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A MARKET-DRIVEN NOMINAL GDP TARGETING REGIME

Scott Sumner

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Mercatus Center
George Mason University
3351 Fairfax Drive, 4th Floor
Arlington, VA 22201-4433
(703) 993-4930
mercatus.org

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ABOUT THE AUTHOR

Scott Sumner received his PhD in economics from the University of Chicago in 1985 and has taught economics at Bentley University since 1982. He has researched the role of gold in the Great Depression, the Japanese liquidity trap, and market-driven monetary-policy regimes. Sumner has authored more than 30 publications in refereed economics journals including the *Journal of Political Economy* and the *Journal of Money, Credit and Banking*. He also runs a popular blog on monetary policy, *The Money Illusion*. In 2012, *Foreign Policy* magazine named him one of the Top 100 Global Thinkers.

ABSTRACT

Central banks have recently done a dreadful job of stabilizing the path of nominal expenditures. The adverse demand shock of 2008–9 led to a severe recession in the United States and Europe. Monetary policy could be greatly improved with a regime of "targeting the forecast," or setting policy so that the expected growth in nominal GDP is equal to the central bank's target growth rate. This goal could be accomplished by setting up a nominal GDP futures market and then adjusting the monetary base to stabilize nominal GDP futures prices. The market, not central banks, would set the level of the monetary base and short-term interest rates under this sort of policy regime. Modest adjustments in such a regime could address many previous criticisms of futures targeting.

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I. INTRODUCTION

In recent decades, there has been a worldwide shift toward market-driven economic policies, including privatization, deregulation of market access, bandwidth auctioning, congestion pricing, and tradable pollution permits. Yet monetary policy has been relatively unaffected by the "neoliberal revolution." Governments have retained a monopoly in the production of fiat money, the setting of policy targets, and the implementation of monetary policy. In this paper, I show how a market-driven monetary-policy regime can lead to greater macroeconomic stability.

Many market-driven policy innovations in other areas retain a substantial role for the government. Similarly, I will not advocate a completely privatized regime. Some advocates of laissez-faire in money favor defining the dollar in terms of a commodity such as gold and then allowing a system of free banking. But it is difficult to envision modern governments abdicating responsibility for determining the path of nominal spending. A gold standard might produce a satisfactory outcome, but one can envision an equally plausible scenario where soaring demand for gold in Asia raises the purchasing power of gold, producing deflation in all countries that use gold as a "medium of account," or the asset in terms of which all prices are quoted.

There are benefits to having a single medium of account, sometimes termed "network effects." People prefer to be paid in the same asset that they spend. Even if the government does define the medium of account, perhaps using bank reserves created by fiat, it is not obvious that it needs to play a dominant role in *managing* our monetary system. Before 2008, when the Fed began paying interest on reserves, currency was nearly 99 percent of the monetary base. Only a bit over 1 percent was bank deposits at the Fed. Banks could be allowed to issue fiat currency, perhaps redeemable into Fed-created bank reserves.

In this paper, I will set aside the issues of whether the government should define the medium of account and whether it should maintain a monopoly on producing currency. Instead, I will focus on what I believe is the most important problem in monetary economics: stabilizing the value of the medium of account. Who should implement monetary policy, the government or the private sector? Who should decide whether too much money has been injected into the economy, or too little? This paper will show that even where governments retain a monopoly in currency

production, a market-driven system of open-market operations can greatly improve the effectiveness of monetary policy.

I will illustrate the advantages of the proposed monetary regime using a nominal gross domestic product (NGDP) futures market, although the basic approach could be used to stabilize alternative nominal aggregates such as the price level. These proposals are often dubbed "index futures targeting." The basic idea is to have policymakers determine a goal of monetary policy, such as stable growth in nominal GDP, and then have markets implement the policy by adjusting the monetary base until it is at a level where the expected 12-month forward level of NGDP equals the policy goal.

Because I envision a policy regime where government plays some role, the various proposals will be susceptible to the standard public choice critique. However, any reform proposal depends on at least some goodwill by policymakers. For instance, under a gold standard, a government could alter monetary conditions by implementing a gold-reserve requirement for banks or by adjusting the minimum gold-reserve ratio. Indeed, gold hoarding by governments in 1929–33 was one cause of the Great Depression.

No previous monetary regime, no matter how "foolproof," has lasted forever. Voters and policymakers always have the last word. However, before beginning to address public choice concerns, it is necessary to think about what sort of monetary regime is capable of producing the best results, at least in principle. Only then will it be possible to work on the much more difficult question of how to make the proposal politically feasible.

Because the idea of monetary policy futures targeting is so unfamiliar, I will develop the proposal one step at a time. In the next section, I examine some conceptual problems with monetary policy—including the surprising fact that it is not clear what monetary policy actually is.

In section III, I show that creating a regime based on index futures targeting could introduce market forces into monetary policy. To illustrate the logic of the proposal, I move from the current monetary regime to index futures targeting, one step at a time. Then I examine three alternative approaches for using market expectations to guide monetary policy. In section IV, I discuss common objections to index futures targeting. Some are based on misconceptions, and others can be addressed by tweaking the proposal from section III. Section V discusses how NGDP futures targeting can address the zero-interest-rate boundary problem, also known as the "liquidity trap." In the conclusion, I discuss how a system of index futures targeting can be seen as a natural evolution from the 19th-century gold standard system.

II. WHAT IS MONETARY POLICY? AND DOES IT MATTER?

Monetary policy disputes tend to become highly contentious during periods of macroeconomic distress. For instance, during the Great Depression, many

economists advocated abandoning the gold standard. During the 1970s and early 1980s, economists developed a number of proposals for removing the government from the monetary policy arena, including Hayek's proposal for "competition in [fiat] currency."[1] The perceived failures of government-run fiat-money regimes, particularly the high and variable inflation rates experienced from the mid-1960s to the early 1980s, explicitly motivated many early proposals.

During the so-called Great Moderation (1985–2007),[2] however, monetary-reform ideas lost momentum. Most major central banks seemed to be doing a respectable job of delivering stable growth with low inflation, but this period of relative stability covered up some deep fissures in macroeconomic theory. Economists can disagree over monetary policy on three levels: whether money should be easier or tighter, which type of monetary regime should be in place, and the nature of monetary policy itself.

The financial crisis of 2008 and the subsequent Great Recession shattered the illusion that central banks had "solved" the problem of monetary policy. The most disturbing aspect of this crisis is not that a policy failure occurred, but rather that economists cannot agree on the nature of the failure, even in retrospect. An important and underappreciated aspect of this loss of consensus is that it has exposed radically different visions about what monetary policy is all about. Alan Greenspan's policies worked (or perhaps seemed to work), but economists could never agree on why. What, precisely, was the Fed doing during the period from 1985 to 2007, and how did that policy lead to stable inflation and nominal GDP growth?

A good way to see these divisions is by considering the policy views of these five distinguished monetary economists:

1. Michael Woodford—Favors policy rules with interest-rate instruments aimed at stabilizing the price level. His recent work is perhaps closest to a consensus model.[3]
2. Bennett McCallum—Advocated policy rules with a monetary base instrument aimed at stabilizing nominal GDP growth.[4]
3. Milton Friedman—Favored steady growth in broader monetary aggregates such as M2.[5]

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1. F. A. Hayek, *Denationalisation of Money* (London: Institute of Economic Affairs, 1976).
2. "The Great Moderation" refers to a period of unusually stable inflation and nominal GDP growth. At the time, economists such as Ben Bernanke and Gregory Mankiw attributed this stability to improvements in monetary policy, particularly the "Taylor rules."
3. Gauti B. Eggertsson and Michael Woodford, "The Zero Bound on Interest Rates and Optimal Monetary Policy," *Brookings Papers on Economic Activity* 1 (2003): 139–232.
4. Bennett T. McCallum, "Alternative Monetary Policy Rules: A Comparison with Historical Settings for the United States, the United Kingdom, and Japan," *Economic Quarterly* 86, no. 1 (2000): 49–79.
5. Milton Friedman, "Monetary Policy: Tactics vs. Strategy," in *The Search for Stable Money: Essays in Monetary Reform*, ed. James A. Dorn and Anna J. Schwartz (Chicago: University of Chicago Press, 1987), 361–82.

4. Robert Mundell—Favors fixed-exchange-rate regimes.[6]
5. Robert Hall—Advocated a price-level targeting scheme involving interest-bearing bank reserves. Higher rates on reserves would lower demand for reserves and thus raise the price level. Hall also proposed monetary policies aimed at targeting the price of a specified basket of commodities.[7]

The problem here is not just that each of these economists has his own preferred approach to monetary policy, but rather that these policy recommendations are based on *fundamentally distinct ways of thinking* about monetary economics in general. Indeed, it is not clear that the preceding five economists would even agree on what is meant by the term "monetary policy." Friedman and McCallum might argue that monetary policy is all about control of the *quantity* of money, however defined. Mundell and Hall might argue that monetary policy determines the *price* of money (in terms of foreign exchange, or gold, or a basket of commodities.) Woodford might see monetary policy in terms of changes in the *rental cost* of money (i.e., short-term interest rates). The quantity, price, and rental-cost approaches to policy have all been around for hundreds of years. And both the short-run sticky-price and long-run classical frameworks go back at least to David Hume.[8] These differences of opinion will not be resolved anytime soon.

The same is true of the structural macroeconomic models that guide policymakers at central banks. Economists do not agree which models are best, and because the macroeconomy is so complex, it is difficult to do a definitive test. Thus, during the recent recession, some proponents of Taylor rules argued that policy was too "tight" or contractionary, whereas John Taylor himself used a different version of the same rule and reached the conclusion that policy was not too tight.[9]

Economists also differ in their views of the relative importance of money illusion, wage stickiness, and price stickiness in the aggregate-supply function. They do not agree on the causes of short-run price stickiness.[10] In fact, there is not even any general agreement as to what one means by "the" price level. Should the basket of goods used for price indices include only newly produced consumer goods, or should it include other assets, such as the stock of existing capital goods? It is unlikely that macroeconomists will ever agree on how best to model the macroeconomy.

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6. Robert A. Mundell, "A Reconsideration of the Twentieth Century," *American Economic Review* 90, no. 3 (2000): 327–40.
7. Robert E. Hall, "Explorations in the Gold Standard and Related Policies for Stabilizing the Dollar," in *Inflation: Causes and Effects*, ed. Robert E. Hall (Chicago: University of Chicago Press, 1982), 111–22.
8. David Hume, "Of Money," in *David Hume Writings on Economics*, ed. Eugene Rotwein (Madison, WI: University of Wisconsin Press, 1970).
9. See John Taylor, "The Financial Crisis and the Policy Responses: An Empirical Analysis of What Went Wrong" (unpublished paper, Stanford University, November 2008).
10. McCallum lists 10 different models of short-run price stickiness in Bennett T. McCallum, "Recent Developments in Monetary Policy Analysis: The Roles of Theory and Evidence," *Economic Quarterly* 88, no. 1 (2002): 84–85n38.

The monetary regime proposed in section III is ideally suited to a world where economists have relatively similar views about what constitutes *good outcomes* but cannot agree how best to get there. I sidestep the question of whether to target interest rates, the money stock, or exchange rates by jumping right to the goal variable. If the goal is stable nominal GDP growth, then the central bank should stabilize the price of nominal GDP futures contracts.

In a previous Mercatus paper, I argued that a stable growth path for nominal GDP is likely to produce better macroeconomic outcomes than an inflation target.[11] If so, then a monetary policy that results in the price of nominal GDP futures contracts rising along a stable trend line, perhaps at 3–5 percent per year, would be desirable. The markets will then determine the money stock, exchange rates, and interest rates that are most likely to lead to on-target nominal GDP growth.

The next section shows that it is not necessary for economists to agree on a structural model of the economy, nor on how monetary policy affects the economy, *nor even on what monetary policy is*. If economists can agree that steady growth in nominal GDP constitutes a good outcome, then they ought to be able to agree on a monetary regime in which the market sets the money supply, interest rates, and exchange rates at a level most likely to produce on-target nominal income growth.

III. WHAT WOULD A NOMINAL GDP FUTURES TARGETING POLICY LOOK LIKE?

Over the past four decades, there have been several proposals to tie monetary policy to market expectations. The late Earl A. Thompson, who taught economics at the University of California, Los Angeles, proposed targeting a nominal wage index.[12] Hall has advocated a target linked to a weighted average of prices and employment.[13] I have proposed targeting nominal GDP futures,[14] and University of Sheffield economics professor Kevin Dowd has suggested targeting a CPI futures contract.[15]

The specific proposals have varied in a number of dimensions. However, all have used market expectations to guide policy. Princeton economist and former Riksbank board member Lars Svensson calls this approach "targeting the forecast," which means equating the goal of monetary policy with the forecast for the

11. Scott Sumner, "The Case for Nominal GDP Targeting" (Mercatus Research, Mercatus Center at George Mason University, Arlington, VA, October 23, 2012), http://mercatus.org/sites/default/files/NGDP_Sumner_v-10-copy.pdf.
12. Earl A. Thompson, "Free Banking under a Labor Standard—The Perfect Monetary System" (unpublished manuscript, University of California, Los Angeles, 1982).
13. Robert E. Hall, "Optimal Monetary Institutions and Policy," in *Alternative Monetary Regimes*, ed. Colin D. Campbell and William R. Dougan (Baltimore: Johns Hopkins University Press, 1986), 224–39.
14. Scott Sumner, "Using Futures Instrument Prices to Target Nominal Income," *Bulletin of Economic Research* 41 (1989): 157–62.
15. Kevin Dowd, "A Proposal to End Inflation," *Economic Journal* 104 (1994): 828–40.

economy.[16] For instance, if the central bank has a *goal* of 5 percent nominal GDP growth, then it should adjust its policy instruments until it also *forecasts* 5 percent nominal GDP growth. In this section, I explain the logic of my 1989 nominal GDP futures proposal and then examine some alternative methods by which market forecasts can assist monetary policymakers.

When reading the following proposals, it may be helpful to think in terms of "prediction markets" rather than "futures markets." Corporations and other organizations often use prediction markets to utilize the "wisdom of crowds." Thus, businesses might offer prizes to those employees who most accurately forecast corporate sales revenue over the following 12 months. The purpose of these markets is not to encourage gambling, but rather to derive the optimal estimate of the future path of important economic variables.

There are currently no nominal GDP futures markets, and the proposed market is very different from existing futures markets in areas such as commodities and foreign exchange. In some ways, this difference is an advantage, as it allows the central bank to set up the NGDP futures market in the fashion best suited to provide an unbiased forecast of future NGDP levels, without some of the drawbacks of existing futures markets.

For instance, historically three factors have been crucial for the success of a futures market: volatility of the underlying asset value, a large number of market participants who want to hedge such volatility, and a contract design that allows those interested in hedging to do so successfully. In the system I will describe, the first two criteria are not necessary; indeed, they may actually make the system *less effective*. It is good news for NGDP futures targeting that an NGDP futures market does not currently exist.

In order to develop a market-driven monetary policy, it is necessary to first think about how to induce market participants to make socially constructive decisions—that is, to engage in open-market purchases or sales that are expected to lead to on-target growth in nominal spending. A "market-driven" monetary regime is one where there is free entry and where traders are rewarded based on their skill at forecasting nominal GDP growth. The "free entry" part is relatively easy to explain: all individuals and institutions would be allowed to undertake open-market operations. The issue of how to reward monetary policy participants is much trickier, so it will be useful to describe how a market-driven system could evolve out of the current policy regime, one step at a time.

During recent years, the Fed has used the interest rate on overnight bank loans (dubbed the "fed funds rate") as its short-term target, or "instrument" of policy. When the Fed wishes to adopt a more expansionary monetary policy, it increases the monetary base through open-market purchases of securities until the fed funds rate falls low enough to provide the desired amount of monetary stimulus.

16. Lars E. O. Svensson, "What Is Wrong with Taylor Rules? Using Judgment in Monetary Policy through Targeting Rules," *Journal of Economic Literature* 41 (2003): 426–77.

Under that sort of monetary regime, there is a relatively simple way to reward monetary-policy decision makers. For example, assume that the Fed has a 3.65 percent nominal GDP growth target and that the committee sets the fed funds target at 2.25 percent, based on the preferences of the median voter on the Federal Open Market Committee (FOMC). Then the six hawkish FOMC members who advocated a fed funds target above 2.25 percent will presumably be concerned that the lower actual instrument setting will be too expansionary and will push the nominal GDP growth rate above 3.65 percent. The six dovish FOMC members would have expected below-target nominal GDP growth when the fed funds target was set at 2.25 percent.

Next comes the first step toward a market-driven monetary policy regime. Assume that the salary of each voting member of the FOMC is tied to the accuracy of his or her NGDP forecasts. Thus, if actual NGDP growth turned out to be "too high"—that is, above 3.65 percent—then all those FOMC members who preferred a more contractionary policy stance (a higher fed funds stance) would receive a pay bonus, and those who voted for an even more expansionary policy would see their pay reduced.[17]

The preceding policy regime is still quite far from a true free market, as economists believe that markets work most efficiently when there is free entry. There is no reason why the FOMC should be limited to 12 members, or indeed why there should be any limit at all. But extending votes on the FOMC to all Americans would be problematic since most people are not well-informed about monetary policy.

Markets aggregate information most effectively if prices are determined on a one-dollar, one-vote basis rather than a one-person, one-vote basis. Those who are not well-informed will generally have little desire to participate in NGDP futures markets, and more knowledgeable investors will have an incentive to engage in a greater quantity of NGDP futures transactions. So let us consider a monetary regime in which FOMC participants "vote" by taking either a short or long position in nominal GDP futures contracts. The Fed would offer to buy or sell unlimited quantities of NGDP futures at a price equal to one plus the expected GDP growth rate, or $1.0365. When the contracts mature a year from today, their value will equal the ratio of next year's NGDP to current NGDP. Thus, if nominal GDP were to rise by 5 percent, the contracts would be worth $1.05. Those who took a long position would profit by $0.0135 per contract, and those who took a short position would lose that amount. If nominal GDP rose by only 2 percent, then those taking a short position would earn $0.0165 per contract.

In principle, the purchase and sale of NGDP futures contracts could act as a sort of "open market operation" that directly impacts the size of the monetary base and hence expected future NGDP. However, this system would expose the Fed to

17. This compensation system requires there to be a generally-agreed-upon policy goal (3.65 percent NGDP growth in this case). Upon moving to a market-driven regime, the strict separation between decisions about policy goals and how best to implement those goals will become much clearer.

default risk, as the Fed is the counterparty in all transactions. Those investors taking a short position would receive money from the Fed, and they might refuse to honor the contract when it matures. In addition, this approach would require a very large NGDP futures market, as the monetary base is roughly a trillion dollars, even when interest rates are not stuck at zero.

The central bank could avoid significant default risk by futures traders by having each NGDP futures market participant put money in a margin account. As long as the sum were large enough to cover any foreseeable move in actual NGDP, the risk to the central bank would be minimal. Thus, investors might be required to put 10 cents in a margin account for each $1.035 contract bought or sold. Because money would flow from investors to the Fed from either the purchase or sale of an NGDP futures contract, the transactions would not directly impact the money supply. When the contracts matured, the money in the margin accounts would be returned to investors, plus interest, and plus or minus any gains or losses due to fluctuations in NGDP.

In most futures markets, a change in investor sentiment affects the price of the futures contract. This proposed market would be very different. The Fed would peg the price of NGDP futures at $1.0365, but only during the period where it was the target of monetary policy. During this period, changes in investor sentiment would affect the quantity of money, not the price of NGDP futures. For market expectations to determine monetary policy, there must be a link between NGDP futures purchases and sales, and the quantity of money. This link can be achieved by requiring parallel open-market operations for each NGDP contract purchase or sale. Because investors buying NGDP futures are expecting above-target growth in NGDP, the Fed should automatically reduce the monetary base each time an investor buys an NGDP futures contract, and it should automatically expand the base each time an investor sells an NGDP contract short. For instance, each $1 purchase of a long position in an NGDP futures contract might trigger a $1,000 open-market sale by the Fed. A purchase of a $1 short position would trigger a $1,000 open-market purchase by the Fed. In that case, investors would be effectively determining the size of the monetary base.

Traders would continue buying and selling NGDP futures until the money supply had adjusted to the point where the market expected NGDP growth to be right on target. Reaching a market equilibrium does not mean that each market participant expects on-target growth. As in any market, there is a diversity of opinion. If there were not, there would be no reason for trading to occur. One common misconception is that no one would trade NGDP futures because they would know that NGDP futures prices would be set at the market expectation for future NGDP. But equilibrium prices reflect market expectations in all asset markets. The price of copper futures reflects the market consensus of where spot copper prices will be at the contract's maturity. The existence of market equilibrium does not stop the trading of copper futures, as there are differences of opinion among traders. Recall that

after the central bank stops pegging a particular contract (and starts pegging the next contract), its price can rise or fall. Thus, people would trade NGDP contracts for exactly the same reason they trade any other asset: in the hope that the price will move in the direction they anticipate (after the Fed is no longer targeting the price).

Even an absence of trading of NGDP futures contracts might not cause problems for monetary policy. If no NGDP contracts were traded, it would mean that the market consensus expected the current setting of the money supply and/or interest rates to produce on-target NGDP growth. At worst, it would mean that any expected deviations from the NGDP target would be so small that investors did not think it was worth the time and effort to trade NGDP futures.

Under the monetary regime described here, the United States would never face the situation that occurred in the latter part of 2008. By late 2008, it was obvious to market participants that NGDP growth during 2008–9 would be far lower than the Fed would have liked. Indeed, NGDP fell by 4 percent between mid-2008 and mid-2009—the steepest decline since the Great Depression.[18] Asset prices were falling sharply as investors reduced forecasts of future nominal growth and future asset prices. Yet, even though financial-market participants saw what was happening, investors had no way to profit from that information. Markets were unable to correct the Fed's monetary policy errors.

If an NGDP futures market had existed in 2008, investors would have sold NGDP futures until the money supply had increased sharply enough to produce on-target expected NGDP growth. That does not mean actual NGDP growth would have been exactly on target; no monetary regime can guarantee that result. But if even *expected* NGDP growth had been on target, it would have been a vast improvement over actual monetary policy, which was far off course in late 2008. On-target expected NGDP growth would have helped to stabilize asset markets.

To summarize, one way to transition from current FOMC policy to NGDP futures targeting would involve the following four steps:

1. Have each FOMC member vote on the optimal policy-instrument setting, and then set the policy at the median vote.
2. Reward or fine each FOMC member based on the accuracy of his or her implied NGDP forecast.
3. Open up the FOMC to anyone who wishes to participate.
4. Shift from a one-man, one-vote system to a one-dollar, one-vote system.

I will call this approach NGDP futures targeting. Before considering objections to this proposal, it will be helpful to discuss three other methods by which market expectations could guide monetary policy.

18. The Philadelphia Fed's "Survey of Economic Forecasters" showed a sharp drop in NGDP growth expectations during late 2008.

Policy-Instrument Forecasting

In a paper published in 1997, I suggested that futures markets could be used to predict the optimal policy instrument setting.[19] The meaning of the term "policy instrument" is actually a bit vague.[20] A policy instrument is generally viewed as a variable that is directly under the central bank's control and which can be used to affect other economic aggregates, perhaps with a lag. Examples include the price of gold, the exchange rate, and the monetary base. The most important policy instrument in contemporary central banking is the fed funds rate.

The fed funds rate has become so identified with monetary policy, at least in the media, that Fed policy is often described as "changing the fed funds rate," as if this rate is directly under the Fed's control. It would be more accurate to describe it as a market interest rate that the Fed influences by adjusting the monetary base.

Now, suppose the Fed wishes to target NGDP growth at 3.65 percent, but it does not know which fed funds target is most likely to produce on-target growth. The Fed could establish a set of contingent auctions of NGDP futures at the price of $1.0365 and offer to buy and sell unlimited contracts at that price. Each auction would be contingent on a particular setting of the fed funds target. Thus, investors would be asked how many NGDP futures they wished to buy or sell short at a wide array of potential settings of the fed funds target. The Fed would then find the interest rate that most nearly balanced the NGDP futures market—in other words, the interest rate at which the number of NGDP futures contracts purchased and sold would be closest to equal. The Fed would then execute only the contracts contingent on the equilibrium fed funds target; all other bids would be negated.

For example, suppose that at a fed funds rate of 2.00 percent, the majority of traders expected above-target NGDP growth. In that case, there would be more demand for long positions in NGDP futures than short positions. Also suppose that at a fed funds rate target of 2.5 percent, most investors expected below-target NGDP growth. In that case, most investors would wish to take a short position in NGDP futures contracts. If the bids were roughly balanced at a target interest rate of 2.25 percent, then the Fed would set the fed funds target at 2.25 percent, and only those NGDP futures contracts would be executed.

Indexed Interest on Reserves

Hall proposed a system in which the Fed would pay interest on reserves at a rate roughly equal to the rate on T-bills, plus or minus an adjustment factor that reflected

19. Scott Sumner, "Reply to Garrison and White," *Journal of Money, Credit and Banking* 29 (1997): 542–45.
20. McCallum points out that there is some ambiguity about the distinction between an indicator variable and a policy instrument. Here I use the term "instrument" in the sense in which it is used in the Keynesian/monetarist policy debates, that is, the monetary base and short-term rates are alternative policy instruments. McCallum, "Alternative Monetary Policy Rules," 72.

changes in the price level relative to the target.[21] Because banks would be able to earn the market rate of interest on reserves, the Fed could flood the economy with liquidity without forcing up the price level. Even better, banks would have an incentive to adjust their demand for reserves as needed to stabilize the price level.

To see how Hall's proposal would work if applied to NGDP targeting, suppose the T-bill yield were 4.5 percent and the target rate of NGDP growth were 3.65 percent. Banks would receive interest on reserves equal to 4.5 percent plus the actual NGDP growth rate minus the target NGDP growth rate. If banks began to expect 4.65 percent NGDP growth, the expected return on holding reserves would rise to 5.5 percent (4.5 percent plus the extra 1.0 percent in excess growth), and this increase in the expected return from holding reserves would cause banks to sharply increase their demand for reserves. A higher demand for money is deflationary, because reserves are the medium of account and the price level is the inverse of the value of reserves. More demand for reserves raises the value of reserves and pushes down the expected NGDP growth rate.

Exactly the opposite would occur if NGDP growth were expected to come in below 3.65 percent. The expected yield on reserves would fall below 4.5 percent, and banks would sell reserves and buy T-bills. This outcome would tend to reduce the value of reserves and boost the NGDP growth rate.

Alternatively, one could envision this process through the standard money-multiplier framework. A lower expected NGDP growth rate would reduce the desired reserve ratio, boost the money multiplier, and therefore boost the broader monetary aggregates.

Index Futures Convertibility

William Woolsey proposed another method of using market expectations to guide monetary policy, which uses a principle similar to the classical gold standard.[22] The basic idea is to make money (currency and bank reserves) convertible into NGDP futures contracts at a fixed price (such as $1.0365), in much the same way that currency notes were once convertible into gold bullion at a fixed price. However, unlike the NGDP futures targeting plan discussed earlier, there is no automatic connection between the purchase and sale of NGDP futures and open-market operations by the central bank.

Under Woolsey's proposal, the central bank would have some discretion over monetary policy. It could choose where to set the monetary base and/or the fed

21. Robert E. Hall, "Optimal Fiduciary Monetary Systems," *Journal of Monetary Economics* 12 (1983): 33–50.

22. William Woolsey, "Index Futures Targeting and Monetary Disequilibrium" (unpublished paper, January 2013). For earlier versions of this idea, see David Glasner, *Free Banking and Monetary Reform* (Cambridge: Cambridge University Press, 1989) and William Woolsey, "The Search for Macroeconomic Stability: Comment on Sumner," *Cato Journal* 12, no. 2 (1992): 475–85.

funds target, as long as it maintained convertibility between money and NGDP futures. This discretion might seem like a drawback, but as the next section describes, it also offers some practical advantages. Indeed, this is the form of NGDP futures targeting likely to be adopted first.

The discretion in Woolsey's proposal is not as great as it might seem. Consider a situation similar to the fall of 2008, when expectations of NGDP growth in the United States were plunging rapidly. In that environment, investors would be taking very large short positions in the NGDP futures market. The central bank would be exposed to very large losses if it failed to adopt a policy expansionary enough to produce on-target expected NGDP growth.

So there are at least four different options for using market expectations to guide monetary policy. *NGDP futures targeting* essentially lets the market directly engage in open-market operations. There is no need to designate a particular policy instrument. Investors could focus on the money stock, interest rates, exchange rates, or whatever other variables they think would contain important information about future growth in NGDP. Under *policy-instrument forecasting*, the central bank picks a particular policy instrument (the base, the fed funds rate, the exchange rate, etc.) and then has market participants predict which instrument setting is most likely to lead to on-target NGDP growth. Under *indexed interest on reserves*, market expectations are used to adjust the demand for reserves in such a way as to stabilize the NGDP growth rate. And under a regime of *index futures convertibility*, the currency is convertible into NGDP futures at a price equal to the policy target.

IV. CRITICISMS OF NOMINAL GDP FUTURES TARGETING

Not surprisingly, an idea as unconventional as NGDP futures targeting has attracted a great deal of criticism. Here are nine frequently cited objections:

1. The "circularity problem," which occurs when markets are watching the central bank for direction at the same time as the central bank is watching the markets for direction, discussed by Ben Bernanke and Michael Woodford.[23]
2. The first-mover problem: Why would investors trade before the end of the period?
3. What if there are revisions to NGDP?
4. Concerns about market liquidity: What if no one trades?
5. Bias resulting from hedging, or risk aversion.
6. The danger of market "bubbles."

23. Ben Bernanke and Michael Woodford, "Inflation Forecast and Monetary Policy," *Journal of Money, Credit and Banking* 29 (1997): 653–84.

7. Market manipulation by speculators.
8. Risks to the central bank balance sheet.
9. The radical nature of the proposal: Are governments willing to forego discretion?

Most of these risks are either based on misconceptions about the nature of NGDP targeting or are easily addressed by tweaking the proposal.

The Circularity Problem

The circularity problem is probably the most well-known objection to index futures targeting, as Ben Bernanke and Michael Woodford are two of the world's most distinguished macroeconomists. A simple example can illustrate their critique. Consider a policy regime where the central bank tightened monetary policy whenever NGDP futures with a 12-month maturity rose more than 3.65 percent above the current level of NGDP, and vice versa. Bernanke and Woodford have shown that if the private sector anticipated these preemptive moves, and if the policy were completely credible, then the price of NGDP futures contracts would never move away from its target value, and hence there would be no market signal for the central bank to respond to in the first place. This dilemma, variously termed the "circularity problem" or the "simultaneity problem," would seem to preclude the development of monetary regimes where central-bank policy was based solely on private-sector forecasts.

However, none of the four proposals discussed in the previous section is susceptible to the circularity problem. Rather, in each case, the market either predicts the optimal instrument setting or the market itself actually implements policy; the Fed merely rubber-stamps the market's decision. Bernanke and Woodford have acknowledged that forecast targeting could work if the futures market predicted the monetary-policy instrument setting (such as the base, or the fed funds rate) rather than the policy-goal variable (NGDP or inflation), so the arguments used in this paper are not refuted by the most famous critique of futures targeting.

The First-Mover Problem

In 1997, Roger Garrison and Lawrence White pointed out that as long as the central bank were pegging the price of an NGDP futures contract, traders would have an incentive to wait until the very last minute before making trades.[24] The extra time would provide more information about the state of the economy and also more information about the likely monetary-policy instrument setting. This tendency to

24. Roger W. Garrison and Lawrence H. White, "Can Monetary Stabilization Policy Be Improved by CPI Futures Targeting?," *Journal of Money, Credit and Banking* 29 (1997): 535–41.

wait until the last minute to trade would be a problem for the first proposal discussed in the previous section (but not the other three), especially since NGDP estimates are reported only once every three months.

There are several ways to address this problem. Private firms such as Macroeconomic Advisers have constructed monthly NGDP estimates using the same monthly data series that the government relies on to compute GDP. Indeed, it would be possible to construct daily NGDP estimates by taking a weighted average of the data from two consecutive months. Thus, the GDP for mid-July (July 16) would be equal to the official estimated GDP for July. The NGDP estimate for July 26 would be two-thirds times the July NGDP plus one-third times the August NGDP (as two-thirds of a 31-day moving average around July 26 would lie in July, and one-third would lie in August). If the Fed were targeting 3.65 percent NGDP growth, it could raise the level of its NGDP target by one basis point per day, or a total of 365 basis points per year.

The Problem of Data Revisions

Another potential problem is the frequent revisions that are made to NGDP data. There are two types of revisions: those that reflect new information that arrives with a data lag, and those that reflect new thinking about how to measure GDP, such as attempts to incorporate estimates of the underground economy, or the value of research and development. The central bank should worry more about the first type of revision, as it reflects new information about where the economy is right now in the business cycle. Thus, the Fed might want to target the third estimate of GDP, which incorporates most of the revisions due to data lags. This estimate comes out approximately three months after the end of the quarter.

Any longer-term adjustments should probably be disregarded, or treated as "allowing base drift" in the terminology of macroeconomists. Thus, if GDP suddenly rises by 15 percent due to the addition of a new estimate for household production, then future NGDP targets should also be adjusted upward by 15 percent. It makes no sense to force near-term NGDP sharply lower, at the risk of recession, because the government has a new framework for thinking about how to measure NGDP.

What If No One Trades?

The United States does not currently have the sort of NGDP futures market that could be used to guide monetary policy. Later, I will show that this fact actually supports the case for NGDP futures targeting. But suppose there is not enough interest in NGDP futures to create a highly liquid market. What if very few people trade the contracts?

There are two ways of addressing this concern. One response is that if no trades are being made then presumably the market thinks that either the Fed will not miss

its NGDP target or it will not miss its target by an economically significant amount. So a lack of trading does not necessarily mean that NGDP targeting would not work.

To see why this is so, consider the US gold-standard regime of 1879–1933. During that 54-year period, the US government defined the dollar as 1/20.67 of an ounce of gold. To make that definition operative, it also had to maintain convertibility between government-issued currency notes and gold. Now think about what this convertibility means. The government offers to buy or sell unlimited quantities of gold in exchange for currency notes, at a fixed price of $20.67 per ounce.

Now suppose that during one year, say 1902, there were no requests to sell gold to the Treasury and no requests to redeem dollars for gold. The Treasury gold market was quiet. Does this lack of activity mean there would have been no meaningful market price of gold? Of course not. The promise to buy or sell unlimited quantities of gold at a fixed price of $20.67 per ounce effectively made that price the market price. The Treasury would have stabilized gold prices throughout 1902 without trading a single ounce of gold.

By analogy, a Fed promise to buy or sell unlimited quantities of NGDP futures contracts at a fixed price of $1.0365 per contract effectively establishes that price as the market price of NGDP futures, *even if not a single contract is traded*. The real question is whether this market price is *useful*, and modern economic theory suggests that it may be highly useful. For instance, the Fed is often able to move the fed funds rate without buying or selling any Treasury securities. Indeed, there is a term for this power—"open mouth operations." Merely signaling an intention to do whatever it takes to move the fed funds rate to the target level is often enough to move market interest rates. The same phenomenon occurs in the foreign-exchange market when the central bank has a credible exchange-rate peg. These interest-rate and exchange-rate movements are economically meaningful, even if they are accomplished solely through the expectations channel. Other asset prices (in asset markets not targeted by the central bank) also move on expectations of a change in the fed funds rate or exchange rate.

Another way to understand this idea is by considering a counterfactual scenario. What could go wrong if no one traded NGDP futures because of a lack of interest? One answer is that NGDP expectations could move erratically. But any economically significant movement (one large enough to cause a business cycle—i.e., at least 2–3 percent above or below target) in NGDP expectations would trigger NGDP futures transactions, according to the efficient markets hypothesis.

Nothing like what happened in late 2008 could occur under NGDP futures targeting, even if no one chose to trade NGDP futures. If the public expected NGDP to be far below target (as in late 2008), then anyone selling NGDP futures could easily earn large excess returns. But this profit opportunity violates the efficient markets hypothesis. If this argument seems too good to be true, it is because NGDP targeting does not have to succeed in a way that a finance theorist would define "success" in order to be highly effective in a *macroeconomic* sense. Thus, if the market was

only efficient enough to prevent expected NGDP growth from falling more than 2 percent below target in late 2008, that performance would be very poor in a financial sense (allowing significant risk-adjusted excess returns), but highly effective at promoting macroeconomic stabilization. Actual NGDP fell about 9 percent below trend in 2008–09, to give some sense of the magnitudes involved. And yet, even an expected 2 percent deviation from target would boost the expected return on NGDP futures by 20 percentage points (i.e., 2,000 basis points) if investors had a margin requirement of 10 percent.[25]

Consider the following analogy. Suppose there is a twisting mountain road where there have been fatal accidents. Now assume that the government proposes installing guardrails. Would it make sense to argue against the proposal on the grounds that the guardrails might never be used, that a car might never brush up against the rail? Obviously not. An NGDP futures market is sort of like a guardrail for monetary policy—it prevents the Fed from adopting policies that lead investors to expect sharp deviations of NGDP from trend. As such, even in the worst-case scenario where no one participates, NGDP futures markets would act as "guardrails" on policy that are not there under the current discretionary policy regime. In this paper, I consider various versions of futures targeting, showing that all offer important advantages, but only some go to 100 percent market-driven policy.

University of Pennsylvania economist Justin Wolfers and Dartmouth economist Eric Zitzewitz find that prediction markets can be highly effective even when there is a relatively low volume of trading.[26] Nevertheless, it would be possible to promote increased trading in NGDP futures markets if the Fed wished to create a deeper market. The central bank could set up and subsidize trading in an NGDP futures market by creating a fund that would be divided evenly among all market participants—perhaps as an add-on to interest payments on the margin accounts of NGDP traders. Assume that traders put 10 percent into a margin account so that the Fed would not be exposed to significant default risk. The Fed could pay interest on that account equal to the yield on one-year T-bills, plus the trader's share of the subsidy. If only one individual participated, then that trader would receive the entire subsidy. That sort of highly profitable outcome would not be the market equilibrium, and thus market size would depend on the size of the trading subsidy. Given the importance of sound monetary policy, where mistakes in stabilization policy can generate costs in the hundreds of billions of dollars, it is difficult to see how the cost of a trading subsidy could be an important constraint on the adoption of NGDP

25. The calculation is as follows. The investor puts 10 cents down on each $1.0365 NGDP contract. At maturity, each 1 percent deviation of NGDP from its target would produce a gain or loss of one cent, or 10 percent of the margin account. If the investors took a short position in late 2008, and if NGDP came in 2 percent below target, the investor would earn a 20 percent return, not including any interest payment the Fed might choose to pay on margin accounts.

26. Justin Wolfers and Eric Zitzewitz, "Prediction Markets," *Journal of Economic Perspectives* 18 (2004): 107–26.

futures targeting. A high level of trading is not required for the policy to improve macroeconomic outcomes, but if vigorous trading is necessary, the problem could be fixed at a low cost.

Consider the following example. This time, assume that each futures contract has a face value of $1,000, to make the math easier. At maturity, the contract for someone taking a long position is worth $1,000 × [(Actual NGDP)/(Target NGDP)]. Now assume that the Fed requires that investors place 10 percent (or $100) in a margin account. The Fed pays a competitive rate of return on the margin account, perhaps the one-year T-bill yield. Assume that rate is 5 percent. The trader also receives a share of the trading subsidy. Now assume that the total trading subsidy is $100,000, and that 50,000 contracts are traded. Each trader then receives a $2 trading subsidy for each contract. Finally, assume that actual NGDP comes in at 1 percent above target, at 1.0465 times current NGDP. The total return for a long contract would be computed as follows: the $100 margin requirement would earn $5 interest, plus a $2 trading subsidy, for a total of $7. At maturity, the contract holder would also receive an extra $10 because NGDP came in at 1 percent above target. Thus, the initial investment of $100 would return $117 one year later, a gain of 17 percent. If NGDP had come in at 1 percent below target, then the total value of a long contract at maturity would be $97, a loss of 3 percent. The expected return is 7 percent, which by assumption is the amount needed to induce trading of 50,000 contracts.

An NGDP futures market should be created even if the central bank has no interest in adopting an NGDP targeting regime. This sort of market would be invaluable in providing all sorts of useful information to policymakers. It would provide real-time estimates of the likely growth in aggregate demand over the next 12 months. If set up along with an inflation and/or real GDP (RGDP) futures market, it would provide information about the effects of monetary policy initiatives on total nominal output and also about the split between prices and real output. The price/output split would help policymakers determine whether the economy's problems are primarily due to a demand shortfall or whether they are structural. For instance, if a monetary policy initiative such as QE2 raised the price of both NGDP and RGDP futures, it would suggest that a demand shortfall had raised the unemployment rate and that the monetary stimulus was likely to reduce unemployment. If the monetary stimulus initiative only impacted inflation, it would suggest that there were structural problems in the economy.[27]

27. This information could be used to discriminate between Keynesian, classical, and monetarist economic models. For instance, it would address the question of whether central banks are powerless at the zero-interest-rate bound. This analysis, however, is beyond the scope of this paper and would have to be developed more fully.

Bias Due to Hedging and Risk Aversion

In order for NGDP futures targeting to be effective, the price of NGDP futures contracts must be approximately equal to the optimal forecast of NGDP. However, this equality will not hold if the market price includes a risk premium. For instance, if many people wish to hedge against the risk of falling NGDP, then the price of NGDP futures contracts may exceed the expected future value of NGDP. The possibility that there might be hedging demand for NGDP futures means that the current lack of interest in NGDP futures markets is actually a point in their favor. There is so little interest in NGDP hedging that an NGDP futures market has not been created. The demand for NGDP futures as a hedging tool would likely be quite limited.[28]

The preceding discussion suggests that newly created and subsidized NGDP futures markets would primarily attract speculators rather than hedgers, so it is unlikely that the risk premium would be particularly large. Indeed, research suggests that even in commodity futures markets, which tend to be far more volatile than NGDP, risk premiums are typically relatively small.[29] Finally, what matters in macroeconomics is not so much the level of variables such as NGDP, but rather the *growth rate*. Thus, a stable risk premium would not cause much macro instability; only a time-varying risk premium in NGDP futures prices would create an unstable NGDP growth rate. For instance, if a risk premium caused the price of NGDP futures contracts to consistently exceed expected NGDP growth by 50 basis points, then the long-term growth rate of NGDP would be completely unaffected. It would merely reduce the *level* of the NGDP trend line by one-half of a percentage point.

The Danger of Market "Bubbles"

The recent "bubbles" in tech stocks (in 2000) and housing (in 2006) have created a generalized distrust of the efficient markets hypothesis. Does this distrust suggest that monetary policy should not be tied to market expectations? Actually, just the opposite is true—the existence of bubbles makes it even more essential to move away from policy-making by committee.

James Surowiecki, who writes for the *New Yorker*, finds evidence that "groupthink" and "herding behavior" can lead to market bubbles. He argues that large and diverse groups will usually make better decisions, even when the group's average intelligence is lower than so-called "expert opinion." He cites the example of a unanimous committee decision to launch the ill-fated Bay of Pigs invasion in 1961.[30]

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28. It is conceivable that there is interest in hedging NGDP risk, but no financial firm can commit to deliver on a bet if NGDP plunged sharply. However, if there is real interest in hedging NGDP risk, it ought to be possible for NGDP hedging counterparties to insure against changes in NGDP by holding assets that rise in price when NGDP plunges, such as long-term Treasury securities.
29. See Michael L. Hartzmark, "Returns to Individual Traders of Futures: Aggregate Results," *Journal of Political Economy* 95 (1987): 1292–306.
30. James Surowiecki, *The Wisdom of Crowds* (New York: Anchor Books, 2004).

The best way to minimize this group-think problem is to avoid decision making by narrow and nondiverse groups. Consider the difference between current monetary policy, which is made by a very small group of people relying on models developed within the Federal Reserve, and an NGDP futures regime that is open to anyone in the world. A study by economists Henry W. Chappell Jr., Rob Roy McGregor, and Todd A. Vermilyea finds much circumstantial evidence that FOMC members face subtle pressure to reach unanimous decisions.[31] Princeton economist Marco Battaglini shows that "the inefficiency in communication converges to zero as the number of experts increases, even if the residual noise in experts' signals is large [and] all the experts have significant and similar (but not necessarily identical) biases."[32] And an experimental study by Bank of England economists Clare Lombardelli, James Talbot, and James Proudman shows that groups made better decisions than individuals when asked to control "a simple macroeconomic model that was subject to randomly generated shocks in each period."[33]

This is not to say that markets never make mistakes; in hindsight, tech investors were overly enthusiastic in the late 1990s. However, it is also easy to find cases where the markets outforecast the FOMC. A good example of the drawbacks of decision by committee occurred in late 2008, when the financial markets saw the oncoming NGDP collapse well before the Fed did. For instance, in the September 16, 2008, Fed meeting, just after Lehman Brothers had failed, the Fed decided not to cut rates (from 2.0 percent) because of the risk of higher inflation. Yet, on that very day, the Treasury Inflation-Protected Securities (TIPS) market was forecasting only 1.23 percent inflation over the next five years. It is now clear that the TIPS market forecast was much more accurate, as inflation has averaged only about 1.4 percent since September 2008.

The Danger of Market Manipulation

Another concern is that special-interest groups might try to manipulate the market for financial gain. Thus, a firm that would benefit from faster NGDP growth might sell a large number of NGDP futures contracts short, pushing the Fed to adopt a more expansionary monetary policy. Evidence from field experiments by Robin Hanson and by Hanson, Ryan Oprea, and David Porter suggests that it is difficult to

31. Henry W. Chappell Jr., Rob Roy McGregor, and Todd A. Vermilyea, *Committee Decisions on Monetary Policy: Evidence from Historical Records of the Federal Open Markets Committee* (Cambridge, MA: MIT Press, 2005).

32. Marco Battaglini, "Policy Advice with Imperfectly Informed Experts," *Advances in Theoretical Economics* 4, no. 1 (2004): 1.

33. Clare Lombardelli, James Talbot, and James Proudman, "Committees versus Individuals: An Experimental Analysis of Monetary Policy Decisionmaking," *Bank of England Quarterly Bulletin* 42, no. 3 (2002): 262–73.

effectively manipulate a prediction market.[34] Any attempt at market manipulation opens up profit opportunities to other traders, who would take advantage of a gap between the current market price of NGDP futures and the expected future price of NGDP futures.

Nonetheless, given the importance of monetary policy, the central bank might want to take extra precautions against market manipulation. One idea would be to limit the net long or short position for any single trader. It would be preferable to allow unlimited trades but then have the Fed take an opposing position for any "suspect" trades. Over time, this system would provide information about whether the Fed's suspicions of market manipulation were correct. If the Fed tended to lose money on these trades, it would suggest that market manipulation was not the motivation for private traders taking large long or short positions in NGDP futures.

Risks to the Central-Bank Balance Sheet

The preceding suggestion leads to another concern. Some of the proposals would expose the central bank to the risk of substantial losses in NGDP futures trading, particularly because the proposals call for the Fed to be willing to buy and sell unlimited quantities of NGDP futures at the target price. Two of the proposals (policy-instrument forecasting and indexed interest on reserves) do not expose the central bank to significant risk. However, the other two options (NGDP futures targeting and index futures convertibility) are more likely to be adopted, at least in the short run.

There are other ways in which the central bank could greatly reduce its exposure to the risk of capital losses. For instance, in the proposal where the Fed targets a new NGDP contract each day, the Fed could begin by setting the monetary base at the anticipated equilibrium level for the monetary base. This level might represent the final equilibrium of the previous day, adjusted for predictable weekly, monthly, and seasonal fluctuations in the monetary base. These estimates of where the monetary base would end up at the end of trading would not always be correct, but if the estimates were unbiased, then the errors would be serially uncorrelated.[35] Losses and gains to the Fed would tend to balance out over the long run.

Another way to reduce central-bank exposure to trading risk is to "leverage" the NGDP futures market so that each dollar's worth of NGDP futures triggers a greater-than-one-dollar change in the monetary base. In principle, with enough leverage, the risk could be reduced to an arbitrarily small number. However,

34. Robin Hanson, "Foul Play in Information Markets," in *Information Markets: A New Way of Making Decisions*, ed. Robert W. Hahn and Paul C. Tetlock (Washington, DC: AEI-Brookings Press, 2006), 126–41; Robin Hanson, Ryan Oprea, and David Porter, "Information Aggregation and Manipulation in an Experimental Market," *Journal of Economic Behavior and Organization* 60 (2006): 449–59.

35. Strictly speaking, one also would have to assume that errors in hitting the 12-month forward NGDP target are uncorrelated with the Fed's net long or short position on a given day. But it is hard to imagine how the two could be correlated.

making the NGDP futures market smaller reduces the market's efficiency at least slightly. There is a tradeoff between market efficiency and central-bank risk reduction. On the other hand, studies have found that even small prediction markets can be efficient, and these experimental prediction markets are many orders of magnitude smaller than the typical daily change in the monetary base.[36] So a substantial amount of leverage would still be consistent with a highly efficient NGDP futures market.

Is the Proposal Too Radical?

Despite the arguments presented here, the idea may be too radical to get serious support at the top levels of policymaking.[37] Policymakers might not be willing to risk giving up all central bank discretion and turn policy over to the financial markets. For these reasons, I anticipate a gradual movement toward NGDP futures targeting, one step at a time.

The first step will involve the Fed creating and subsidizing trading in an NGDP futures market, and perhaps in GDP-deflator and real-GDP futures markets as well. Over time, it will become possible to observe those markets' track records. In particular, the Fed will be able to study whether the NGDP futures market can accurately predict policy errors. If so, then the next step will be for the Fed to use NGDP futures prices as one element in the monetary-policy decision-making process. Once it has achieved a comfort level with using this market, the Fed should make currency and reserves convertible into NGDP futures at a fixed price. This is the index futures convertibility approach that Woolsey advocates, which still gives the central bank some discretion over monetary policy—much like the classical gold standard. Eventually, the Fed may move to a full-fledged NGDP targeting regime, where it passively implements market instructions to adjust the monetary base.

V. NGDP FUTURES TARGETING AT THE ZERO-INTEREST-RATE BOUNDARY

In recent years, the most important issue facing central banks has been what to do when nominal interest rates fall to zero and policymakers lose control over their favorite monetary instrument—the interbank loan rate. However, the so-called "liquidity trap" is one of the most misunderstood concepts in all of macroeconomics. In fact, only one policy tool becomes ineffective at that zero bound—the fed funds rate. Monetary policymakers continue to have a wide variety of options for implementing monetary policy, including changes in longer-term rates, the monetary base, and the

36. See Wolfers and Zitzewitz, "Prediction Markets."

37. When I presented a similar plan at the Federal Reserve Bank of New York, seminar participants indicated that they thought the Fed could handle monetary policy just as effectively as the market.

exchange rate.[38] And one of the best options is NGDP futures targeting, for which there is no zero bound.

Keynesians like Paul Krugman argue that use of these alternative policy instruments does not solve the zero-bound problem.[39] In fact, it does, although the reasons are poorly understood. In the real world, no fiat money central bank can ever "run out of ammunition." A sufficiently determined central bank can always debase its currency. The only real uncertainty is the amount of base money that people and banks want to hold when NGDP growth is on target.

The most common misunderstandings come in three areas. First, most people assume that the existence of a zero interest rate implies that monetary policy is "accommodative," and that if these low rates are accompanied by economic stagnation, then the Fed must be out of ammunition. In fact, as Milton Friedman has observed, ultralow interest rates usually imply that money has been tight, not easy.[40]

Second, traditional Keynesians assume that changes in short-term interest rates are the "transmission mechanism" by which monetary policy affects the economy. However, cutting-edge research suggests that it is future expected policy that matters most, and that current changes in short-term interest rates have relatively little impact on demand.[41] According to this new view, changes in interest rates are mostly important as a sort of "signaling device," an indication of the central bank's intentions for future monetary policy. That is why the zero bound is a problem for interest-rate targeting—the Fed essentially becomes "mute" when short-term nominal rates hit zero. It can no longer signal its policy intentions via changes in short-term interest rates.

In contrast, there is never any zero-rate boundary problem with NGDP futures targeting. But this observation raises another question: What happens if the central bank must buy up the entire national debt, and then some, in order to peg the price of NGDP futures? On closer inspection, a lack of eligible assets to buy is the essence of the "liquidity trap" problem, not the zero-interest-rate trap. The issue has never been about whether a fiat money central bank can inflate the price level and NGDP and zero rates. It can. The real question is whether it would have to expand its balance sheet to such an extent that it would expose the central bank to excessive risk.

NGDP futures targeting could help clarify the real issues that occur when nominal rates hit zero. When this situation occurs, policymakers have three choices:

1. Expand the balance sheet as needed to peg the NGDP futures price. If the central bank purchased the entire national debt (a very unlikely scenario for

38. See Lars E. O. Svensson, "Escaping from a Liquidity Trap and Deflation: The Foolproof Way and Others," *Journal of Economic Perspectives* 17 (2003): 145–66.
39. Paul Krugman, "It's Baaack! Japan's Slump and the Return of the Liquidity Trap," *Brookings Papers on Economic Activity* 2 (1998): 137–87.
40. Milton Friedman, "Reviving Japan," *Hoover Digest* 2 (1998).
41. Eggertsson and Woodford, "Zero Bound on Interest Rates."

the United States), then the central bank would be forced to begin purchasing riskier assets.

2. Raise the long-run target-growth path for NGDP. A higher growth path will lead to higher inflation expectations and a lower demand for base money. In other words, instead of increasing the money supply to hit the NGDP target, the Fed would be increasing the velocity of circulation by raising inflation expectations.
3. Accept the fact that policy will fall short and NGDP will grow by less than the target.

The real issue is not the zero bound to nominal interest rates, but rather the zero bound to eligible assets still in the public's hands. That is, once the central bank has purchased all the assets that it is legally entitled to buy, it would face a difficult policy dilemma. But that scenario is certainly not the problem the United States faces in 2013, and thus NGDP futures targeting would immediately allow the Fed to hit its target for expected NGDP growth.

VI. CONCLUDING REMARKS

In this paper, I have mostly focused on how NGDP futures targeting solves the technical problem of minimizing instability in the growth path for nominal income. However, there are also a number of side benefits to NGDP futures targeting. For instance, under this policy regime, the expected fiscal multiplier would always be exactly zero.[42] Changes in fiscal policy would not be expected to have any impact on nominal spending, as they would be offset by monetary policy adjustments large enough to keep expected NGDP growth on target. Fiscal policy advocates might view that as a disadvantage, as the central bank would have one stabilization tool rather than two. In fact, it would be a huge boon to policymakers. Because monetary policy would be set at the level expected to produce on-target NGDP growth, fiscal policy could focus on doing what it does best: providing a good environment for the economy to flourish in.

With NGDP futures targeting, there would be no reason to bail out failing firms, as the bailouts would not save jobs, but would merely shift jobs from one sector to another. And countries could implement needed fiscal austerity measures without worrying that they might push the economy into a recession.

NGDP futures targeting would also be a boon to individuals and businesses in the private sector. Under the current policy regime, firms must guess where NGDP is likely to move over the next 12 or 24 months. In late 2008, many firms cut back

42. Here I am referring to demand-side fiscal policy, sometimes called "stimulus." Some fiscal actions, such as cuts in marginal tax rates, may boost the supply side of the economy.

on investment projects, guessing (correctly) that NGDP would remain depressed over the next few years. With NGDP futures, targeting firms would know that a temporary shock to the financial system would be handled much as was the 1987 stock market crash, which had no perceptible impact on the path of NGDP over the next several years.

NGDP futures targeting has many of the advantages of the old gold standard system, without its disadvantages. Between 1879 and 1933, the US government kept the nominal price of gold fixed at $20.67 per ounce. Unfortunately, the real value of gold (its purchasing power) was often unstable, resulting in cycles of inflation and deflation, rising NGDP and falling NGDP. The United States needs a rules-based system that works automatically, as the classical gold standard did, but also one that stabilizes NGDP growth over time. NGDP futures targeting is just such a system.