RETHINKING THE FRAMEWORK FOR MONETARY POLICY

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Once again, the Federal Reserve is under attack from lawmakers who propose measures designed to increase the accountability of monetary policymakers while preserving the independence of the institution. Legislation that is currently the subject of debate on Capitol Hill would either remove the voting power of District Reserve Bank presidents (Hamilton 1993; Sarbanes 1993) or require that they be appointed by the President of the United States and confirmed by the Senate (Gonzalez 1993). I will argue in this paper that these efforts (well-intentioned or not) to alter the monetary policymaking process cannot possibly improve the substance of policy, because they do not address the central shortcoming of the present framework: the absence of a single, clear, measurable, and attainable objective for monetary policy. Instead, the political leadership focuses on a mix of objectives that no central bank can provide.

Congress should direct the central bank to promote the maximum attainable level of employment and output by achieving and sustaining a stable price level. The ideal framework for monetary policy includes independence for policymakers in pursuing the objective of price stability and accountability for performance relative to that objective. The Federal Reserve should have complete freedom to design and adopt procedures and set and seek intermediate targets, without political interference. At the same time, it must constantly be held accountable for the results of its actions—for producing a stable price level over time. The appropriate committees of Congress or the Executive Branch must have the authority to, and be specifically directed to,

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remove and replace monetary policymakers if and when the actual price level deviates from stability over a pre-specified time by a pre-specified amount. Meanwhile, policymakers should not be distracted from the objective of price-level stability by congressionally mandated targets for real growth or the unemployment rate.

Some, outside government advocate replacing the Federal Reserve with a private system of money creation, a so-called free-banking environment. I argue that theory and evidence demonstrate the superiority of a government-sponsored central bank or other monetary authority that is guided by a statutory objective of price stability, is independent in pursuing this objective, and is held strictly accountable for delivering it.

The Objective

First, what is the proper objective of monetary policy? A primary goal of public policy is to promote an environment conducive to achieving the highest standard of living that our endowment of real resources and human capital will permit. The pursuit of this goal is necessarily constrained by what is possible and what is not possible.

What Monetary Policy Cannot Accomplish

It is now widely accepted that monetary policy cannot directly deliver permanently higher levels of employment and output. Despite the overwhelming evidence in favor of this proposition, some remain transfixed by the appearance that real economic measures follow movements in money in a predictable way. The body of evidence—from experience, theory, and empirical analysis—against this notion is compelling. Thirty years ago, it was widely believed that monetary policy could raise output and lower unemployment, in exchange for a higher rate of inflation. The rising trends in both inflation and unemployment in the 1970s and the simultaneous disinflation and downward trend in unemployment during the 1980s soundly reject this logic (Council of Economic Advisors 1990).

Yet there remains the apparent lead-lag relationship between money and output and unemployment over the course of the cycle. One possible explanation, from real business cycle theory, is that the public

For example, during recent congressional hearings on monetary policy and the economy, a number of prominent academic economists advocated active manipulation of fiscal and monetary policy to manage the economy. See the testimonies of James Tobin and Robert Solow in U.S. Congress, Joint Economic Committee, "Monetary Policy in 1993," 102nd Congress, 2nd Session, 30 December 1992, and the testimonies of Paul Samuelson and Paul McCracken in U.S. Congress, Joint Economic Committee, "The Economic Outlook," 103rd Congress, 1st Session, February 1993.

alters nominal money balances in anticipation of future changes in output, creating the illusion that money causes output (King and Plosser 1984). Although this reasoning may not be complete, empirical analysis cannot demonstrate that causality runs in the other direction, from money to output. Granger causality tests are valid only within the context of a given model; if the model is misspecified, the results are worthless. Charles Carlstrom and Edward Gamber (1989) suggest that money causes output in the same way that people carrying umbrellas cause rain. Both assertions arise from models that omit an expectations variable.

Another explanation is that while monetary policy can affect the real economy in the short run, it cannot be actively used to fine-tune business activity. The economy is too complicated and rapidly changing and too little is understood about the monetary transmission mechanism for anyone to confidently and effectively adjust policy to dampen fluctuations. And even if we had sufficient knowledge, even the proponents of fine-tuning acknowledge that only surprise moves in money have real effects, putting policymakers in the position of routinely attempting to deceive the public. Nor can monetary policy favor some sectors, regions, or industries over others, or alter the distribution of income. Historical experience in this country, and around the world, suggests that inflation, as a deliberate policy either to promote economic growth or to affect sectoral or income distribution objectives, produces perverse results and eventually leads to poor economic performance.

What Monetary Policy Can Accomplish

What monetary policy can do to promote maximum sustainable growth is provide a stable purchasing power for the nation's currency, that is, a stable price level. The only policy target over which monetary authorities have complete and lasting control is the monetary base. Through open-market operations, and to a more limited extent by altering the discount rate or reserve requirements, the Federal Reserve can control the monetary base with some precision. Close control of the base gives the Federal Reserve reasonable influence over the broader monetary aggregates from quarter to quarter. Shifts in the narrow monetary aggregates that are unexpected may cause temporary disruptions in economic activity, but in the long-run, determine only the general level of prices.² Since monetary policy cannot

²Alex Cukierman (1992) notes the transitory effects of money on output. Stanley Fisher (1977) and John Boschen and Leonard Mills (1990) present evidence that money has permanent effects only on the price level.

be used to advantageously manipulate economic activity, yet cannot escape its role in determining the price level, the natural objective of monetary policy is to provide that pricing environment most conducive to maximum sustained economic growth and the highest possible standard of living. A stable price level is ideal in this respect, where price-level stability is defined as the condition of the general price level that induces individuals to behave as though they expect no change in the domestic purchasing power of the dollar over time. This is popularly known as "zero inflation", but it is more accurately viewed as the absence of change in the average of all prices. Individual prices would move up and down relative to one another in such a way that the average remained essentially unchanged.

The Benefits of Price Stability

The benefits of long-term price stability are numerous and substantial and outweigh the costs of achieving a stable price level. First, price stability is the moral high ground. Congress is given the authority to coin and regulate the value of money by the Constitution. Implicit in this duty is a contract between the central government and its citizens that the purchasing power of a unit of currency will be invariant over time. A policy that erodes the value of money is a breach of this social and moral contract. Second, the existence of a positive rate of inflation induces individuals and businesses to waste scarce resources in efforts to protect themselves, resources which could otherwise be devoted to productive purposes. Third, inflation artificially raises interest rates by the amount of the expected rate of inflation. The uncertainty surrounding future inflation boosts nominal interest rates further, to compensate for the risk that expectations will prove incorrect. As a result, interest rates will be unnecessarily high, even when the average expectation of inflation is correct.

Fourth, price stability is a prerequisite for financial stability. Throughout history, dishonesty, mismanagement, and occasionally stupidity have sparked failures of financial institutions. Instability of the general price level has at times been a greater source of turmoil. By altering expected rates of return on some assets, price-level instability has critically damaged bank asset portfolios with large concentrations in a particular region or industry. The booms in energy prices and agricultural land prices in the 1970s, for instance, were driven by the volatile upward trend in inflation. The unanticipated disinflation in the 1980s sparked the collapse in asset prices that destabilized the financial system (Schwartz 1988).

In addition, general price-level instability has raised the volatility of interest rates and impaired assessment of credit risk and interest-rate risk, interfering with intermediation and warping loan decisions. As a main source of financial institution failure, price instability played a key role in weakening the deposit insurance funds. It is well recognized that the variable and rising inflation of the 1970s and early 1980s destroyed much of the capital of the savings and loan industry, encouraging the behavior responsible for the massive obligations of the deposit insurance system that have required tax payer funds. Deposit insurance is badly in need of fundamental reform, but achieving a stable price level would more readily promote stability of the financial sector. Indeed, price-level stability may well be a prerequisite for financial stability (Schwartz 1988).

Fifth, the interaction between inflation and our current tax system, especially as it applies to income generated by capital, represents one of the more significant channels through which non-zero inflation can exact economic costs (Altig and Carlstrom 1990). This source of distortion is often dismissed under the assumption that its effects are minimal or that it could be easily eliminated by indexing the tax system. Correcting the tax code is a good idea, of course, but until that is accomplished, the monetary authorities would be remiss in not doing all within their power to improve social welfare. The horrendous U.S. inflationary experiences of the 1970s and early 1980s induced only limited indexation of the system. Capital gains, corporate depreciation and interest expenses, and personal interest income remain exposed to inflation, and the bracket indexation implemented by recent tax reform does not fully protect taxpayers from "bracket creep" (nonlegislated increases in marginal tax rates created by inflation). Even modest additional steps toward more complete indexation would be difficult to engineer. In fact, the idea of repealing personal income tax indexing is periodically considered.

The argument that these inflation/tax interactions are a significant drag on the economy, but that only Congress should be concerned with the problem, is untenable. The problem exists because of the interactions between inflation and a tax system based in current dollars. Therefore, the responsibility for minimizing these costs lies as much with the monetary authorities as with Congress. It makes more sense for monetary authorities to try to correct the inflation part of the problem, rather than simply hoping that Congress will implement changes that it may be unable or unwilling to pursue.

Finally, an insidious and pervasive group of costs that would be eliminated by a stable price level are those arising from distortion or obfuscation of relative price signals. There is a class of models—the market-clearing, imperfect-information paradigm associated with Robert Lucas and others—in which inflation uncertainty harms the

economy by distorting the period-to-period relative price signals that facilitate the efficient allocation of scarce resources (Lucas 1972). Despite the pervasive intellectual influence exerted by the Lucas framework to this day, the empirical evidence accumulated since the development of the paradigm in the early 1970s has not been entirely supportive. This point is not lost on critics, who think that the lack of evidence on short-term distortions should persuade us that inflation uncertainty is simply not that important to social welfare. Surely the relative-price/aggregate-price confusion stressed by the Lucas-type models is a special type of uncertainty. The failure to find significant effects arising from uncertainty that is resolved within the frame of a few quarters tells us next to nothing about the type of long-run uncertainty with which the zero-inflation position has always been fundamentally concerned.

Indeed, it seems likely that it is precisely the uncertainty occurring over *extended* time horizons that is most affected by the average inflation rate (Ball and Cecchetti 1990). This is one reason why I favor a price-level target. An inflation-rate target would enable the price level to drift without bound, and with no enforcement mechanism to ensure that inflation mistakes are corrected, the long-run variance of the price level would be infinite. When people have reason to believe that this standard will erode over time, they invest numerous resources to protect themselves. Those who have nominal debt outstanding will drag their feet in paying it back, while creditors will invest in ways to accelerate the collection of funds.³ The private gains to self-protection are clear, as are the social costs.

Recent experience is the best testimony to the real resource cost of inflation. During the 1970s, people could see that inflation accelerated with each passing year. They guessed, reasonably at the time, that financial assets were of limited value in protecting their wealth from the inflation tax. Consequently, farm land, commercial and residential property, and precious metals became much more expensive as people sought to shelter their wealth. Not only was time spent seeking out these investments, which was socially wasteful, but the resource misallocation itself resulted in a much greater waste of land, labor, and capital that society is still paying for today.

³Brazil boasts a state-of-the-art check collection system, with capabilities far beyond what one might expect to find in a developing country. Checks are typically used to pay bills in order to reap the substantial benefits of float during hyper-inflation. In response, banks developed and implemented a check clearing system capable of two-day final collection. Even a check deposited in the headwaters of the Amazon will clear in Sao Paulo within forty-eight hours.

It is difficult to comprehend how efficient planning within the public and private sectors could be immune to this type of long-run uncertainty. Furthermore, the intuition that long-run inflation uncertainty is costly has some tentative empirical support. Cross-country comparisons have demonstrated a negative correlation between economic growth and the variability of inflation,⁴ although Ross Levine and David Renelt (1992) show that the results of these and other studies are highly dependent upon model specification. The case for reducing price-level uncertainty is far more compelling than a cursory analysis might indicate.

Transition Costs and Credibility

Even if price stability is the place to be, some argue, getting there is not worth the ride. Although the transition from some positive rate of inflation to a stable price level may impose costs, the degree to which these costs can be avoided by a credible commitment on the part of the Federal Reserve has been largely overlooked.

In evaluating the costs of attaining zero inflation, economists typically use models in which markets fail to clear, or clear only at some cost. The source of the friction is usually not entirely explicit, but the implication is that we must assume some frictions. It is these frictions, coupled with the inability of markets to clear, that make the costs of ending inflation appear so high.

Yet it only seems logical that these frictions, which make lowering the inflation rate costly, also contribute to making the existence of inflation costly. For instance, a variety of explicit and implicit nominal contracts already exist among people, and a transition to zero inflation could alter the real values of payments from those that were originally intended. But surely the entire institutional apparatus that generates these contracts must involve resource costs that are positively related to the average rate of inflation. One should not compare the costs of getting to zero inflation in non-market-clearing models, where such costs are high, to the benefits of being at zero inflation in frictionless, continuously clearing models, where the benefits are low. If we are going to use a model with frictions to measure the cost of getting to zero inflation, then we should also use such a model to examine the benefits of being there. Such comparisons should be made in the context of present value calculations. These are legitimate grounds for skepticism regarding so many "cost/benefit" estimates of reducing inflation.

For a further discussion of this point, see Roger Kormendi and Philip Meguire (1985); Kevin Grier and Gordon Tullock (1989); David Lebow, John Roberts, and David Stockton (1990).

Finally, models that do not account for the likelihood that a pricestability objective will be regarded as credible by the public surely overstate transition costs. Economic theory and reasonable model simulations indicate persuasively that, with credible commitment, a central bank can greatly minimize private-sector planning errors during the transition period. I think that much of the disagreement among economists on the size of transition costs revolves around the ability of a central bank to credibly commit itself to achieving its objective. In fact, to the extent that transition costs are related to the divergence between actual and expected inflation, they can be substantially alleviated by credible commitment (Ball 1990, 1991). A simple, but plausible, class of models predicts that disinflation with a credible policy could actually produce a *boom* in economic activity. It still puzzles me that volumes of research have been published on central bank operating procedures and management of monetary aggregates, yet relatively little research has been published on the value of a credible commitment to a price-stability objective. My intuition tells me that the latter is far more important than the former in terms of economic welfare.

Avoiding Multiple Objectives

In addition to being the appropriate objective of monetary policy, price stability must be the overriding objective. Under the Employment Act of 1946, the Humphrey-Hawkins Full Employment and Balanced Growth Act of 1978, and the Federal Reserve's own statement of its functions, the objectives of monetary policy are to promote economic growth, high employment, an acceptable balance of trade, stable prices, and an orderly foreign exchange value of the dollar. Politicians appear to expect the central bank to maintain low interest rates as well.⁵ Clearly, the existence of multiple targets is a frequent source of conflict. A "perceived" need to "support" the dollar on foreign exchange markets, for example, might dictate greater restraint on bank reserves in order to raise short-term interest rates, which might in turn obstruct goals for employment and economic growth. To be sure, the pursuit by the central bank of high employment and rapid real growth during the last thirty years was instrumental in allowing the price level to more than quadruple along an erratic and unpredictable path. While providing a convenient scapegoat for politicians and protective cover for central bankers, the existence of

⁵When asked his opinion of the Federal Reserve Reform Act of 1991 in a debate among presidential candidates in October 1992, Bill Clinton embraced current policy, because the interest rates that it controls were low.

multiple objectives that vary in importance over time precludes the intentional achievement of any objective. In particular, price stability and the benefits that accompany it are lost in the process.

To be fair, the economics profession has helped to direct politicians down the road toward multiple objectives. For much of the postwar period, economists advocated active business cycle management, leading the central bank to repeatedly shift attention among objectives. Conventional wisdom today still encourages the central bank to respond to economic weakness, regardless of the underlying cause, suggesting that the lessons of the 1970s are fading from our memories. Calls for lower nominal interest rates or faster money growth to stimulate business activity are apparently based on the notion that a tradeoff exists between inflation and output that can be exploited by the central bank. Even some highly regarded members of the economics profession cling to the notion. At a hearing of the Joint Economic Committee of Congress in late 1992, Paul Samuelson testified that "leaning against the wind" could ensure a closer adherence of actual to potential output (U.S. Congress 1992). Paul McCracken praised the successes of discretionary monetary policy in the 1970s:

There was great concern that what seemed to be high unemployment at that time was fundamentally structural, that it would not respond to just generally expansive policies. The fact is we [implemented] generally expansive policies, and we got back to full employment. Whenever we have unemployment, one can always look at various things that seem to be a little out of adjustment, out of whack (U.S. Congress 1992).

In reality, as many of us learned, the futile attempts at fine-tuning contributed to higher and less predictable inflation and slower and more variable real growth during the 1970s than during the 1960s.

Ultimately, central bank policymakers, such as the members of the Federal Open Market Committee (FOMC), reflect what is believed by the mainstream. In a 1990 survey of business economists, more than 80 percent of those responding said that reducing the inflation rate to zero over the next five years is *not* the appropriate objective of monetary policy (NABE Policy Survey 1990). Presumably, they believe that the FOMC should be attempting to trade off inflation for economic growth or some other objective. Similarly, the House Subcommittee on Domestic Monetary Policy surveyed, at about the same time, 500 members of the American Economic Association who list monetary economics as either their first or second specialty. The unpublished survey shows that only a slight majority of those who responded favored a monetary policy directed at achieving zero inflation over the next five years.

These views have had a bearing on policy. Prior to each FOMC meeting, members of the Committee are presented with the views of several prominent economists, which invariably present policy alternatives in the context of a Phillips curve tradeoff. Staff projections at the FOMC meeting also imply such a tradeoff, as do the statements by some FOMC members. Moreover, policy actions, such as a reduction in the federal funds rate, often follow the release of employment or output statistics, further reinforcing the notion that the Federal Reserve can manage real variables. To the extent that this explanation of central bank behavior is valid, inflationary bias will not be eliminated until there is agreement within the profession on price level stability as the dominate objective for central banks.

Fortunately, I believe that day is coming. There is naturally a long lag between the development of theory and its widespread acceptance and application in policy formulation. Policymakers generally draw on theory that they learned twenty or more years earlier. In the postwar period, the focus of monetary authorities has evolved from credit policy, which emphasized interest rates and credit availability, to monetary policy, which emphasized the quantity of money (Friedman 1964). I detect more recently a further evolution toward emphasis on price-level stability. As price-level stability becomes more widely recognized as the optimal objective, I expect it to gain greater favor among policymakers and, eventually, their political watchdogs.

Until that time, as Milton Friedman (1968: 5) has warned,

We are in danger of assigning to monetary policy a larger role than it can perform, in danger of asking it to accomplish tasks that it cannot achieve, and, as a result, in danger of preventing it from making the contribution that it is capable of making.

Independence and Accountability

Experience in New Zealand, where legislators singled out pricelevel stability as the primary objective of monetary policy, suggests that it is the mere existence of the objective that is the major force behind containing inflation (Archer 1992). The record in Germany also lends support to this notion. Nonetheless, any gains toward pricelevel stability may not be sustainable unless the monetary authority is independent to pursue that objective and accountable for achieving it.

Most politicians and many academicians confuse the notions of independence and accountability, and by doing so blur the debate over central bank reform. As typically used, the phrase "independent but accountable" is meant to imply that monetary policymakers should be insulated from political pressures, yet not allowed free reign. In

the most general sense, however, independence and accountability cannot coexist because one cannot be simultaneously "autonomous" and "answerable." Experience over time and around the world illustrates the importance for central banks of insulation from political pressures. Yet at the same time, there remains the dilemma that no public policymaker—however selected—should enjoy complete autonomy.

The answer is to give central bankers freedom of action (independence) in the pursuit of a single, clear, measurable, and attainable objective, while making them answerable (accountable) for the results of their actions. Independence in pursuing a stated objective—that is, the freedom of action—insulates the institution from political pressures for policies that could impede achievement of the objective. In this context, independence avoids the pitfalls of policy rules that, however flexible and well grounded initially, could become outmoded or under some unforeseen circumstances become destabilizing forces. In contrast, independent policymakers have the freedom to adapt, as markets evolve and our understanding of the economy grows, and implement the most effective methods of achieving the stated objective.

It is widely recognized that politics plays a role in the formulation of monetary policy in the United States. In my view, however, the Federal Reserve has sufficient independence, as established by statute, practice, and a growing body of legal precedent. The Federal Reserve System was created in 1913 in response to banking industry pressure in the wake of a series of panics that seriously disrupted economic activity by contributing to contractions in money and credit. The original charter left many avenues for the Executive Branch to influence monetary policy, some of which were closed when the Banking Act of 1935 removed the Secretary of the Treasury and the Comptroller of the Currency from the Board of Governors. In addition, the law established the Federal Open Market Committee, with the seven Governors and five Federal Reserve Bank Presidents as voting members. This ensured that power within the central bank would be shared

⁶For a further discussion of this point, see King Banaian, Leroy Laney, and Thomas Willet (1983); Robin Bade and Michael Parkin (1987); Alberto Alesina (1988, 1989); Alberto Alesina and Lawrence Summers (1991); Alex Cukierman (1992); Summers and J. Bradford DeLong (1992).

⁷For a further discussion of this point, see Robert Weintraub (1978); Arthur Burns (1979); Nathaniel Beck (1982); Edward Kane (1982); and Richard Wagner (1986).

This is true in general, but it is important to note that much of the Fed's independence arises from the existence and structure of the District Reserve Banks, as opposed to the Board of Governors, which is more directly dependent on the executive branch.

between political appointees and regional bank presidents, reinforcing the "fire wall" that made the Federal Reserve, and not the Executive Branch, responsible for the conduct of monetary policy.

The independence of the Federal Reserve was strengthened further by the accord of 1951 between the Fed and the Treasury, which established that the Federal Reserve would not be coopted into solving the federal government's debt management problems. Later, the Humphrey-Hawkins Act required the Federal Reserve to set and report on goals for money growth. Nonetheless, the Fed retained great leeway to adjust the targets, redefine monetary aggregates, and alter operating procedures.

During the period since the late 1970s, there have been court challenges to the independence of the Federal Reserve, all dealing with the voting status of District Bank Presidents on the FOMC (Auerbach 1992). Two cases were denied standing. A third was decided in favor of the presidents, and the Supreme Court refused to hear the appeal. This continued the legal precedent established by McCulloch v. Maryland that private citizens could direct the monetary affairs of the central bank, in this instance expanded to include serving as voting members of the FOMC.

But freedom to act without undue interference is not enough. Based on meticulous measures of legal independence and deviations of practice from statute, the Federal Reserve has been one of the most autonomous central banks in the world during the postwar period (Cukierman 1992). Even so, the Fed's performance on occasion has been disastrous—witness the one-third contraction in money in the early 1930s and the almost fivefold increase in the price level since 1950, one-third of which occurred in the 1970s. In addition to having independence of action, central bankers must be held accountable for the results of their actions. Ideally, central bank policymakers themselves should be held accountable for achieving the policy objective. The Reserve Bank of New Zealand is a good example. The responsibility for achieving an inflation rate of between zero and 2 percent rests solely with the Governor, who is appointed to a fiveyear term by the Minister of Finance (Archer 1992). The only other explicit charge is to ensure the soundness of the financial system. If the target is not met, the Governor may be removed by the Minister. Concerns over the personalities or politics of central bank officials and the dangers of discretion in policy formulation melt away under a system that combines accountability for specific results with the independence necessary to achieve them. In such a world, the process used to select individual policymakers is important only with respect to its success in attracting and retaining the most skilled individuals.

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It is unlikely that recent reform initiatives would improve the current process in the United States. The Federal Reserve Accountability Act of 1993, H.R. 28, introduced in the House on January 5, 1993 would require that the presidents of the Reserve Banks be appointed by the President of the United States and confirmed by the Senate. The Act further instructs the President to include among those candidates representatives of agriculture, small business, labor, consumer and community organizations, women, and minorities. In addition, the selection process for the directors of Reserve Banks would be altered. Three Class A Directors would be elected by commercial banks, as under current practice, with the added stipulation that only domestically chartered and owned banks could vote. Six Class B Directors would be appointed by the Board of Governors, up from three currently, again with directions to include minorities and representatives of specific groups (Gonzalez 1993). One aim, presumably is to make the Reserve Bank Presidents the equals of Governors; however, the twelve Presidents would apparently continue to share five votes at FOMC meetings on a rotating basis, although the bill is not clear on this, whereas the seven Governors would retain permanent voting rights. Comparable bills introduced in the House and the Senate on January 26, 1993 would abolish the FOMC, make the Board of Governors solely responsible for the conduct of monetary policy, and establish a Federal Open Market Advisory Council, through which the twelve regional bank presidents could advise the Board of Governors (Hamilton 1993; Sarbanes 1993). All of the bills would mandate greater disclosure of policy deliberations and authorize more comprehensive audits of Federal Reserve activities.

None of the legislation would restrict the independence of policy-makers to act, but in the absence of the overriding objective of fostering a high standard of living by maintaining price-level stability, the injection of politics into the selection process would risk compromising policy outcomes. If less emphasis was placed on the skills necessary to stabilize the price level by the President or Congress than by the boards of directors of District Reserve Banks or if the President or Congress actually sought individuals predisposed to pursue objectives other than price-level stability, the substance of policy would suffer. There is every reason to believe this would occur. Senator Sarbanes (D.-Md.) ranks process well ahead of substance:

It clearly is ... deficient to have a process which put people in significant policy judgments who are picked by private interests and are making public decisions. Now, they may have made all of the right public decisions, but still, you have to sort of conclude that these people lack the public legitimacy to be making these kinds of decisions (U.S. Congress 1992).

Senator Sarbanes went on to cite the opposition of President Woodrow Wilson during discussions over the Federal Reserve Act to placing representatives of private banks directly on the Federal Reserve Board. If the private status of policymakers were indeed a valid concern, it would be best addressed by stating the desired outcome of policy and establishing a system of risks and rewards that motivates policymakers to seek that objective. In contrast, focusing on the process is counterproductive when policymakers, regardless of the method of their selection, have the option to choose the wrong objective. This is especially the case when legislators select individuals precisely because they will make that choice.

The argument is not at all transparent, however, that private citizens have no place in the formulation of public policy. In reference to the idea of a National Bank—an early version of a central bank—nearly two hundred years ago, Alexander Hamilton (as cited in Lodge 1904: 29) urged, that

to attach full confidence to an institution of this nature, it appears to be an essential ingredient in its structure, that it shall be under a private not a public direction—under guidance of individual interest, not of public policy . . . It would, indeed, be little less than a miracle, should the credit of the bank be at the disposal of the Government, if, in a long series of time, there was not experienced a calamitous abuse of it.

Woodrow Wilson may have objected to, and current lawmakers may shudder at the thought of, private citizens making public policy, but one of the founders of our country saw the virtue in a private sector check on the central government's ability to print money.

Framework for Central Banks

A classic statement of the economic rationale for the existence of central banks was provided by Milton Friedman in his 1959 Millar Lectures at Fordham University, subsequently published as A Program for Monetary Stability. Friedman's argument appealed fundamentally to the costs inherent in a pure commodity-standard system (e.g., gold). These costs arise both from pure resource costs and perhaps more significantly from substantial short-run price variability resulting from inertia in the adjustment of commodity-money supply to changes in demand. The inefficiencies represented by these costs are a significant disadvantage of commodity-money exchange systems.

As a consequence there is a natural tendency, borne out by history, for pure commodity standards to be superseded by fiat money. But particular aspects of fiat money systems—such as fraudulent banking practices, "natural" monopoly characteristics, and tendencies for localized

banking failures to spread to the financial system as a whole—resulted in the active participation of government. We have come to know this active participation as central banking.

These rationales for the existence of central banks have not gone unchallenged, not even by Professor Friedman (Friedman and Schwartz 1986). Disruptions in payments can be costly, but so are the instabilities and inefficiencies caused by the lack of an effective anchor for the price level in flat money systems. Moreover, theoretical discoveries in the area of finance and monetary economics, closer attention to the lessons of historical banking arrangements, and advances in information and financial technologies have contributed to a healthy skepticism about the superiority of central banks and government regulation to alternative market arrangements. For example, some of the financial backstop functions performed by central banks and banking regulators may have weakened private market incentives to control and protect against risk (Goodhart 1988).

Still, those who argue for alternative monetary structures must at least recognize that their case rests on untested propositions. Yes, it would be wrong to accept unthinkingly our current central banking system as the best alternative for performing the monetary functions of advanced economies, but it would also be wrong to claim that the current central banking system does not reflect society's choice of an institutional arrangement to perform those functions.

It is not sufficient to argue that market-oriented alternatives to our current central-banking systems functioned better in other times and places; for example, in eighteenth-century Scotland (White 1984). This begs the question of why such a system did not prove to be sustainable. Nor is it sufficient to argue that this system would have prevailed if not for government intervention and interference. This line of debate fails to consider whether a political equilibrium exists anywhere that would support a market-oriented system in an advanced economy.

It is premature to claim that some hypothetical monetary system can, or should, come to dominate institutional arrangements that have already evolved from extended political and economic experience. I believe that the prudent first course is to seriously consider the advantages of improving the performance of central banks. The benefits of a properly managed fiat currency are considerable, and the issue is, or should be, how to provide the central bank with a proper charter to insure policy action that generates price-level stability in the long term. There is growing evidence that a political equilibrium exists. The German government long ago directed the Bundesbank to achieve price-level stability above all other objectives. More recently, governments

in New Zealand, Spain, Canada, and Sweden have some form of pricelevel stability goal.

The Federal Reserve was born out of a compromise between those who would have kept the banking system entirely private and those who wanted government to assume a prominent role in a rapidly growing economy. Other nations have grappled with the same problems and created similar institutions. Today, many republics of the former Soviet Union and several eastern European nations are facing these same issues. We now have a world monetary system in which governments, through central banks, monopolize the supply and management of inconvertible flat monies.

The displacement of the commodity standard that prevailed at the time the Federal Reserve was founded has exposed problems not otherwise envisioned in 1913. For example, the price level has no anchor except for that provided by the resolve of Federal Reserve policymakers. Fed policymakers' commitment to price stability is neither as explicit, nor as strong, as necessary for the successful management of a fiat currency. If the benefits of a fiat currency are to be achieved without large offsetting costs, then the gradual demise of our convertible monetary standard has brought us to a point that requires a basic change to the framework within which the Federal Reserve functions.

One proponent of "free banking" acknowledges that monetary reform is not possible without political reform (Wagner 1986). Even should the confluence of events necessary to allow "free banking" occur, in the absence of political reform, it would prove temporary, lasting only until political interests once again diverged.

Conclusion

Scores of new nations are busy constructing central banks to implement monetary policy. Using history as a guide, these new central banks will try to pursue objectives other than price stability, especially since they are being counseled by central bankers with weak records on price stability. Short-term political agendas will likely dominate their policy actions and push them away from the pursuit of price stability. Yet, it seems to me that there are powerful market forces that will crimp the efforts of central banks to mismanage their currencies.

The integration of world markets, particularly financial markets, is limiting the degree to which policymakers are willing to drift away from price stability, at least for the major economies. Twenty years ago the Federal Reserve paid scant attention to the impact of foreign markets on the price of U.S. government securities and interest rates in the United States. Yet, when I participated in the FOMC

deliberations, we almost always discussed the impact of a policy action on long-term Treasury rates, currency values or the shape of the yield curve. The FOMC now looks at how world financial markets assess the credibility of its policy actions with respect to inflation expectations. This process, in effect, limits the degree to which the FOMC is willing to risk inflationary policy actions.

In Europe, smaller countries often peg their currencies to the German mark, allowing the Bundesbank to determine their monetary policies. The German central bank is also limited by world markets in terms of the inflation path it chooses to pursue. I am not so bold as to argue that markets will cause central banks to wither away to agencies that simply pump out monetary growth rates that provide price stability. However, it does seem to me that market forces are strengthening the hand of central banks in fighting political pressures for short-term "quick fixes" to economic problems. The power of integrated financial markets to focus the world's financial resources on flawed government economic policy was aptly demonstrated in last summer's European monetary crisis. Perhaps even the dullest politicians and central bankers learned the limits of governments in solving economic problems from that experience.

If this view proves incorrect, then central banks will face the prospect of market participants developing private money to a much greater degree than exists today. When government management of particular institutions results in failure, private sector alternatives appear—witness the privatization trend in U.S. schools and courts. Perhaps those who yearn to revisit the Scottish system of free banking may live to see a version of it replace central banking. If so, we are

likely to pay a heavy price along the way.

Experience, theory, empirical analysis, and common sense indicate that an unfocused monetary policy or a monetary policy aimed at objectives other than price stability falls woefully short of its potential in delivering the maximum standard of living. Although the optimal system of free banking might yield superior results, I have serious doubts about our willingness to let such a system develop. And why attempt to reinvent what has evolved over time and can be nearly perfected by simple legislation that would explicitly and credibly direct the Federal Reserve to pursue price stability, with independence of action and strict accountability for achieving the objective?

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WHICH KIND OF MONETARY POLICY, IF ANY?

Lawrence H. White

Lee Hoskins wants "a single, clear, measurable, and attainable objective for monetary policy." The request sounds reasonable. But notice that no other federal government policy has any such thing. Federal policies in other areas officially aim at multiple, vaguely-defined, immeasurable, or unattainable objectives. Why should we expect monetary policy to be any different? Hoskins notes that economic theory tells us fairly definitely what monetary policy can and cannot achieve. But economic theory also tells us what other government economic policies can and cannot achieve. So why should we expect greater coherence from monetary policy?

My questions are not entirely facetious. When we assign the production of money to government, we should expect inferior money. I see no reason to think that money production differs from mail delivery in this regard. Even if a government agency could be assigned a coherent and desirable quality objective, the problem of accountability or enforcement remains. Particularly with government of the current size and scope, the political process simply does not enable citizenconsumers to hold a government agency tightly accountable for a poorquality product. Once we take the accountability problem seriously, we should, as Milton Friedman has done (1987: 381), recognize that the best real cure for monetary instability lies in abolishing the Federal Reserve System's money-creating powers. To propose that monetary policy can be harnessed to a single clear and measurable objective is to engage in wishful thinking given the logic of political bureaucracies.

Can a free market provide better money? Following Hoskins' format, I defer this question to the end of my discussion.

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Alternative Objectives for Monetary Policy

Hoskins' assessment of what monetary policy cannot and can accomplish is fundamentally correct. He rightly observes that monetary policy (a) cannot permanently push real output above, or unemployment below, its natural rate, and (b) cannot beneficially stabilize real output through activism. Incentive problems aside, the monetary authority inherently lacks the information it would need to out-forecast and thereby advantageously steer the market.

Monetary policy in a fiat money regime, operating through control of the monetary base, allows the monetary authority to control over time the value of the currency unit, the "nominal scalar" in the economy. The authority can indeed, as Hoskins proposes, produce a flat price-level path over the long term. Alternatively, as Hoskins neglects to consider, the authority can equally well produce a different price-level path, for example a gentle deflation. Or it can produce a desired path for some other nominal variable, for example a flat path in nominal income over the long term. Hoskins unfortunately does not explain why he prefers a flat price-level path to such alternatives.

Hoskins states, "The natural objective of monetary policy is to provide that pricing environment most conducive to maximum sustained economic growth and the highest possible standard of living. A stable price-level is optimal in this respect." Certainly a stable price-level path would be better in either respect (faster growth or a higher standard of living) than the erratic and rising path that has characterized the U.S. dollar consumer price index over the past thirty years. Erratic inflation leads to misallocation of resources in a number of ways (Hayek 1978: chap. 13; Leijonhufvud 1981: chap. 9 and 10). A monetary policy that produced a stable price level would be an improvement. But Hoskins fails to furnish any grounds for claiming that a flat price-level path is "optimal" in any respect. Why does a stable price level enhance economic growth or the standard of living more than a stable volume of nominal income? Why is a stable price level better in either of these respects than a gradually falling price level?

Most fundamentally: what is the microeconomic basis for attributing optimality or first-best status to any particular path for any particular nominal aggregate, once we take into account the interferences with free exchange that are necessary to generate the institutional

^{&#}x27;Hoskins should have placed "or" rather than "and" between maximum growth and maximum consumption (standard of living). The two are distinct objectives and can conflict, particularly in the choice of a savings rate. Monetary policy may have to recognize a trade-off between them.

arrangement (government fiat money) that makes such deliberate path-setting possible? In claiming that the "optimal" arrangement is to have a fiat-money-issuing government central bank devoted to a flat price-level path, Hoskins mistakes an improvement for a move to first-best.

Let us put aside for a moment the question of whether any arrangement can be first-best that involves the interventions necessary for government flat money. Taking a flat money regime for granted, let us consider the choice among alternative nominal aggregate paths. Friedman (1960) provided the well-known argument that attempting to stabilize the price level directly might in practice destabilize the economy because of the long and variable lag with which monetary policy acts on prices. He accordingly recommended that the central bank produce steady growth in some monetary aggregate, at a rate consistent in the long run with zero inflation, rather than aim directly at a stable price level. Hoskins surprisingly overlooks this argument. In addition, there are affirmative cases to be considered for (a) the objective of stability in some measure of nominal income, and (b) the objective of a declining price level. In the long run, if real income grows fairly steadily, there is little conflict between these last two objectives.

Arguments for stable nominal income (or nominal income per capita, or nominal income per unit of real factor services) have a long pedigree in monetary economics, and have recently been revived by my colleague George Selgin (1990, 1993). Selgin (1990: 266) defends the "productivity norm" of price-level behavior, under which

the consumer price index is allowed to vary inversely with changes in unit real costs of production. In theory, the productivity norm is equivalent to stabilization of a price index of factors of production; in practice, it is roughly equivalent to the stabilization of per capita nominal income.

The case for the productivity norm is that it better preserves monetary equilibrium than does ordinary price-level stabilization. Stabilizing the consumer price index, after a fall in productivity (for example, due to an oil-price shock) has raised prices, means pushing the price level back down. This action requires a negative monetary shock (contraction of the money stock) that disturbs monetary equilibrium and in the short run intensifies the decline in output brought on by the real shock to productivity. Proponents of the productivity norm see less harm in letting prices rise and remain higher when productivity falls. The reduced standard of living (lower real wage) then arrives through higher consumer goods prices, rather than being forced to arrive through lower nominal wages. Conversely, to push the price level back up after a rise in productivity has reduced prices requires

the authorities to create a disequilibrating excess supply of money. If the productivity norm is indeed better suited to preserving monetary equilibrium in such cases, it would seem more conducive to keeping the economy near its real-standard-of-living frontier.²

An indirect effect of stabilizing nominal income (Py, in the familiar quantity equation MV = Py) is a secularly falling path for consumer prices (P) as productivity gains push up real income (y). The merits of deliberately engineering a steady decline in the price level have been intensely debated by monetary theorists over the last twentyfive years. The case for deliberate deflation—at the risk-free real rate of interest, so that the nominal interest rate on risk-free assets would become zero—is that such a policy would allow individuals to hold "the optimum quantity of money" because it would eliminate the opportunity cost of holding currency rather than alternative risk-free financial assets. A competitive real return on currency, generated by deflation, would spare the economy the costs associated with individuals' efforts to economize on currency holdings (Friedman 1969: chap. 1; Woodford 1990). It would eliminate the implicit tax on currency holding, a tax that is inefficient even given a government revenue requirement (Kimbrough 1986).

Hoskins offers six arguments for a flat path in the consumer price level. In doing so he argues effectively for the superiority of a stable price level over the current regime of positive and erratic inflation. But he does not address the question of whether the objective of price-level stabilization should be pursued directly or via a money growth rule, and he argues not at all for the superiority of price-level stabilization over the productivity norm, other variants of nominal income stabilization, or deliberate deflation. My comments on each of the six arguments must be brief and correspondingly blunt.

- 1. The U.S. Constitution implicitly gives government a contractual duty to keep the purchasing power of money invariant. Not so: taken seriously, the Constitution mandates a specie standard. It empowers Congress only to coin money and to specify its metallic content ("regulate the value thereof"). It expressly prohibits the states, and by implication the federal government, from declaring anything but gold or silver a legal tender (Timberlake 1991, 1993). A specie standard delivers greater price-level stability than our current regime, dramatically so over longer horizons, but does not render the purchasing power of money invariant over time.
- 2. A positive rate of inflation induces individuals to undertake socially unproductive efforts to avoid losses from holding currency.

³For a fuller discussion see Selgin (1990), and White (1991).

Yes: but a *fortiori* a negative rate of inflation, driving the risk-free nominal interest rate to zero, is necessary to eliminate such efforts entirely.

- 3. Inflation uncertainty boosts the nominal interest rate above the rate necessary to compensate for the (mean) expected rate of inflation, because lenders are averse to the risk of mispredicting the future purchasing power of money, and thus makes real interest rates unnecessarily high. Hoskins cites no empirical support, but the argument is plausible, given that indexing of financial contracts (which would remove the problem) is costly. It is an argument for low anticipated variance in the price-level path, however, not for a flat rather than rising or falling path. It seems to me that an equally plausible argument could be made, alternatively, for low variance in nominal income, in order to share real-return risk between lender and borrower in the face of productivity shocks. It is not clear that even costlessly indexed contracts would be preferred to fixed nominal contracts in a regime obeying the productivity norm (White 1991: 476).
- 4. Price-level stability is a prerequisite for financial stability, for two reasons: (a) Interest rates become more volatile when the price level becomes unanchored. Yes, because inflation-rate expectations become unanchored and more volatile (Barro 1983). (b) Instability in the price level causes unexpected changes in relative prices, to the detriment of banks that hold claims to weakening assets. I would not put the causal process that way. Rather, erratic monetary policy both destabilizes the price level and disturbs relative prices. A significant part of the disturbance to relative prices occurs because of the previously noted excess volatility in interest rates, which causes excess volatility in the prices of long-duration assets relative to other goods and services. All of this is an argument for some nominal anchor, but not for any one particular type of anchor.
- 5. Because our tax system is not fully indexed, higher inflation has important distortive effects, especially via taxes on purely nominal capital gains. Yes; but deflation would reduce the tax burden even further.
- 6. Erratic monetary policy distorts or clouds the price system. Yes; but this again is a case generally for eliminating erratic monetary policy, not particularly for doing so by means of a flat price-level rule. Both the productivity norm and a deliberately deflationary price-level rule, if effectively enforced, would eliminate erratic monetary policy at least as effectively. Either would call for smaller changes in the quantity of base money than a price-level stabilization rule.

My purpose in this section is not to argue for a money-growth rule, for the productivity norm, or for deliberate deflation, as the best

among fiat money supply policies, all things considered.³ It is to urge proponents of price-level stabilization to articulate their reasons for preferring their objective to these alternatives. Until they do so, the case for the optimality of price-level stabilization will have the appearance of an empty box.

Hoskins's Defense of Central Banking

It is not surprising that Hoskins is not yet ready to challenge the rationale for central banking. Few former central bankers are (though Paul Volcker [1990], remarkably, has acknowledged that central banking has little or nothing of economic substance to offer to emerging market economies). But I find it puzzling that Hoskins goes out of his way to argue affirmatively for central banking as against free banking. To argue for central banking is surely a diversion from the main point of his paper, which is that a central bank commitment to price-level stability would be better than what we have now.

Hoskins and other advocates of monetary rules should note that idealism in theory—in this context, the preference for a laissez faire monetary system over a government monopoly or legally restricted system—is not the enemy of gradualism in practice—here the preference for fastening a monetary policy rule on the central bank over preserving its discretion. Both Hoskins and the modern free banking advocates want monetary policy rules. Both are on the same side in the battle against the tyranny of the status quo. A free banking rule—which involves abolishing the open market desk—is just a bit more rigorous than the rule Hoskins favors.

It is therefore puzzling that Hoskins makes sweepingly conservative arguments, favoring the status quo, against the free banking case. When he demands that "those who argue for alternative monetary structures must at least recognize that their case rests on untested propositions," he should recognize that such a demand equally applies to his own case for monetary reform. Those who argue for free banking have at least attempted to "test" their propositions by examining the

The productivity norm was originally developed as a case for not altering the metallic content of a specie standard, against the case (mostly made during periods of falling prices) that alteration in the standard was desirable for the sake of price-level stabilization. Free banking on a specie standard can be thought to approximate the norm automatically (Selgin 1988: 98-103). It is another question whether the monetary authority in a fiat money regime should be directed, or could manage, to obey the norm through deliberate policy, considering the accountability problem and the practical problems of implementation.

'In his closing paragraph Hoskins takes a different tack, allowing that "the optimal system of 'free-banking' might yield superior results," but suggesting that the transition to free banking poses major problems.

historical evidence on relatively unregulated monetary systems (see Dowd 1992). Hoskins' arguments for a price-level rule remain untested, in his paper at least, against any evidence from New Zealand or wherever else a single, clear, and measurable price-level objective has been legislated.⁵

Hoskins's substantive argument against free banking contains nothing really new. He draws it almost entirely from Milton Friedman's earlier (1960) case for government intervention in money. Friedman cited the resource costs of a 100 percent commodity reserve system as a rationale for the emergence of redeemable fiduciary money (not "fiat money," as Hoskins has it). It is true that such costs—as faced by bank depositors—naturally lead the market to fractional reserve banking. It is not true that the remaining resource costs represent a source of inefficiency, if money-users voluntarily incur those costs in order to gain the benefits of a commodity-redeemable money (Garrison 1985).

It is not even true that the resource costs (the sacrifice of alternative uses of gold and gold-producing inputs) are lower under a pure fiat system, unless the rightful holders of gold coin and bullion stocks voluntarily melt them down for commodity use. Private gold coin and bullion stocks around the world have not been melted down yet; not even central banks, with one or two desperate exceptions, have sold their stocks. The real price of gold is actually higher now than it was under Bretton Woods or the classical gold standard, suggesting that even greater resources are being devoted to the mining, minting, and hoarding of gold coins and bullion. *Perhaps* gold coins and bullion would be voluntarily melted down upon the enactment of a Hoskinstype price-level rule. But Hoskins must at least recognize that in this respect his own case rests on an untested proposition.

I am surprised that Hoskins criticizes the classical gold standard's price-level performance. It seems to me that he should find it rather attractive by comparison to the performance of post-gold fiat money standards.

Hoskins goes on to cite Friedman's (1960) rationale for government monopoly in the provision of fiduciary money, namely, the fears that competitive private note-issue is inherently prone to fraud and to overissue. Neither fear is historically or theoretically well grounded, as Friedman and Schwartz (1986) have more recently recognized, in

⁵It might be said that those who argue for the status quo should recognize that their case rests partly on untested (by them) propositions about the consequences of a switch to an alternative regime, and partly on falsified propositions about the properties of a discretionary flat regime.

light of the historical and theoretical research that monetary economists have done since 1960. Hoskins asks why free banking in Scotland did not survive to the present day. In brief, it fell victim to a combination of rent-seeking by established bankers and dubious theoretical arguments by monetary economists (White 1984: 76-80).

Hoskins makes the novel claim that a "political equilibrium" exists to support a price-level stability rule. His evidence is frustratingly thin. He claims that Germany, New Zealand, Spain, Canada, and Sweden "have some form of price-level stability goal," but makes no reference to sources of information about the nature of the commitment to price stability in these countries, or its results. New Zealand does have legislation, only a few years old, that directs the central bank to aim for inflation in the 0-2 percent range. We have not yet seen how effective the legislation will be in actually stabilizing the price level. More germane to the claim of "political equilibrium," we have not yet seen how long it will stand up against future demands that Parliament give the central bank a more ambitious agenda. I am not aware of any similarly unambiguous commitments in the other countries.

For what it is worth, I am probably no more optimistic than Hoskins about the likelihood that the U.S. Congress will vote to allow a free banking regime in my lifetime. I share Hoskins's "serious doubts about our [government's] willingness to let such a system develop." I agree that a premature legislative victory—achieved by some unlikely accident—would probably be reversed. But any monetary reform, including a legislated price-level stabilization rule, is subject to exactly the same frailty.

The switch to an alternative monetary regime could be embodied in a constitutional amendment to enhance its durability. A free-banking amendment, which would simply enumerate what the federal government may not do (manipulate the quantity of money or restrict the freedom of contract with respect to money), would be easier to write down and simpler to enforce than a Hoskins- type price-level-stabilization amendment, which would leave independence for monetary policymakers in pursuing a given objective, but hold them "strictly accountable for delivering it." To provide strict accountability, the amendment would have to specify exactly what objective the monetary officials are required to pursue (what measure of stability, over what time horizon, with respect to what index of prices, with what provisions for revising the index) and how they are to be held accountable for their performance (what penalties are to be imposed, on whom, when, for failures of various magnitudes).⁶

Conclusion

Incremental improvements are certainly worth thinking about. Among nominal-path goals that leave the central bank and fiat money intact, more work needs to be done to sort out which goal, all things considered, is most desirable: a flat path for a consumer price level, a declining path for a consumer price level, a flat path for a producer price level, a flat path for nominal income, or possibly something else. We should not let the good be the enemy of the best in monetary reform. Milton Friedman (1987: 368-69), long the best-known advocate of a monetary rule, has rightly noted that any rule that leaves the monetary policy bureaucracy intact carries the seeds of its own undoing, especially a rule in the weak form of a resolution or legislation that the Congress is left to enforce. A central bank will tirelessly resist being held accountable for its monetary policy choices. If the "political equilibrium" exists for a stronger reform, on the order of a constitutional amendment, there is no reason not to press for a first-best change in regime.

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⁶J. Huston McCulloch (1991) has taken a different approach, writing out an explicit errorcorrection rule for the money stock designed to be consistent with long-run price stability. Implementing McCulloch's approach involves specifying exactly what day-to-day actions the monetary authority is to undertake, based on previous specifications of (a) the measure of the money stock it is to adjust, (b) how quickly, (c) the particular error-correction formula it is to use, and (d) the particular price index, and its target level, to which the formula is to be applied.

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