An Introduction to Monetary Policy Rules

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Abstract

This paper is an introduction to contemporary discussions within monetary theory and policy. The paper focuses on comparing proposals for monetary policy rules. It first lays out an argument for why monetary policy—defined here broadly to mean adjusting the money supply in an attempt to influence the economy—is desirable in the first place. It then presents an argument for why rules-based monetary policy is preferable to discretionary policy. Next it discusses at a general level two kinds of rules: those that can be implemented with minimal changes to current monetary institutions (i.e., central banking) and those that would require significant institutional changes to implement. The discussion is primarily an effort to promote informed participation in the democratic process.

JEL codes: A2, E42, E5, P16

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An Introduction to Monetary Policy Rules

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1. Introduction

This paper is an introduction to the conduct of monetary policy according to stable and predictable rules. It will present several rules that are popular in current debates over monetary policy, as well as some that are more radical and hence less frequently discussed. I will make no recommendation about which of the presented rules is best, although I will argue that rules-based monetary policy is preferable to discretion. I will focus on how such rules function, the conditions under which they can be expected to achieve macroeconomic stability, and the plausibility of implementing them should the desire to do so arise.

The importance of securing an institutional environment conducive to effective and responsible monetary policy has been made apparent by the 2008–2009 financial crisis. There is disagreement over what role monetary policy played in the crisis, however. Some contend that overly loose monetary policy helped fuel an unsustainable boom that would inevitably result in a painful recession (e.g., Beckworth 2012; Horwitz and Luther 2011; White 2012). Others argue that monetary policy was not responsible for creating an unsustainable boom, but it was responsible for the ensuing bust through a failure to act decisively once it became obvious that financial markets were distressed (e.g., Hetzel 2012; Sumner 2011, 2012). The consensus is that monetary policy bears some of the blame for the recession and lingering economic malaise. To prevent such calamities in the future, policymakers must have the tools to determine which policies and institutions constitute sound monetary policy. This paper provides these tools.

Section 2 of this paper outlines the case for a flexible money supply, showing how the ordinary functioning of markets can benefit from adjustments in the supply of money when the

demand for money changes.[1] Monetary policy is often seen as a highly technical and impenetrable field to nonacademics or professional policy analysts. However, the fundamental case for having monetary policy—defined here as an authority (or authorities) adjusting the money supply in an attempt to influence the economy—is straightforward.

Section 3 presents the case for rules-based monetary policy. After discussing some recent empirical studies suggesting that the financial crisis occurred during an era of ad hoc monetary policy (thus supporting the superiority of rules), I present the theory behind the desirability of rules-based monetary policy. Conceptually, it is possible to have an organization responsible for conducting monetary policy that is unconstrained except by its judgment of how the economy could be improved through targeted monetary policy. However, there are strong reasons to believe that discretion on the part of a monetary authority results in worse outcomes than can be obtained if the monetary authority's behavior is constrained by a rule.

Section 4 introduces the equation of exchange, the basic framework I will be using to analyze these rules. It then covers four monetary policy rules that could be implemented without significant changes to current monetary institutions, namely central banks. These are Milton Friedman's k-percent growth rule, John Taylor's interest rate rule, Bennett McCallum's monetary base rule, and inflation targeting.

Section 5 contains more radical alternatives. Whereas the rules in section 4 could be seen as commandments passed down to the monetary authority, the rules in section 5 fundamentally change the nature of the monetary authority itself. Rules considered in this section include targeting nominal income, that is, the nominal gross domestic product (NGDP); commodity

[1] Whether the organization doing the adjusting ought to be a modern central bank is one of the questions that will be treated.

standards; and free banking. The rules are presented in increasing order of the degree to which they rely on ordinary market mechanisms to implement macroeconomic stability.

2. Monetary Policy in a Nutshell

Monetary policy is the adjustment of the money supply by a central bank in order to avoid monetary disequilibrium. That is, monetary policy attempts to offset changes in money demand with changes in the money supply. This section will explain why this function is important.

The most popular method of implementing monetary policy is through buying and selling government bonds, although central banks such as the Federal Reserve (Fed) have also begun dealing in more exotic assets—such as mortgage-backed securities—in the aftermath of the financial crisis. When central banks wish to increase the money supply, they will add money to the economy by buying assets; when they wish to decrease the money supply, they will siphon off money by selling assets. It is important to note that central banks do not have complete power over the money supply. However, they do have significant control over what economists call the monetary base, which consists of the supply of physical currency plus commercial banks' reserves held in accounts at the central bank. Depending on how one defines money supply, it can contain additional items, such as demand deposits and saving accounts.[2] Central banks *indirectly* manipulate the money supply by *directly* manipulating the monetary base. The more stable the relationship between the monetary base and the money supply, the easier it is for central banks to implement policy.

[2] Different definitions of the money supply depend on the liquidity of their various components. For example, demand deposits are considered more liquid than savings accounts, so the latter are only included in broader definitions of the money supply.

But why is monetary policy (i.e., adjusting the money supply) desirable in the first place? The network of voluntary exchanges that economists call the market already provides both the incentives and information necessary for producer supply to match consumer demand, conditional upon an institutional framework that protects property rights, enforces contracts, and upholds the rule of law. Market prices are set by the interaction between supply and demand, and these prices usually do a good job of helping market actors make production and consumption decisions, thus allocating resources efficiently. Even when a market inefficiency exists, it will probably not persist for very long because the price system provides economic actors with the knowledge and incentives they need to correct these inefficiencies over time (Alchian 1950; Hayek 1948).

However, something is missing from the above description. It presumes that market prices, denominated in money, accurately reflect underlying supply and demand conditions. But this is only true when the market for money itself is in a state of equilibrium, that is, a state where supply equals demand at the current price. Problematically, money has no market of its own in which it is independently priced. Therefore the price of money must be expressed in terms of the goods and services it can purchase. The price of money is simply the inverse of the prices of all other goods and services a consumer may wish to purchase. Just as the money-price of apples is denominated in dollars, the apple-price of dollars is denominated in apples (Hayek 1931; Yeager 1956). The economy-wide price of money, which adjusts to bring the demand to hold money balances in line with its supply, is money's purchasing power. Thus the price of money is a weighted average of the prices of all other goods and services, typically expressed as the inverse of the price level.

Unless the market for money is in equilibrium, the price system will not accurately reflect underlying supply and demand conditions. If the supply of money is higher than the demand to hold it, individuals will spend down their excess money balances to bring the money market back to stability. In such a situation, business owners will experience rising sales and revenues, which they could mistake (at least in part) for a rise in demand. But real demand for their product—that is, demand that does not arise solely due to monetary effects—would not actually be higher. The excess supply of money over demand would merely make it *appear* as if this were so.

Conversely, if an excess demand for money exists, consumers will seek to increase their money balances, resulting in lower business sales and revenues. Business owners could mistake this situation for real decreased demand. The result would be significant changes to the *real* economy in response to a change in a *nominal* variable. Eventually, the excess supply of (demand for) money will self-reverse, as the price of money falls (rises) as consumers work to reduce (increase) their stock of held money. This is achieved as individuals, responding to the excess supply of (demand for) money, buy (sell) additional financial assets, engage in more (less) direct consumption, and increase (decrease) the amount of labor they supply.

But if individuals try to do all of the above all at once in an environment where prices adjust only imperfectly, they will allocate resources to uses other than their highest-valued ones (Lucas 1972), and the result will be waste. If producers could determine precisely what part of a change in demand for their product was due to real factors and what part was due to nominal (monetary) factors, this would not be a problem. Producers would simply adjust their prices to reflect real demand, and no resource misallocations would follow. Obviously, producers cannot perform such a heroic calculation. Changing the prices of goods and services is itself costly because of the information that must be invested to discover how prices ought to be changed.

Producers will invest some resources to discover how best to change their prices, but not enough to reduce errors in the price system, along with resource misallocations, to zero.

This is the very problem that monetary policy is supposed to solve. Instead of adjusting the prices of goods and services across the economy when the money market is in disequilibrium, why not simply restore equilibrium in the money market by changing the supply of money? This is the rationale for a flexible money supply. By increasing (decreasing) the money supply in the face of an increased demand (supply), both the resources used up in changing prices and the resources wasted due to misallocation from "noisy" prices can be saved and put to more productive uses. This is a real wealth gain: resources that were previously tied up in other activities become available for satisfying society's demands. If it is feasible to change the money supply in response to changing conditions in the money market, the costs associated with the latter can be avoided, and the price system will ensure resources are directed to their highest-valued uses over time. I now turn to the question of how this goal can be achieved.[3]

3. Rules vs. Discretion in the Monetary Authority

In the vast majority of advanced economies, the institution responsible for conducting monetary policy is the central bank. Ideally the central bank adjusts the supply of money in the economy whenever necessary to act as a stabilizing force against the possibility of monetary disequilibrium.[4] However, it is an open question what means a central bank ought to employ in order to achieve the desired stability in the monetary economy. The most important issue is whether central banks should be given a firm rule that dictates what actions they can take to

[3] The following section is closely adapted from Salter (2014).
[4] I mentioned above that the success of this action depends on the stability over time of the link between the monetary base and the money supply. While this is an interesting question both in theory and in practice, it is not important to an understanding of the basics of monetary rules and how they function, so I will not discuss it further.

stabilize the economy, or whether they should be allowed discretion to perform monetary policy as they see fit. It should be noted that a binding rule does not need to be a precise mathematical formula. A good monetary policy rule specifies plans of action, depending on contingencies, on which the central bank cannot later renege.

The empirical literature on rules versus discretion in monetary policy is enormous. Rather than conduct an exhaustive literature review, I will discuss briefly some recent arguments in order to provide a frame for the theoretical discussion to follow. John Taylor (2012), after whom the Taylor rule for monetary policy is named, argues that recent monetary policy in the United States can be divided into an implicitly rules-based era from 1985 to 2003, but thereafter enters an ad hoc era characterized by discretionary policy. The generally favorable economic performance during the first era, and the generally poor economic performance during the second, leads Taylor to conclude that rules are preferable to discretion. Alan Meltzer (2012), another prominent economist and scholar of monetary policy, concurs. Nikolsko-Rzhevskyy, Papell, and Prodan (2013), using different methods, date the beginning of the rules era to 1984, and its end to 2000. Both sets of dates do suggest that there is some link between the monetary policy abandoning an implicit rules framework[5] and the recent financial crisis. For example, if Beckworth (2012) is correct that the Fed misread crucial economic signals and engaged in overly expansionary policy in the years leading up to the crisis, then the judgment of monetary policymakers—the predominant guiding force in the ad hoc period identified by Taylor, Meltzer, and Nikolsko-Rzhevskyy et al.—resulted in significant economic harm. This in turn suggests that rules-based policy might have spared us the economic calamity that followed.

[5] I say "implicit" because the Federal Reserve has never formally adopted a specific monetary policy rule. The authors cited suggest that during the earlier era the Fed had been following a form of the Taylor rule, which I will discuss further below.

At first, the superiority of rules over discretion seems confusing. An economy is an overwhelmingly complex order that is constantly in flux. How can a single rule account for all economic contingencies? Shouldn't the judgment of leading monetary scholars and policymakers on the specifics of each situation inform the conduct of monetary policy? Defenders of discretion frequently employ such arguments to justify central banks having the unconstrained freedom to take the necessary steps to stabilize the economy. While there is some truth in arguments for discretion, there is also much these arguments miss. In addition, a little more deduction shows some of the premises favored by advocates of discretion, especially the incredible complexity of the economy, actually tilt the balance in favor of rules. Below I will sketch the reasons why discretionary policy, despite its initial appeal, is second-best to rules.

3.1. *Time Inconsistency*

In the rules-versus-discretion debate, the single most familiar argument in favor of rules is that of time inconsistency. In a simplified explanation, an individual or organization faces a time inconsistency problem when its preferences tomorrow are at variance with its preferences today. The problem was first articulated and applied to central bank behavior by Kydland and Prescott (1977), and extended soon after by Barro and Gordon (1983). The time inconsistency problem shows that, even when the central bank and the public are perfectly informed, and even when the central bank is perfectly benevolent (i.e., it seeks to do nothing more than maximize social welfare) discretion on the part of the central bank will lead to suboptimal outcomes. If the central bank could somehow commit itself to following a rule for monetary policy *that it cannot later change*, social welfare would improve.

More concretely, the problem with discretion is that the central bank cannot credibly commit to restricting its behavior when it knows it can take action to improve social welfare, from the public's perspective. The public is typically conceived as disliking both inflation and unemployment but willing to accept a certain amount of one in order to avoid too much of the other. The central bank has short-run control over unemployment—it can temporarily lower the unemployment rate by expanding the money supply—and long-run control over inflation—if it prints money today, inflation will materialize tomorrow. The central bank has an incentive to tell the public that it will commit to a particular stance on monetary policy, which it will not later violate. Assume that the public believes the central bank and conducts economic activity by entering into contracts and other agreements, expecting a given amount of inflation because the central bank promised to deliver only that amount. Because the public believes the central bank, the central bank has an incentive to break its promise and engage in surprise expansionary monetary policy. The short-run result would be low inflation (it takes time for the new money to work its way through the economy and put upward pressure on prices) and low unemployment both, clearly an advantage from the public's perspective, at least for now. But the public realizes that the central bank faces this temptation, so they would never set their expectations conditional upon the central bank keeping its word. The public instead incorporates higher inflation expectations into their contracts and other agreements, with no reduction in unemployment.

If something could bind the central bank's behavior, such as a monetary policy rule, this problem could be avoided. If the central bank is committed to a specific monetary policy due to some rule that it cannot violate, the public can then safely believe the central bank and can coordinate on a more preferred equilibrium with lower levels of inflation and unemployment.

3.2. *Robust Political Economy*

The time inconsistency problem shows that, even in a world where the public and central bank are fully rational and the central bank is fully altruistic, discretion leads to suboptimal results. Of course, real-world monetary policy decisions are made by imperfectly rational agents, for an imperfectly rational public, by imperfectly altruistic central bankers. We need some way of comparing the decisions available to the central bank when information is less than perfect and incentives are not fully aligned. We must ask, "Which institutions perform best when people have limited knowledge *and* are prone to self-interested behavior?" (Pennington 2011, 3). This perspective, known as robust political economy, further strengthens the case for a binding monetary policy rule.

3.2.1. Knowledge. As stated before, the complexity of the economy seems to suggest the unlikelihood of a firm monetary policy rule being adequate for all scenarios. This in turn suggests monetary policymakers' judgment ought to be left unconstrained to do what they feel is best. But this position overlooks two problems. First, by allowing the central bank this extensive a mandate, we are subsuming the social intelligence of the marketplace to the individual and far more limited intelligences of a committee (Hayek 1948). As a rule, it is unwise to believe that a small group of policymakers, however intelligent and well educated they may be, can out-plan the market. Second, and related to the preceding point, discretion allows the possibility that monetary policymakers and market actors will come to conclusions at odds with each other with respect to the best course of action. This can result in an environment of uncertainty, which is inimical to economic well-being. Counterintuitively, a second-best rule may be better than first-best discretion, since the former at least anchors market actors' expectations and reduces the

chance of uncertainty and central bank miscommunication. Thus the complexity of the economy is better managed by a simple and easily communicated rule that minimizes the knowledge burden on both market actors and monetary policymakers.

3.2.2. Incentives. As in all areas of economics, incentives matter for central bank decisions. If central banks' policy decisions can be influenced by public *or private* interests, they are unlikely to be robust. A firm monetary policy rule would limit the ability of these interests to use monetary authority to achieve their own ends, which almost certainly would not align with the public's welfare. The actual degree to which central banks are free from political influence is, unfortunately, nontrivial (Cargill and O'Driscoll 2013). As Boettke and Smith (2014) note, the US Federal Reserve has deferred to politicians on a number of issues, such as public debt accommodation during the Korean War and Fed Chairman Arthur Burns's use of monetary policy in support of President Nixon's electoral ambitions.

Nor are central banks immune to private interests. As key players in an advanced economy's financial systems, large private financial institutions have a very strong incentive to influence central banks' behavior at the margin. This influence, while privately beneficial to financial institutions, is socially costly (Buiter 2008; Dowd 2009; Hetzel 2012; Ravier and Lewin 2012; Roberts 2010; Salter 2012, 2013; Selgin 2010, 2012; see also the journalistic account in Stewart 2009). The most obvious example is the Fed's handling of the recent financial crisis. Although the Fed's publicly stated motivation for its unprecedented actions during the crisis were an adherence to emergency lending orthodoxy, in actuality these activities were of dubious merit, serving primarily to enhance the balance sheets of large and well-connected financial houses (Hogan, Le, and Salter 2013).

3.3. *Central Banks and Bureaucracy*

Finally, even putting aside the problems associated with the susceptibility of central banks to other interests, there is still the problem of central banks' interests themselves. Monetary policy decisions are not made in a vacuum. Central banks are bureaucracies, with their own procedures and decision structures. As in any bureaucracy, these are very difficult to change, even in situations where change would serve the public interest. A key area of worry is the resistance to new developments in monetary economics and macroeconomics. Old ways are familiar; new ways are uncertain and costly to implement, and since it is the public who benefits rather than the central bank's staff, observers should be skeptical that advances in economic theory will make their way to central banks' decision makers. As Mankiw (2006, 14–15) remarks in commenting on the memoirs of former Federal Reserve Governor Laurence Meyer,

> Recent developments in business cycle theory, promulgated by both new classicals and new Keynesians, have had close to zero impact on practical policymaking. Meyer's analysis of economic fluctuations and monetary policy is intelligent and nuanced, but it shows no traces of modern macroeconomic theory. It would seem almost completely familiar to someone who was schooled in the neoclassical-Keynesian synthesis that prevailed around 1970 and has ignored the scholarly literature ever since. Meyer's worldview would be easy to dismiss as outdated if it were idiosyncratic, but it's not. It is typical of economists who have held top positions in the world's central banks.

As with informational difficulties, problems with incentive alignment on the part of central banks weaken the case for discretion. A firm and clear rule dictating the range of policy options can help the public coordinate its expectations based on credible commitment, limit the knowledge burden facing monetary policymakers, and help insulate the central bank from undue influence.

All these factors suggest that a rule better serves the public interest than does discretion. However, the fact that a rule is preferable to discretion does not tell us anything about which rule the central bank should be forced to adopt. In the next two sections I will address this issue.

4. Which Rule? The Pros and Cons of Some Popular Targets

This section will cover four well-known types of rules: Milton Friedman's rule of k-percent growth, John Taylor's interest rate rule, Bennett McCallum's rule for adjusting the monetary base, and inflation targeting. Each of these rules has its pros and cons; it is the purpose of this paper to compare them, not to make a definitive suggestion.

Before going into the specifics of each rule, we should go over a simple framework by which we will analyze each of these rules. Remember that it is the purpose of monetary policy to maintain monetary equilibrium so the price system can accurately convey information concerning real resource scarcities. The demand and supply of money can be described as follows:[6]

$$M^D = kPy, \tag{1}$$

$$M^S = M. \tag{2}$$

The first equation holds that individuals desire to hold a fraction of nominal income as money balances. The left hand term denotes money demand, and k denotes the fraction of nominal income that individuals desire to hold as cash. P is the price level (the inverse of money's purchasing power) and y is real income (real GDP), making Py nominal income (nominal GDP). The second equation says that the central bank can set the nominal money supply at whatever level it wishes, M. In equilibrium, money demand equals money supply, so

$$M = kPy. \tag{3}$$

The fraction of nominal income that individuals desire to hold is defined as the inverse of the rate at which these nominal dollars are spent in the economy. This rate is called the velocity

[6] This discussion is at variance with the orthodox Keynesian model, which holds that the interest rate is the price that clears the money market. While the interest rate obviously influences the desire to hold money balances, the fundamental notion is incorrect. The interest rate is not the price of money, but the price of time.

of money, denoted *V*. Since $V \equiv {}^{1}/_{k}$, we can modify equation 3 to arrive at the famous equation of exchange:

$$MV = Py. \tag{4}$$

Nominal income, Py, is also known in macroeconomics as aggregate demand. It is defined as the total nominal expenditure on all goods and services in a given time period. Equation 4 shows us that this equals the money supply, M, multiplied by the rate it turns over in the economy, *V*. Since the equation of exchange was derived from equation 3 using the definition of *V*, we see that maintaining monetary equilibrium is equivalent to stabilizing aggregate demand. This is the standard against which the monetary policy rules will be judged.

Importantly, equations 3 and 4 are *static* results. They imply that the variables in the equation must remain constant over time in order to stabilize aggregate demand. However, these equations can also hold in *dynamic* form, denoted in growth rates over time. These equations then become

$$gM = gk + gP + gy, \tag{3′}$$

$$gM + gV = gP + gy, \tag{4′}$$

where *g* denotes growth rates. Monetary equilibrium, and hence aggregate demand stabilization, can hold in dynamic form as long as the public's expectations for the growth rates of these variables are in line with the central bank's behavior in producing the growth rates. The importance of consistency in expectations, and hence credible commitment, further highlights the importance of rules-based monetary policy.

Having developed the theory by which I will judge monetary policy rules, I now proceed to discuss concrete examples of these rules.

4.1. *Friedman's k-Percent Rule*

Milton Friedman's recommendation that the money supply be increased by a certain fixed percentage per time period (Friedman 1960, 1968) is arguably the simplest of the rules discussed here. Friedman's reasoning was based on his view that the economy's real variables tended, in the long run, to a natural rate that is independent of monetary policy. The interest rate, unemployment, and output are, in the long run, determined by technological factors, and hence are an issue of supply. Monetary policy, in contrast, is an issue of demand. While monetary policy can impact real variables in the short run—for example, surprise increases in the money supply can temporarily lower interest rates and raise output—these changes will eventually reverse as variables tend toward their natural levels. In Friedman's view, it is best to avoid the costly disturbances associated with deviations from variables' natural rates by completely tying the central bank's hands. The money supply would grow by some predetermined rate every time period, and this rate cannot be changed by agents of the central bank.[7]

The k in Friedman's plan denotes the rate at which the money supply would grow.[8] That rate should be chosen to achieve, on average, no change in money's purchasing power, meaning a constant price level. In terms of the dynamic equation of exchange, this implies $gP = 0$. By substituting this into the dynamic equation of exchange, we can see that the money supply should grow at a rate equal to real income growth less velocity growth:

$$gM = k = gP - gV + gy = gy - gV. \tag{5}$$

Friedman's plan has great intuitive appeal. It would be very easy to implement. The committees that determine monetary policy for central banks could be replaced by a computer

[7] See also White (1999, 219–22).

[8] Readers will note that there are many measures of the money supply kept by central banks. In Friedman's proposal, the measure of money to be targeted is determined by whichever has the most stable velocity of circulation.

that calculates what the money supply should be in any given period in order to be consistent with the stated target. From there, the already existing framework for actually conducting monetary policy could be put to work adjusting the money supply to the rule-determined level. With such a simple metric and little if any room for discretion, the k-percent rule seems robust.

However, the ability of Friedman's rule to achieve short-run stability is contingent on the stability of the two variables, gy and gV, which determine k. If either one of these variables is subject to sudden and unexpected swings, picking a k and sticking to it will be insufficient to provide the economy with a stable nominal anchor. Unfortunately, history has proven these variables to be subject to such swings. While velocity appeared stable when Friedman was writing the papers that contained his proposals, it has since ceased to exhibit the stability necessary to serve as an anchor for a predetermined money growth rate.[9] Implementing Friedman's rule in a world where velocity is subject to unexpected swings can still result in costly resource misallocations through booms and busts. For example, if velocity growth were to suddenly and unexpectedly increase, the result would be "not enough" money added to the economy. This development would result in a temporary downturn in economic activity, as the dearth of money lowered economy-wide demand, and hence output, employment, and the price level. Output and employment, as real variables, would eventually return to their natural (long-run) rate, but depressed conditions would prevail in the meantime. It is this eventuality that Friedman's rule was intended to avoid in the first place.[10]

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[9] See http://www.research.stlouisfed.org/fred2/tags/series/?t=velocity for data on the variability of velocity.

[10] Real income growth can also change unexpectedly, due to supply shocks. This possibility will be discussed in more detail in the section on inflation targeting.

Another important element affecting the stability of Friedman's rule is the money multiplier. If the money multiplier is not stable over time (meaning a given change to the monetary base by a central bank does not map to a constant change in larger monetary aggregates), Friedman's rule will not result in stability. Let B be the size of the monetary base and m the multiplier that maps a given base, B, to some broader monetary aggregate. Also, let V^B be the velocity of the monetary base. The equation of exchange becomes $BmV^B = Py$, and in terms of growth rates,

Could adherence to Friedman's rule have prevented the 2008–2009 financial crisis? This depends on the role of overly loose monetary policy in creating the crisis. If such policy, unconstrained from a money supply growth rule, was responsible, then it is probable that strict adherence to the rule in the years before the crisis would have resulted in monetary policy neither too loose nor too tight, and hence no unsustainable boom. But if the main cause of the crisis was irresponsible behavior on the part of financial organizations due to implicit promises that the Fed would not allow them to fail—which is partly the Fed's fault, but does not constitute monetary policy per se—the crisis may have happened anyway, and strict adherence to Friedman's rule may have prevented the money supply from growing enough to mitigate the crisis. Ultimately there are too many variables that need to be specified for this question to be answered satisfactorily.

Knowing the costs and benefits of any one rule is not enough to determine whether that rule is desirable. All exercises in economic policy are inherently comparative. While we can speak in the abstract of the benefits and costs of Friedman's rule, this discussion does not provide us with any course for action until we examine additional rules to which we can compare it.

4.2. *Taylor's Interest Rate Rule*

A slightly more complicated rule, but one that is still rigorously discussed and debated in the academic literature on monetary policy, is the Taylor rule.[11] Named after John Taylor, the

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$gB + gm + gV^B = gP + gy$. The central bank only controls B directly, so if the central bank wants zero inflation ($gP = 0$), this implies $gB = gy - gV^B - gm$. If the money multiplier changes across time, meaning gm is not always equal to zero, the central bank must wrestle with another parameter to which its target is sensitive.

[11] Most central banks use the Taylor rule as part of a "flexible inflation targeting" regime, where they target a low and stable rate of inflation over the medium term. More specifically, the European Central Bank (ECB) has an explicit mandate to focus on stabilizing the purchasing power of the Euro. It aims to keep inflation near but below 2 percent as its monetary policy goal. Since 2012, the Federal Reserve has stated it is targeting 2 percent inflation until the output gap, approximated by unemployment, shrinks to acceptable levels. Proponents of using the Taylor rule to

Stanford economist who first formulated it (Taylor 1993), this rule specifies, not a money supply target, but a target for the short-run interest rate that the monetary authority sets in conducting open-market operations. The Taylor interest rate rule generally takes the form

$$i = gP + r + \alpha(gP - gP^*) + \beta(\ln y - \ln y^*), \tag{6}$$

where i is the target for the short-term interest rate, r is the assumed equilibrium real interest rate, and α and β are terms dictating how the monetary authority should adjust the target rate when inflation (gP) is above the desired rate (gP^*) and (the natural log of) real output is above its long-run trend rate (y^*), respectively. In Taylor's original formulation, $\alpha = \beta = 0.5$.[12]

Taylor's rule basically says that, whenever inflation and/or output are above their desired rates, the monetary authority should raise the target rate by contracting the money supply. Since money is typically taken out of capital markets when the monetary authority shrinks the money supply, this action will raise the price of loanable funds, that is, the interest rate, thus slowing down the economy by raising the costs associated with investment, and hence lowering total spending (aggregate demand). This should result in prices and output dropping from their currently too-high levels. If prices and output are below their desired levels, the monetary authority does the opposite. By injecting money into capital markets, the monetary authority increases the supply of loanable funds, which (all else being equal) lowers the interest rate.[13]

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implement flexible inflation targeting argue that it delivers the benefits of rule-constraining behavior while allowing monetary policymakers enough leeway to respond to any given macroeconomic problem. An example is past Chairman Bernanke's advocacy of "constrained discretion" (Bernanke and Mishkin 1997; Bernanke 2003). Inflation targeting in general is discussed further in section 4.4.

[12] Interestingly, Taylor's original simulation described how central banks *actually did* behave. However, the massive literature spawned on the Taylor rule typically takes this result as a standard against which monetary policy ought to be judged. In other words, the Taylor rule is now widely regarded as a measure of how central banks *ought* to behave.

[13] This action affects other variables as well. Changing interest rates will also influence aggregate demand through changes in net exports (since exchange rates will change) and personal consumption (since lifetime wealth will change). Investment will also be affected through the change in assets' market value relative to the costs of replacing these assets.

The chief benefit of the Taylor rule is its specificity. Rather than a broad money supply target, the Taylor rule can tell the monetary authority how to adjust the short-term interest rate in response to changing economic conditions, thus making it more adaptable than Friedman's rule, at least theoretically. However, the specificity of the Taylor rule is a double-edged sword. The difficulty lies in finding the right balance between the magnitude of the coefficients on the inflation and output gaps. While this seems trivial, it is a subject of much debate among economists (e.g., Taylor 1999). If the monetary authority, based on incorrect information, sets an "incorrect" interest rate, one of the most important prices in the economy—the price of time—will not accurately reflect the real scarcity of capital, and can result in costly resource misallocations.

Taylor (2012), building on Meltzer (2012), does seem to suggest adherence to a Taylor rule would have prevented the financial crisis. Given that real interest rates, and hence the cost of financial capital, were held low for such a long period by the Fed in the years before the crisis (see, e.g., White 2012), it does seem that continued adherence to the pre-2003 (or 2000 if one uses Nikolsko-Rzhevskyy et al.'s [2013] timeline) implicit rule scenario would have meant no artificially cheap capital, and hence less financial irresponsibility. But, as in the discussion of Friedman's rule, this assumes that overly loose monetary policy was the proximate cause of the crisis. If moral hazard is primarily to blame, distress in financial markets may have resulted anyway. In addition, recent discussion of the infamous "zero lower bound"—referring to the fact that nominal interest rates cannot go below zero, and hence conventional monetary policy can become inoperable to the degree necessary to stabilize the economy—calls into question the flexibility of Taylor rules in stemming deep recessions.

4.3. *McCallum's Feedback Rule*

A less well-known rule proposal than Taylor's is Bennett McCallum's (1989) feedback rule.[14] Like Friedman's rule, it targets the money supply; like Taylor's rule, it is more specific as to how the target variable should change in response to other macroeconomic variables. McCallum notes that Friedman's rule—picking a k and hoping that, due to intertemporal velocity and real income stability, this k will result in zero inflation—is unlikely to work. Velocity can and does frequently change. Although less frequently, real income can also suddenly change for reasons other than demand-side (monetary) factors. The global spike in oil prices beginning in the 1970s is an example.[15]

McCallum's rule attempts to take into account the possibility of changes in both velocity and income. Defining B to be the monetary base, V^B to be the velocity of the monetary base, and m the money multiplier determining how a given monetary base maps to the money supply, we can rewrite the equation of exchange as $BmV^B = Py$. In growth rates, this becomes $gB + gm + gV^B = gP + gy$. McCallum's rule is for the monetary base, taking the form of the following equation:

$$gB = gy^* - gV^B + \gamma(\ln Py^* - \ln Py), \tag{7}$$

where gy^* is the trend growth rate of real output, Py^* is the target value for nominal income, and Py is the current period's nominal income. And finally, γ is a parameter dictating how the money supply growth should change in response to nominal income deviations from the "ideal" level. In McCallum's formulation, $\gamma = 0.25$. McCallum's rule explicitly takes nominal income into account in order to minimize the undesirable effects of sudden and unexpected swings in nominal income.

[14] White (1999, 223–225) provides a cogent discussion of McCallum's rule, upon which this section is based.
[15] Such an event is referred to as a negative supply shock. Positive supply shocks, such as the sudden development of a new technology that makes labor and capital more productive, can also occur.

The benefits and costs of McCallum's rule are similar to those of Taylor's rule. It is a more specific rule than Friedman's in that it takes into account the possibility that other variables may change. But taking these variables into account also places an increased knowledge burden on monetary policymakers. Relative to the Taylor rule, McCallum's rule is probably less costly to implement, on the grounds that the variables required to implement McCallum's rule (money supply, velocity, and nominal income) seem easier to measure than those required to implement the Taylor rule (real income and the equilibrium real interest rate).[16] However, one could argue that, conditional upon correct information, the Taylor rule delivers more specific advice for achieving macroeconomic stability than McCallum's rule. Whether one prefers Friedman's, Taylor's, or McCallum's rule will largely depend on the difficulties one perceives with measuring macroeconomic variables accurately, and how costly deviations from the rule, or a breakdown of the rule, will be in terms of negative effects on output and employment.

Assuming McCallum's rule had been effectively institutionalized before the Great Recession, it probably would have made the financial crisis much less severe. Irrespective of the debate about the importance of overly loose monetary policy versus moral hazard in creating the crisis, the sudden drop in nominal income in 2008 was probably the single largest factor influencing the length and depth of the Great Recession (Sumner 2011, 2012). Since it takes nominal income into account, McCallum's rule could have provided some much-needed cushioning.

4.4. *Inflation Targeting*

The final rule considered in this section, inflation targeting, is very popular both in the academic literature and in real-world monetary policy decisions.

[16] Taylor's rule is harder to measure because, for a given level of agreed-upon nominal income, there are several ways nominal income can be decomposed into the price level and real income.

The desirability of an inflation target grew out of the macroeconomic consensus that began to form in the late 1970s and early 1980s, when faith in the old Keynesian system of macroeconomic fine-tuning broke down in the face of the simultaneous rise of unemployment and inflation. This phenomenon, known as stagflation, was difficult to understand in the then-popular paradigm. Macroeconomic theorists, and especially monetary policy theorists, came to believe that effective monetary policy could not and ought not steer the real economy. Instead the monetary authority should focus on predictability by committing to stabilize a nominal variable, which would provide an anchor to help coordinate market actors' expectations. Such a policy would promote economic activity.

The mechanics of an inflation target are easy to understand using the dynamic equation of exchange. If the monetary authority were targeting 2 percent inflation, as in the case of the European Central Bank, it would increase the money supply every time period by 2 percent, plus the period's growth in real income, less that period's growth in velocity:[17]

$$gM = 2\% + gy - gV. \tag{8}$$

An inflation target does not specify whether the central banks should measure gy and gV every time period or whether they ought to take average or trend values. As we have seen, there are costs to each. Measuring these variables every time period is costly in terms of collecting information, but using trend values runs the risk of sudden deviations from trend, rendering the rule insufficient to achieve economic stability. Which of these approaches is preferred depends on one's evaluations about which of these costs is greater.

[17] An inflation target is simply the dynamic form of a price-level target. A price-level target aims for a constant price level, meaning $gP = 0$. Price-level targeting is significantly less favorably viewed, both in the academic literature and in central bank boardrooms, than inflation targeting.

Inflation targeting is quite similar to the above rules, especially Friedman's and McCallum's, since it specifies desired changes in terms of making adjustments to the money supply. Also, since Friedman's and McCallum's rules were each calibrated to deliver zero secular inflation, they can be thought of as a form of inflation targeting, namely a zero-inflation or price-level target. Like these rules, inflation targeting has an advantage over the Taylor rule in economizing on the knowledge necessary to implement the rule.

However, relative to Friedman's and McCallum's rules, there is a larger possibility that an inflation target can *de*stabilize the economy. Take the case of a negative supply shock. In this case, real income (and likely its growth rate as well) and employment are reduced by some change unrelated to the economy's monetary system. This reduction would tend to also *raise* prices across the economy, and hence increase inflation because a negative supply shock reduces the real quantity of goods and services, but not the quantity of money. With an unchanged quantity of money chasing fewer real goods and services, the purchasing power of money must fall—that is, inflation must increase. If this pushes inflation above the targeted level, the monetary authority will then *contract* the money supply to push prices back down. But in this case, contractionary policy, while it would serve to push inflation back to its targeted level, would cause a further reduction in real output and employment. The unsettling possibility of this double whammy is perhaps the most significant argument against inflation targeting.[18]

Since the Great Recession was primarily a demand-side phenomenon, resulting from a sudden drop in nominal income in 2008, an inflation target would have been a stabilizing force, much in the same way McCallum's rule would have been. But again, we need to consider the

[18] Friedman's rule, because it specifies a predetermined rate of money growth, would actually be *less* destabilizing in the presence of supply shocks. Because McCallum's rule uses aggregate demand, Py, as its nominal anchor, it too would be less destabilizing, since it takes into account changes in both prices and output.

possibility that overly loose monetary policy helped fuel an unsustainable boom in the first place. Supply-side growth in the pre-crisis years put benign downward pressure on inflation. To keep a given inflation target, a central bank would have had to increase the money supply. As an unintended consequence of the inflation target, the extra money could have fueled a speculation boom in financial markets, which is precisely Beckworth's (2012) account of the run-up to the financial crisis. In the final analysis, an inflation target would have mitigated a crisis that was manufactured in part by that target in the first place!

As we have seen, each of the proposed rules has its pros and cons. What these rules also have in common is that they can be implemented without significantly changing the operating structure of currently existing central banks. However, there are proposals for macroeconomic stability that, in theory, improve upon the outcomes expected from the above rules. The implementation of these rules would require, or at least work best conditional upon, a radical restructuring of monetary institutions.

5. Radical Possibilities: Market-Based Nominal Income Targeting, Commodity Standards, and Free Banking

The following proposals go even further in limiting the monetary authority in an attempt to institutionalize a predictable and stable monetary policy rule. In these cases, the concept of a rule is broadened to include the choice of the monetary-institutional framework itself. The rules-as-institutions approach to economics has its own subfield within academic economics, known as

constitutional political economy (e.g., Brennan and Buchanan 2000).[19] As such, this section can be viewed as a combination exercise in constitutional political economy and monetary theory.

Each of the following proposals, in theory, eliminates the possibility of the monetary authority influencing the economy once the underlying rule has been chosen. In these scenarios, what remains of the monetary authority looks vastly different from a modern central bank. The proposals will be considered in an increasing level of radicalness—that is, by the degree to which they strip the monetary authority of responsibility.

5.1. *Market-Based Nominal Income Targeting*

The proposals in section 4, aimed at maintaining macroeconomic stability through monetary equilibrium, can be viewed as varying technologies for hitting a nominal income target. The differences between those proposals can thus be understood as competing views about which variables are sufficiently stable over time to be treated as parameters upon which the policy is built. The ultimate question is deciding which method is best for offsetting changes in V with opposite changes in M to maintain either a constant Py or a constant $gP + gy$. But what if this knowledge burden could be entirely sidestepped? Is it possible to make an end run around the question of whether changes in the observed variables are due to demand-side factors—in which case there may be a valid monetary response—or supply-side factors—in which case the best policy, from an efficiency standpoint, is to allow the variables to adjust to new underlying market conditions?

Scott Sumner, a macroeconomist who has risen to public prominence since the financial crisis, says yes (1989, 2006, 2011, 2012). Rather than having a central monetary authority

[19] Here the term "constitution" does not refer to any one document, but to the overarching rules that give structure to interpersonal behavior within a given society.

attempt to engineer monetary equilibrium, the institutional structure of the monetary authority can be changed to allow market forces themselves to change the supply of money in response to changes in the demand to hold money. The monetary authority's role in such a scheme is limited to buying and selling an unlimited amount of a derivative financial instrument, the market value of which is dependent on the actual level of nominal income. By stabilizing the value of this "quasi-futures contract" (Dowd 1994), the monetary authority can harness the diffused knowledge and incentive-aligning features of the market process to bring about macroeconomic stability.

In more detail, Sumner proposes that the monetary authority promise to buy or sell—at some date in the future—however much the market is willing to bear of this quasi-futures contract. The price at which the monetary authority will buy or sell this contract is pegged by the same monetary authority. It can be set to be a constant level of nominal income, Py, or any constant growth rate of nominal income, $gP + gy$, that the monetary authority believes to be consistent with market actors' expectations. But the value of the contract—the rate at which the monetary authority will exchange the contract for dollars, and vice versa—is determined by the level of nominal income in the economy when the execution of the contract falls due.

Suppose market actors believe that *actual* nominal income, at the time the contract is to be executed, will be higher than the level specified in the contract. Market actors then have a financial incentive to buy this contract from the monetary authority immediately. Since they expect nominal income to be higher when the contract falls due than it was when they bought the contract, they expect to make a pure arbitrage profit. In response, the monetary authority will take the money used by market actors to purchase these contracts and destroy it, thus reducing the money supply, which puts downward pressure on nominal income. Eventually the money

supply would fall enough to bring expected future nominal income in line with the pegged value selected by the monetary authority. Arbitrage profits from buying the contract would be zero, and the system would be in equilibrium.

Conversely, if expected future nominal income fell below the pegged level, individuals would have an incentive to sell this contract to the monetary authority. Since the contract, the value of which is tied to the prevailing level of nominal income, is expected to depreciate in value, this again would result in pure arbitrage profits for traders. In buying this contract from traders, the monetary authority injects base money into the economy, which would raise the money supply. This action would eventually raise future expected nominal income until the point where it equaled the monetary authority's pegged level, again bringing the system into equilibrium, with zero arbitrage profits expected to the traders.

Sumner's proposal thus harnesses individuals' profit-seeking behavior to stabilize the macroeconomy. As mentioned before, if implemented correctly, this proposal would put the knowledge of the whole marketplace to work in stabilizing the economy:

> Because traders' expectations are based on a wide variety of different structural models, their forecasts will be similarly diverse. As with any futures market, in equilibrium there will be traders taking both long and short positions. Unlike ordinary futures markets, however, equilibrium is not established by movements in the market price (which is fixed by the Fed at its policy goal). Instead, equilibrium would be established as trades of . . . futures contracts shifted monetary policy (Sumner 2006, 11).

In this system, the monetary authority has only two jobs: create and destroy base money at a rate dictated by the trading preferences of nominal income speculators, and pick the pegged value at which the monetary authority will buy and sell the contract before the system is set up. Rather than relying on the expertise of the small handful of individuals that make monetary policy decisions, the committee responsible for deciding the proper course of monetary policy

would be disbanded—or, to put it more colorfully, expanded to include anyone in the world who had sufficient capital to speculate in this market.

Sumner's proposal is simple, elegant, and founded on well-established theoretical insights about what micro-level conditions must prevail in order for the macroeconomy to remain stable. Had it been in place in the years preceding the financial crisis, the crisis may never have materialized. Since the monetary authority's sole job would be managing the day-to-day operations of the NGDP futures market, it would be unable to engage in discretionary policy, meaning there would be no chance of excessively loose policy fueling an unsustainable boom. It also means that there would be no possibility of moral hazard, since there would be no possibility of bailouts for irresponsible financial organizations.

However, this rosy narrative overlooks some conceptual difficulties with the proposal. First, and most significantly, this system, radical as it may seem, still vests a single, nonmarket institution with the sole authority to create money. As long as the monetary authority has a monopoly on the provision of legal tender, there will be the temptation on the part of policymakers to overstep their mandate and harness this privilege to fulfill their own interests. Second, the market must be sufficiently capitalized in order for it to function as an effective stability-enhancing instrument. Markets normally become increasingly capitalized over time as they grow. Since this market would be created *ex nihilo*, the monetary authority would probably have to engage in special subsidization of the market. The potential for political interests to influence this practice, too, are concerning. Third, there are technical problems with regard to the timing at which individuals would buy and sell the contracts. Individuals would wait to trade in the nominal income futures market until they had, in their minds, good enough information to predict the level of future nominal income. They would therefore want to wait as long as possible

to buy or sell the contracts, and the majority of trading would take place in a short time period preceding the execution of the contracts. Consequently, this system could still result in sudden, unexpected swings in nominal income, as noted by Garrison and White (1997).[20] Sumner (2006, 17–22) discusses ways around this problem, but they are not ironclad.

5.2. *Commodity Standards*

A commodity standard, such as a gold standard, is relatively simple to understand: money takes the form of a commodity, with the prices of all other goods and services in the economy listed in units of this commodity. As such, it differs from fiat (government-decreed paper) money, which implicitly characterized each previous proposal discussed in this paper. It is important to note that historically, there has been massive heterogeneity among commodity standards, and even among gold standards. There is no such thing as *the* gold standard, let alone *the* commodity standard. For simplicity's sake, the proposal outlined here will assume a gold standard, with gold coins or claims to gold coins serving as the everyday medium of exchange.

In this system, the price level (and hence the purchasing power of money as well) is determined by the stock of monetary gold that exists at any given time. Gold stocks will expand over time due to new mining of gold and will contract due to wear and tear of gold coins. Which effect dominates depends on whether the stock of monetary gold will tend to expand or contract over time. Since we cannot say for sure which of these effects is larger, are we unable to know whether the supply and demand for money will tend toward an equilibrium, as in other systems?

Fortunately, we do not confront nearly so strong an indeterminacy. There is a stable equilibrium under this kind of a commodity standard. The market for existing stocks of monetary

[20] This critique is made in the context of price-level futures targeting, rather than nominal income targeting, but the critique is generalizable to any nominal variable.

gold, characterized by supply and demand for this gold, determines the price of gold relative to all other commodities, and hence money's purchasing power. At this price of gold, there is also an equilibrium in the market for gold flows: that is, the market determines how much gold is mined in any given time period. If the demand for monetary gold rises above this equilibrium price, it becomes more profitable to mine gold and mint gold coins. This situation provides a financial incentive for gold miners to add to the stock of monetary gold when demand for it increases, thus obviating the need for costly price adjustments in the economy at large. Conversely, if the demand for monetary gold falls, it is less profitable to mine and mint gold. Less gold will be added to existing stocks, meaning the supply of gold will fall back in line with the reduced demand, again with minimal need for costly economy-wide price adjustments. Thus commodity standards exhibit robustness to demand-side monetary changes.[21]

But what of changes in supply? Over time, general technological growth should improve miners' ability to mine gold. If such technological growth benefits the mining industry disproportionately to other industries, it is plausible that "too much" monetary gold will be added to the economy over time, pushing us out of monetary equilibrium into a costly phase of overproduction. Critics might point to the mid-19th century gold rush in the United States as an example of this troubling possibility. However, a glance at the data should be somewhat reassuring. From 1849 to 1857, the most inflationary period of the gold rush, the general level of prices rose 12.4 percent, which translates to an approximate 1.5 percent year-over-year increase (White 2008, 2). Thus while it is theoretically possible for an unexpected gold bonanza to destabilize the system, empirically it is extremely unlikely.

[21] For a more in-depth account of this process, see White (1999, 26–37). For a detailed reply to common objections to gold standards, see White (2008).

As we have seen, this kind of a commodity standard exhibits self-correcting tendencies on the demand side. Empirically, it also appears stable on the supply side. Since it is upheld by ordinary incentive-aligning market mechanisms, it meets the requirements for a robust monetary-institutional arrangement. But as with every other arrangement we have yet covered, there are costs to consider. First and most obvious is the extreme political impracticality of such a system. The gold standard, and commodity standards more generally, fell out of favor long ago with most economists and policymakers. This is due in no small part to the belief that skillful macroeconomic management could improve on commodity standards' vagaries. As we saw in sections 2 and 3, this belief is unfounded, but nonetheless the status quo must be recognized for what it is. Achieving agreement on this margin would be incredibly difficult, and hence costly. It is unclear that these costs are worth bearing if there are alternative rules that can yield results that are as good, or even almost as good. Second, as with all institutional fixes, we must be concerned with transitional issues. Even if agreement could be achieved, it is not clear how we could transition to such a system, given that it would have to start in the political sector, and hence must deal with pushback from those who have an interest in preserving the current monetary-institutional order.

5.3. *Free Banking*

Free banking, also called laissez-faire banking (subject only to ordinary contract and property laws), is the final system under consideration. Under free banking, anyone may open a bank and issue notes and checkable deposits, which serve as liabilities that fund the bank's long-term asset portfolio. Thus there is no monopoly on the issuance of legal tender. The right of issue is open to any bank that can secure public demand for its notes and checkable deposits. The spread between

the interest earned on this portfolio and the interest paid to note holders and deposit holders is the bank's profit. Free banking may seem a radical system, and by today's standards it is. However, these systems have existed and persisted for a century or more in some places. The most successful occurrences were in Scotland during the 18th and early 19th centuries, Sweden during the 19th century, and Canada for virtually all its history until World War I (Dowd 1992; Fink 2014; Selgin 1988; Selgin and White 1994; White 1989, 1995).

A free banking system is really a special type of commodity money system. Historically, gold was the commodity that typically served as money in free banking systems. Banks were in the business of issuing notes and checkable deposits that were *claims* to gold. This system grew out of the warehousing system of the Middle Ages, where owners of gold would keep their stocks with smiths or other artisans for safekeeping. Eventually these warehouse keepers realized that the gold owners would not all be redeeming all their gold at once. Therefore the warehouse keepers could make a profit by loaning out the money-gold until their customers sought redemption. As long as they kept enough physical gold on premise to meet the public's expected redemption demand in any given time period, they would remain liquid. Thus modern banking—borrowing short to lend long, necessitating fractional reserves—was born.

In a mature free banking system, as existed in Scotland, Sweden, Canada, and many other places, the day-to-day medium of exchange is the banks' claims to gold. These liabilities on the banks typically took the form of notes (which usually paid no interest) and checkable deposits (which usually paid some interest). The physical exchange of gold was rare, usually only taking place between banks that wanted to settle their account balances with each other. In the ordinary course of business, the Bank of A would acquire notes drawn on the Bank of B,

and vice versa. When they cleared these balances with each other, the exchange was done in gold reserves.[22]

At first it seems like there is no way that a free banking system could be stable. Once the public was willing to accept the Bank of A's notes, didn't that bank have an incentive to print as many as possible, acquiring lots of wealth in physical goods and services in the short term? And since it makes sense for all banks to do this, shouldn't the result of free banking be permanent and rampant inflation? Fortunately, persistent inflation in free banking systems was exceedingly rare.[23] Each bank in reality was constrained in the amount of notes that it could profitably issue. What constrained these banks was individuals' demand for held money. If banks issued more notes and checkable deposits than the public was willing to hold, the public would quickly bring these liabilities back to the bank for redemption, causing the bank to lose gold reserves and putting it in a precarious financial position. Such a bank would be forced to contract its notes and checkable deposits in order to stay afloat.

The mechanism that would prevent banks in a free banking system from overissuing notes makes the system appealing from the standpoint of macroeconomic stability. Imagine the public's money demand increased. Banks would eventually notice that individuals were willing to hold more notes and checkable deposits for longer periods, and the banks' gold reserves would not drain as quickly. This situation would signal to a bank that the public was more willing than before to give the bank a low-interest loan of its gold. The bank would respond by issuing more notes and checkable deposits, which would enter the stream of total nominal expenditures as banks used these newly created instruments to buy additional assets for their portfolio. Once again, we would

[22] Banks had a profit-maximizing incentive to accept each other's notes at par, provided that the banking system was sufficiently well developed that transaction costs were low. For the theory behind this, see Selgin (1988).
[23] For a detailed analysis of the behavior of familiar macroeconomic variables, such as inflation, under free banking, see Selgin (1994) and Sechrest (2008).

have a system where demand-side changes in the money market are offset by profit-seeking behavior on the part of market participants. A similar story holds for a decrease in the demand for money: banks would see that individuals were less willing to loan to banks than before, and they would contract their supply of notes and checkable deposits as a consequence. Thus free banking, both in theory and in practice, is conducive to monetary stability, due to its tendency to offset changes in money demand with appropriate changes in money supply.[24] It can be thought of as a fully privatized nominal income-targeting regime, and it has the same stabilization properties. Like other nominal income targets, a free banking regime would have prevented the financial crisis by eliminating both overly loose monetary creation and moral hazard.

What are the downsides of free banking? Like a commodity standard, it is so radical a departure from the current monetary-institutional order that obtaining the necessary consent and actually affecting the transition would be incredibly costly. It is not clear a priori that the benefits of this system would be worth the transition costs. In particular, free banking has no need for a monetary authority, since each bank can issue its own notes and checkable deposits. A monetary authority of the conventional type would more likely be a danger to this system, and would be best done away with. This in particular would be incredibly difficult to achieve.[25]

6. Conclusion

The theoretical framework and details of the proposed rules covered in this paper provide a foundation for those hoping to advance their understanding of monetary theory and policy. As

[24] Those familiar with US banking history would point to this history as an obvious counter-example. But the US banking experience is not remotely free. There were many regulations that prevented banks from adjusting the money supply in a way consistent with macroeconomic stability (Smith 1990).

[25] A less costly possibility would be to eliminate the monetary authority but use existing fiat national currency as the monetary base, upon which the new free banks can issue their notes and checkable deposits. Selgin (1985) discusses this possibility in more detail.

stated in the introduction, there is no recommendation for any specific rule made in this paper. There are, however, a few key questions that any proposed monetary policy rule should be able to answer:

- Is the proposed rule theoretically capable of attaining monetary equilibrium, and hence macroeconomic stability? If the answer to this question is conditional upon some parameters (such as velocity) remaining stable, how likely is it that they will in fact remain stable? And how robust is the rule's success to instability of these parameters?
- What assumptions does the rule make concerning the knowledge and incentives available to public and private actors whose actions influence the rule's functioning?
- Can the rule be put into practice by central banks as they currently are? How much does the rule rely on central banks versus private market actors to work effectively?
- If the rule requires a significantly different monetary-institutional framework, does creating this new framework pass a benefit-cost test?

It has been the purpose of this paper to convey why these questions are important. In doing so, it suggests that the correct way of thinking about issues in monetary theory and policy is not to work within these fields only, but to include broader considerations of political economy as well. Abstract monetary theory is both good and necessary, but without engaging issues of political economy, little can be said about whether the rule in question is desirable (Boettke and Smith 2013).

Issues in monetary theory and policy do not have to be opaque. Informed participants in the democratic process can and should understand the fundamentals of monetary theory and policy. This is more important than ever following the post-2008 financial crisis. Hopefully, this paper has served as a building block upon which further discussion and exploration can be based.

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