economy so that it always stabilizes rather than periodically destabilizes it? Does the structure of the economy not impose a discipline on FOMC procedures that manifests itself in an underlying consistency in the optimal policy? If so, how does the FOMC learn about that structure and the resulting need for a consistency in policy (a rule)?

The need for an answer to these questions can be illustrated by the dramatic change in the monetary policy regime in March 2020 when the COVID-19 virus impacted the economy. FOMC Chair Powell (2020, 2021a, 2021b) explained the rationale for a strongly expansionary monetary policy. The absence of any correlation between inflation and unemployment during the recovery from the Great Recession implied the existence of a Phillips curve flat down to at least the 3.5 percent level of unemployment that existed without inflation before the pandemic. Encapsulating the abandonment of the Volcker–Greenspan–Yellen policy was the abandonment of preemptive increases in the funds rate to prevent the emergence of inflation in favor of the policy of FAIT.

With the FAIT framework, when inflation rose in 2021, because the unemployment rate was above 3.5 percent, the FOMC and Chair Powell (2021c) based policy on the assumption that it would be transitory and would not require an increase in the funds rate. What then should one make of the need for a sharp rise in the funds rate that began in March 2022? In retrospect, should not the FOMC have retained the former policy of price stability through preemptive increases in the funds rate rather than rejecting it in favor of the activist policy of the 1970s organized around Phillips curve trade-offs? In the 1970s, with the unemployment rate above the presumed full employment level of 4 percent, the FOMC also thought that the Phillips must be relatively flat. Inflation had to come from external supply shocks just as the FOMC assumed in 2021 and 2022.

The language of discretion, as opposed to the language of economics with its framework of a model of the economy and a reaction function (a rule), allows FOMC communication to portray macroeconomic instability as arising from external, unforeseen shocks rather than from a nonoptimal policy rule. The FOMC never has to ask whether macroeconomic instability arises from a mistaken rule. Such ambiguity is facilitated by the absence of any systematic procedure for maintaining an institutional memory useful for evaluating past monetary policy regimes.

The FOMC's communication in terms of forward guidance does not answer the question "What does the FOMC control and how does it exercise that control?" An answer requires a model expressed not as a structural model of the economy, which is a technical impossibility, but rather a model detailed enough to explain how the price system transmits the policy actions of the FOMC to the economy, and how the consistency in policy shapes the expectations of markets. Such a model would address whether inflation is a monetary or a nonmonetary phenomenon and whether the FOMC can exercise predictable control over trade-offs between low unemployment and low inflation.

In an increasingly populist world, it is important for the FOMC to be clear about the limits of its powers. Monetary policy is and has been stabilizing when the FOMC follows a rule that allows the stabilizing properties of the price system to work. Such a rule requires preemptive increases in the funds rate to maintain price stability. The FOMC is then tracking the natural rate of interest rather than controlling the real economy. Maintaining "maximum employment" requires a rule that allows output to grow at its potential. The FOMC needs to communicate to progressive advocacy coalitions like Fed Up that raising the funds rate preemptively when inflation is "nonexistent" does not throw workers out of work.

Fed Up organized a counter Jackson Hole conference in August 2014. Binder (2024, 246) wrote:

> Many of these activists were unemployed and had been sent to Jackson Hole on behalf of a coalition of more than seventy left-leaning and populist advocacy groups, community organizations, and labor unions, including the Center for Popular Democracy. The coalition . . . advocated for continued low interest rates, greater diversity at the Fed, and a stronger commitment by the Fed to address unemployment and racial disparities in the labor market.

As an outcome of its Fed Listens program, the FOMC later adopted the spirit of the Fed Up program in its FAIT monetary policy.[18] The significant rise in underlying inflation in 2021 and 2022 argues for a return to the policy of the Volcker–Greenspan era with its preemptive increases in the funds rate to maintain price stability.

At each FOMC meeting, explicitness about the rules-based nature of a stabilizing monetary policy organized around price stability would start with a consensus of FOMC participants over the Summary of Economic Projections (SEP), to be published regularly after the meeting. The FOMC chair would organize discussion at FOMC meetings around a Board staff Tealbook forecast that gives content to the Orphanides' rule, expressed above as formula (4) in section 5. That is, the Tealbook would report a path for the funds rate projected to eliminate the difference between the growth of nominal output, n, and the sum of the Fed's inflation goal, π^*, plus the growth rate of potential real GDP, g^*, that is, n^*. In its discussion, FOMC participants would modify their forecasts based on their usual debate over the forecasts contained in the Tealbook. In the press conference, the FOMC chair would highlight and defend the path for the funds rate based on the Orphanides' rule.

The monetary policy public debate required for accountability and transparency would then be encouraged by Fed watchers, who would compare this FOMC forecast with the forecasts of market players like the Blue Chip forecasts and debate its plausibility. Reporters at the post-FOMC press conference would ask about the reasons for the differences in market forecasts and the FOMC's forecast. Questions would go beyond the current game of trying to tease out from the chair additional information about the likely behavior of the future funds rate. Over time, the FOMC's reaction function for controlling nominal spending would become credible and a fundamental factor in enforcing the expectation of price stability. It would be a bulwark against populist political pressures.

At present, monetary policy depends upon an unarticulated FOMC understanding of the structure of the economy. Accountability would be enhanced by debate with academic economists over the appropriate structure as represented

18. The Board of Governors (2021) described Fed Listens on its website (https://www.federalreserve.gov/fedlistens.htm):

> In 2019 and 2020, the Federal Reserve undertook a comprehensive, multiyear review of its monetary policy strategies, tools and communication practices. An important pillar of that review was *Fed Listens*, a series of events held around the country that engaged a wide range of organizations—employee groups and union members, small business owners, residents of low- and moderate-income communities, workforce development organizations and community colleges, retirees, and others—to hear about how monetary policy affects peoples' daily lives and livelihoods.

in a model. Accountability also requires a review by academic economists of the quality of FOMC internal debate. To this end, transcripts of FOMC meetings should be released after one year rather than the current timeframe of five calendar years. Because FOMC chairs determine the agenda for FOMC meetings, and because they largely confine discussion to individual policy actions, they exercise a dominant influence on monetary policy understood as the consistency underlying those individual policy actions. Accountability requires that FOMC participants have the necessary background to challenge the chair. Such independence is discouraged based on a common understanding that the FOMC needs to reach a consensus with few or no dissents. Economists Andrew T. Levin and Christina Parajon Skinner (2024, 25) pointed out the absence of FOMC dissents "in the face of accelerating inflation" that started in 2021.

In addition to the Committee SEP, each FOMC participant other than the FOMC chair could make public their own SEP with forecasts for growth in nominal and potential real output and a funds rate path, as well as the components currently contained in the SEP. Participants then would explain the differences in their forecasts from the FOMC consensus SEP. Several reasons for the differences from the FOMC SEP consensus would be possible: (1) a different forecast of the evolution of the economy; (2) a reaction function different from that of the FOMC consensus; and (3) a different model of the economy. The next section makes the argument that the explicitness about a rules-based policy advocated here would not limit the ability of the FOMC chair to defend Fed independence.

11. Defending Fed Independence with the Language of Rules

In the past, the FOMC chair has found the language of discretion useful for defending Fed independence. The language of discretion allows the chair to claim to be addressing the economy's most pressing problem. This strategy has worked in an environment in which populist critics are marginal. However, the FOMC cannot assume that this environment will always exist. Binder (2024, 248) cited President Trump for criticizing the FOMC and the "naiveté of Jay Powell" for not cutting the funds rate, which was 1.5 percent at the time, to zero: "No inflation! . . . A once in a lifetime opportunity that we are missing because

of 'boneheads.' " [Trump] also tweeted, "who is our bigger enemy, Jay Powell or Chairman Xi?"[19]

The general problem is that while the language of discretion allows the FOMC chair to claim to be managing the economy to maintain a high level of employment ("maximum employment"), its ambiguity can be turned against the FOMC. It does not deal directly with the criticism of the populists who claim that a policy of price stability requires maintaining an undesirably high level of unemployment. Binder (2024, 250) wrote: "Senator Elizabeth Warren, a progressive Democrat from Massachusetts who had campaigned for the Democratic presidential nomination, promised to "appoint Federal Reserve Board members who believe in full employment, who recognize that inflation fears have been overblown for years, and who are willing to let wages grow."[20]

A policy of price stability is a prerequisite for full employment. With the price stability that results from a credible rule that causes price setters to set dollar prices based on the assumption of price stability, the FOMC is free to allow the stabilizing properties of the price system to work. With the policy termed here "LAW with credibility," the FOMC is free to move the funds rate to maintain stability in the economy's rate of resource utilization. Consequently, real output grows in line with potential output. Full employment is a byproduct.

A defense of a price stability policy would require the honesty to take responsibility for the inflations and deflations that have accompanied macroeconomic instability in the past. The two primary examples of recent inflation are those of the 1970s and of 2021–22. Both resulted from high rates of money growth that resulted from the FOMC's departure from LAW with credibility. The failure to implement preemptive increases in the funds rate to prevent the emergence of inflation was tantamount to the macroeconomic equivalent of price fixing. Most generally, the FOMC would need to abandon the misleading message that a market economy is inherently unstable and requires the management of a discretionary monetary policy.

At present, early 2025, implementation of a stabilizing monetary policy faces enormous challenges. The heart of a stabilizing LAW policy is to maintain the expectation of price stability and then move the funds rate in a way that counters persistent increases or decreases in the economy's rate of resource utilization so as to maintain growth in real output at its potential rate. However,

19. The citations are tweets: Donald Trump (@realDonaldTrump), tweet, September 11, 2019, and August 23, 2019.
20. Elizabeth Warren, "Elizabeth Warren's Remarks at St. Anselm College," December 12, 2019, https://2020.elizabethwarren.com/st-anselm-speech.

implementation of such a policy requires forecasting the near-term behavior of the economy. Policy makers must then assess whether deviations of inflation from price stability will be transitory or sustained. Similarly, they must assess whether emerging undue weakness or weakness or strength in the economy will be transitory or persistent.

This dual assessment is rendered especially difficult given the massive increase in uncertainty about the way in which fiscal policy and tariffs will impact the economy. In addition, the Fed could serve as a scapegoat for disruption to the economy caused by tariffs and irresponsible fiscal policy. Politicians could easily blame any disruption to the real economy on the FOMC for maintaining the funds rate at too high of a value. Maintenance for the expectation of price stability could be rendered difficult given both populist attacks on the Fed and an unwillingness of the political system to deal with a structural deficit only worsened by large tax cuts. A problem for the FOMC will be the incentive to maintain the existing funds rate until the economic situation clarifies and until the chair can achieve a consensus. That incentive could impart an undue inertia to changes in the funds rate that over time appear as essential to stabilize the economy.

The FOMC needs to be explicit about the rule it is following so that the public has confidence in the long-run stability of prices and the economy. The public also needs to know that the internal debate within the FOMC is fully addressing how to deal with the rise in uncertainty over the course of the economy. That communication will be especially challenging as the FOMC will want to present a united front rather than suggesting that it is itself divided.

12. Concluding Comment

Monetary policy and its implementation have become hugely complicated. As a result, accountability to the public and to Congress has become nearly impossible (Levin and Skinner 2024). One problem is that the implementation of monetary policy seems to be an ever-increasingly complex task, while in reality the design of the monetary policy regime is simple (Nelson 2024). The Fed's language of discretion obscures the simplicity of the underlying consistency in policy. Moreover, the endless parsing by the media of the Fed's communication about forward guidance and the behavior of the economy suggests to the public that the FOMC understands the structure of the economy. If that were the case, it could (and should) provide a simple conceptual framework for monetary policy based on that under-

standing. To do that, the FOMC would need to make explicit the consistency in its policy, i.e., the rule that it now communicates informally to markets.

As long as the Fed's communication about the consistency in monetary policy is opaque, there can be no oversight either by the economics profession or by Congress. To eliminate opaqueness, the FOMC needs to drastically simplify, and thereby clarify, its communication. To do so, it would have to accept the idea that economic stability comes from procedures that allow the stabilizing properties of the price system to work. It would then have to admit that allowing the price system to work requires a rule that provides for a stable nominal anchor in the form of the expectation of price stability and turns over the determination of real variables (output and employment) to the unfettered operation of the price system.

FOMC chairs like to argue that the alternative to Fed independence and its presumed discretionary policy is subjecting monetary policy to interference and control by partisan political forces and that inflation would be the result. They do not discuss the idea that a better way to defend Fed independence would be a rules-based monetary policy, widely understood by the public, that provides policy continuity across a changing political environment and uncertain political appointments to the Board of Governors.

Appendix: Money Creation and Destruction in a Regime With and Without IOR

In the pre-October 2008 period before IOR, to prevent market interest rates from rising above the FOMC's interest rate target, excess supply in the bond market would require open-market purchases (replacing bonds with money from their purchase by the New York Desk, thus adding to its bond portfolio accompanied by bank deposit creation). Conversely, to prevent market interest rates from falling below the FOMC's interest rate target, excess demand in the bond market would require open market sales (replacing money with bonds from their sale by the New York Desk out of its bond portfolio, accompanied by bank deposit destruction).

In the succeeding period of IOR, excess supply in the bond market would lead to a decline in bond prices and an increase in their interest rate. At an unchanged funds rate target (unchanged IOR rate), banks would find it profitable to buy bonds and create bank deposits (money). That is, individual banks would *try* to draw down their reserves to buy bonds. For banks collectively, total bank reserves would remain unchanged, but with the bank deposits held at the

Fed more of them would be devoted to clearing purposes and fewer would be held as reserves beyond what banks need for clearing purposes. Conversely, excess demand in the bond market would lead to an increase in bond prices and a decrease in their interest rate. At an unchanged funds rate (unchanged target IOR), banks would find it profitable to sell bonds and destroy deposits (money). That is, individual banks would *try* to gain reserves by selling bonds to place them with the Fed at the existing, more attractive IOR. For banks collectively, total bank reserves would remain unchanged, but fewer of them would be held for clearing purposes and more of them would be held as reserves beyond the need for clearing purposes.

With IOR, banks would adjust the demand for reserves for clearing transactions by using either more or less of the surplus of reserves supplied by the large size of the Fed's asset portfolio beyond the basic amount demanded for clearing purposes. Just as in the pre-IOR world, banks have an incentive to arbitrage away a difference in the funds rate and the market rate on bonds by buying or selling bonds, as the case may be with corresponding changes in bank deposits. The result is that the FOMC maintains the level of the funds rate with an unchanged IOR, but bank deposits and money change. As in the pre-IOR period, monetary control still requires that the FOMC have procedures that cause the funds rate to track the natural rate of interest.

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