

The Princeton School and the Zero Lower Bound

Scott Sumner

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Abstract

In the early 2000s, a small group of economists at Princeton University revived the debate over liquidity traps and developed a framework for monetary policy at the zero lower bound. Paul Krugman's 1998 Brookings paper provides the basic model that underlies much of the new view, but work by Ben Bernanke, Michael Woodford, Gaudi Eggertsson, and Lars Svensson also played an important role in reshaping our view of stabilization policy at the zero bound.

By the late 2010s, their ideas had begun to influence policy at the Federal Reserve. Research by Krugman and other Princeton School members provided the rationale for the Fed's new policy of flexible average inflation targeting, which is the most important shift in the Fed's policy regime in several decades. Comparing the Princeton School to other recent developments such as market monetarism and NeoFisherism helps to illuminate both sets of ideas.

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Introduction

During the late 1990s and the first decade of the 21st century, a small group of economists revived the debate over liquidity traps and developed a framework for monetary policy at the zero lower bound. Because the key members of this school of thought were all teaching or studying at Princeton University during the early 2000s, I'll call this group the "Princeton School." Paul Krugman's 1998 Brookings paper provides the basic model that underlies much of the new view, but work by Ben Bernanke, Michael Woodford, Gauti Eggertsson, and Lars Svensson also played an important role in reshaping the view of stabilization policy at the zero bound.¹

By the late 2010s, their ideas had begun to influence policy at central banks, including the Federal Reserve. Indeed, research by Krugman and other Princeton University members provided the rationale for the Fed's new policy of flexible average inflation targeting, which is the most important shift in the Fed's policy regime in several decades.

In the 1930s, Keynes argued that very low interest rates could limit the effectiveness of monetary stimulus in a deep recession. Macro models based on the *General Theory*, however, proved inadequate for addressing policy issues in a fiat money world with large and unanticipated changes in the trend rate of inflation. The Chicago School of monetarists led by Milton Friedman was better able to explain phenomena such as the Great Inflation, especially the large variation in inflation rates and nominal interest rates over time and across countries from 1950 to 1990. The New Keynesian model that emerged in the 1980s incorporated ideas from

¹ Note that some of the key work was done during the late 1990s, before several of these economists had moved to Princeton, thus creation of the school may have resulted from Princeton's hiring of people with common interests.

both the Keynesian and monetarist camps, and this model resulted in a policy regime that incorporated the “Taylor principle,” which led to a period of relative policy stability from the mid-1980s to 2007.²

The consensus New Keynesian model of the 1990s was upended by the global shift toward near-zero nominal interest rates, which increasingly seem like the new normal of the 21st century. Today, it has become hard to even imagine a US recession where nominal interest rates don’t fall to zero for an extended period of time. In Europe and Japan, there is little expectation of rates rising above zero even during a boom period. Going forward, central banks will struggle to achieve their inflation targets if they ignore the insights of the Princeton School.

The first section of this paper discusses Krugman’s key 1998 paper and uses the Coase Theorem as an analogy to show how the policy “message” in a theoretical model often depends on some subtle distinctions that are easy to overlook. In my view, the most important insights of the Princeton School are still not well understood, and I hope to provide some context for interpreting these studies, which can be read in multiple ways. For instance, Krugman’s paper has been read as both a defense of using a certain type of monetary policy at the zero bound and as an explanation of why monetary policy might be ineffective in that situation.

The second section discusses Ben Bernanke’s forceful critique of the Bank of Japan’s policy during the 1990s and the difficulty Bernanke faced in persuading his colleagues at the Fed to adopt an aggressive policy stance, especially given the strongly conflicting views among policymakers.

² Under the Taylor principle, the central bank’s policy rate rises by more than one for one with an increase in inflation so the rate can ensure a contractionary policy stance to push inflation back down to the target (and vice versa).

The third section shows how Eggertsson and Woodford built on the insights of Krugman (1998) to show how various policy rules might overcome the zero-bound problem and how those models could provide a tool for explaining some key events in monetary history.

The fourth section discusses two important papers by Lars Svensson, one of which provides a “foolproof” method for escaping from liquidity traps, while the other explains why an efficient monetary policy rule should equate the policy goal (target) and the policymaker’s forecast of the goal variable.

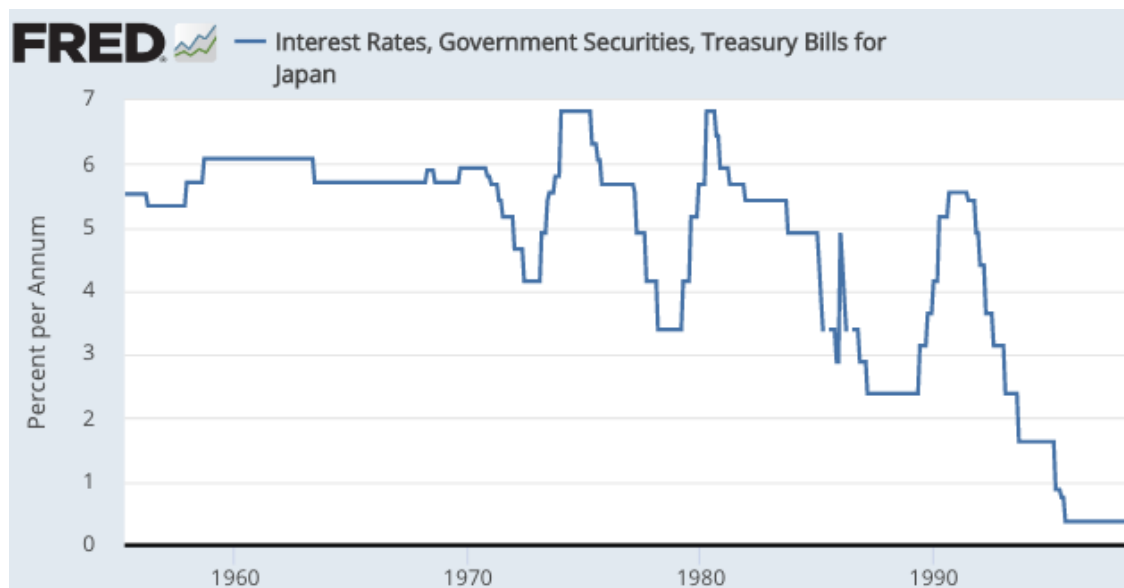
The paper will conclude by showing some surprising links between the Princeton School and heterodox theories such as NeoFisherism and market monetarism. By looking at both the similarities and differences between the models, we can understand all three approaches better than if each were viewed in isolation.

1. Paul Krugman’s Expectations Trap

More than two decades after it was published, Paul Krugman’s 1998 Brookings paper (“It’s Baaack: Japan’s Slump and the Return of the Liquidity Trap”) seems strikingly prescient in anticipating many of the zero-bound issues faced in recent years. It may well be the most important macro article of the past 40 years and is the obvious place to begin when trying to understand the role of monetary and fiscal policy in the 21st century.

Recall that in 1998, the United States and most other developed economies were not even close to being in a liquidity trap, and very few people expected that situation to change in the near future. Even Japan had been at the zero bound for only a short period (see figure 1), and that fact could be fairly easily dismissed as an economic overhang from the banking crisis of the early 1990s.

Figure 1: Japan's Interest Rates, 1950s–1990s



Source: International Monetary Fund, retrieved from FRED, Federal Reserve Bank of St. Louis.

From this relatively modest zero-bound episode, Krugman made some pretty expansive claims:

1. Banking problems are not the root cause of a liquidity trap; rather, the root cause is the hoarding of base money at zero nominal interest rates.
2. A liquidity trap can occur in a flexible price model. This point is important because it suggests that a liquidity trap can persist for a long period, even after wages and prices have adjusted.
3. A liquidity trap can occur in an economy with full employment (which occurred in Japan in the late 2010s).
4. A liquidity trap can occur in an economy with highly productive capital because stocks have a large equity premium.

5. A very large increase in the monetary base, that is, quantitative easing (QE), will be largely ineffective if the public expects it won't be permanent (relative to the change in money demand).³
6. Monetary stimulus at the zero bound is not necessarily a “beggar-thy-neighbor” policy, even if it leads to currency depreciation.
7. Europe might be next. Here's how Krugman concluded his paper:

Germany and France currently have short-term interest rates of only 3.5 percent, and Europe faces Japanese-style demographics; could a liquidity trap happen to the European Monetary Union? Economists now know that the liquidity trap is not a historical myth: it can and does really happen sometimes, and we had better try to understand it.

Clearly, this danger was not obvious at the time, because the eurozone did not make any sort of effective plans for dealing with a zero rate environment.

Early in the 1998 paper, Krugman summarizes his core insight:

The central new conclusion of this analysis is that a liquidity trap fundamentally involves a credibility problem—but it is the inverse of the usual one, in which central bankers have difficulty convincing private agents of their commitment to price stability. In a liquidity trap, the problem is that the markets believe that the central bank will target price stability, given the chance, and hence that any current monetary expansion is merely transitory. The traditional view that monetary policy is ineffective in a liquidity trap, and that fiscal expansion is the only way out, must therefore be qualified: monetary policy will in fact be effective if the central bank can *credibly promise to be irresponsible*, to seek a higher future price level. [Emphasis added]

Notice that Krugman does not say that the core problem in a liquidity trap is that central banks cannot cut interest rates any further. The zero lower bound can create problems, but only if paired with additional assumptions about the public's expectations for the future path of policy.

³ The effectiveness of permanent increases in the monetary base has recently declined because of a combination of persistently low equilibrium interest rates and the decision to pay interest on bank reserves during periods when market rates rise above zero.

A central bank is unable to stimulate the economy at the zero bound if either of the following two conditions is met:

1. For institutional reasons, a central bank is unwilling to promise higher future inflation.
2. A central bank promises higher future inflation, but its promises are not credible.

When analysts are evaluating the potential for monetary stimulus, it is all too easy to conflate “cannot” and “will not.” This distinction is crucial when thinking about whether the focus should be on fixing the monetary regime or relying more heavily on fiscal policy. Because Krugman’s paper is often misunderstood, it will be useful to compare his analysis to another important paper that has also been widely misunderstood—Ronald Coase’s famous 1960 article about the problem of social cost.

Coase (1960) began by exposing serious flaws in the traditional Pigovian theory of externalities, which had suggested that government regulation was appropriate when one party imposed external costs on another. But Coase didn’t stop there; he rebuilt the theory of externalities on a stronger foundation—the concept of *transactions costs*. Traditional Pigouvian taxes became a special case, appropriate where transactions costs prevent private parties from negotiating an optimal solution. This paper had a major effect on the field of law and economics.

Similarly, Krugman began by exposing serious flaws in the traditional Keynesian theory of liquidity traps. Even at the zero bound, permanent monetary expansion should be able to create expectations of future inflation and hence depress current real interest rates. But Krugman didn’t stop there; he rebuilt the theory of monetary policy at the zero bound on a stronger foundation—the concept of *policy credibility*. Traditional Keynesian solutions such as fiscal stimulus became a special case, appropriate for situations where central banks could not or would not commit to a

credible policy of inflation, perhaps because of the time inconsistency problem. Krugman's paper has had a major influence on the debate over stimulus options at the zero lower bound.

Coase's paper is frequently misunderstood by readers who focus on only a portion of his analysis. Thus, some conservatives who favor free markets might claim, "Coase showed that externalities don't require regulation." Progressives might argue, "Since transactions costs do exist, we can ignore the rest of Coase's analysis." In fact, Coase's analysis is richer than either caricature.

Although it is tempting to find a liberal and conservative reading of Krugman's paper, I'll steer clear of those terms for two reasons. First, Krugman clearly thinks it is worth giving important consideration to fiscal policy at the zero bound, but he believes it is important for central banks to try to be more aggressive in forward guidance at the zero bound (the "promise to be irresponsible," as he put it). Second, Krugman is clearly not a conservative, so calling either view conservative is misleading. In addition, if we take the standard assumption that fiscal policy is the more liberal option, we are forced to label the monetary option—a central bank's "promise to be irresponsible"—as the conservative option. Political labels seem more likely to confuse than illuminate.

Instead, I'll call a focus on the monetary policy option at the zero bound the "New Keynesian view," whereas the old Keynesian view will denote a focus on the fiscal policy option. This labeling makes sense for two reasons. First, during the so-called New Keynesian period (roughly 1984–2007), monetary policy was widely viewed as the appropriate tool for stabilizing aggregate demand and inflation. Second, policy expectations play a big role in the New Keynesian model, and the expectations channel is crucial for making monetary policy effective at the zero bound. Indeed, Krugman used a set of assumptions that might be regarded as

relatively classical (flexible prices, rational expectations, Ricardian equivalence, etc.), but not because he thought they were realistic; rather he wished to demonstrate that a liquidity trap really could occur, even under the most “conservative” assumptions.

Of course, there is more than one way to interpret the implications of Keynes’s *General Theory* for monetary policy. Some pundits insist that Keynes viewed a liquidity trap as a mere theoretical curiosity, whereas both the British economist John R. Hicks and Milton Friedman claimed that the liquidity trap was the *General Theory*’s most important innovation, upon which much of the rest of the analysis relied (see Keynes 1936; Hicks 1937; Friedman 1972). Back in 1988, when few people worried about the zero-bound issue, Allan Meltzer (1988) wondered why, if Keynes was so worried about monetary policy ineffectiveness, he didn’t just recommend an inflation target high enough to ensure that nominal interest rates never fell to zero. In that case, monetary policy would always be effective, and fiscal stabilization policy would be superfluous.

Of course, Meltzer was a monetarist, and Keynesian advocates of fiscal policy might be tempted to dismiss this advice. And yet during the Great Recession, a number of prominent Keynesian economists did advocate raising the inflation target to 4 percent for essentially the reasons cited by Meltzer. Indeed, the 2 percent inflation target that many central banks settled on in the 1980s and 1990s was chosen partly because it was viewed (wrongly, in retrospect) as being high enough to avoid the zero-bound constraint.⁴

The point here is not to argue that Meltzer was correct that a higher inflation target eliminates the need for fiscal policy—there are other possible justifications for fiscal stimulus

⁴ If policymakers had anticipated the fall in the equilibrium real interest rate during recent decades, then an even higher inflation target might have been chosen.

beyond the zero-bound issue—rather, that it represents one plausible reading of the *General Theory*. The policy message of a model is not always obvious.

To illustrate this point, consider the following statement by Krugman (1999) from a working paper criticizing stabilization policy in Japan:

What continues to amaze me is this: Japan's current strategy of massive, unsustainable deficit spending in the hopes that this will somehow generate a self-sustained recovery is currently regarded as the orthodox, sensible thing to do—even though it can be justified only by exotic stories about multiple equilibria, the sort of thing you would imagine only a professor could believe. Meanwhile further steps on monetary policy—the sort of thing you would advocate if you believed in a more conventional, boring model, one in which the problem is simply a question of the savings-investment balance—are rejected as dangerously radical and unbecoming of a dignified economy.

Will somebody please explain this to me?

Notice that Krugman is taking a much more New Keynesian approach than in his post-2008 policy statements. In 1999, he was strongly advocating more monetary stimulus while being somewhat skeptical of the efficacy of fiscal policy. And yet this paper was written just a year after the Brookings paper. So why did Krugman's policy preference seem to change after 1999?

I suspect that much of the shift in Krugman's views can be attributed to subsequent events. First, as time went by, it became apparent that the Bank of Japan (BOJ) was unable or unwilling to adopt a “promise to be irresponsible” approach, at least to the required extent. Second, the liquidity trap problem spread to many other countries and lasted much longer than expected. Third, ultra-low interest rates became the new normal, easing worries about debt sustainability. All these factors pushed many New Keynesian economists toward a greater willingness to embrace fiscal stimulus, thus Krugman's shift in emphasis is consistent with the recent evolution of mainstream Keynesianism.

In 1999, the Great Moderation was still in its heyday, and the New Keynesian approach to monetary policy still seemed adequate for most developed countries, even without the assistance

of fiscal stabilization policy. In that sort of environment, it was natural to suggest that the Japanese first try to use monetary policy more effectively. And as this paper will show, Krugman was not the only Western economist who at that time was frustrated with what seemed an overly cautious approach on the part of the BOJ.

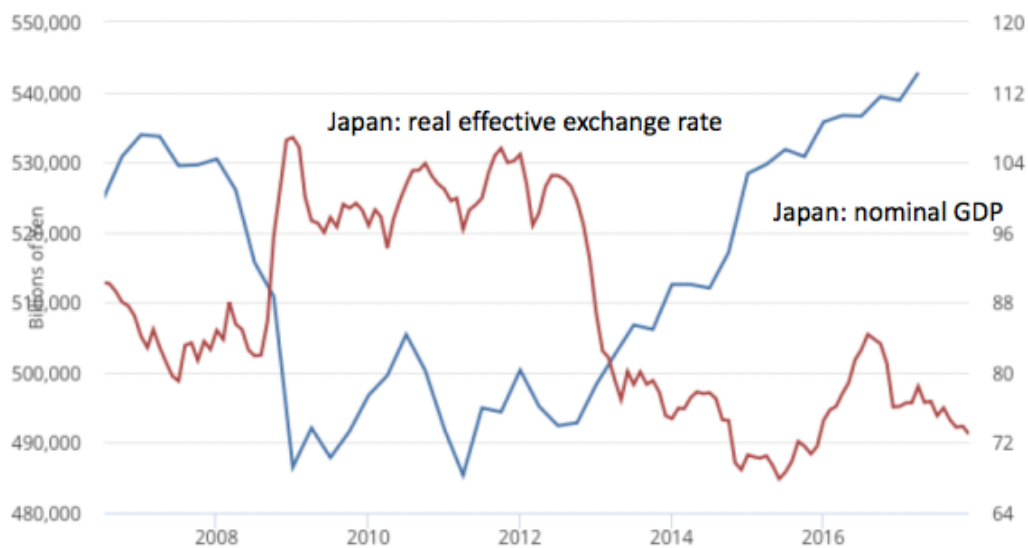
Later, Krugman (2018) revisited the Brookings paper with a new paper titled “It’s Baaack, Twenty Years Later.” In this retrospective, Krugman provides clear evidence that he continues to view both interpretations of the 1998 model as important. For instance, he notes that most central banks have been unwilling to pursue the sort of aggressive regime change that he recommended in 1998, but he also points to Abenomics as coming closest to what he had in mind:

When he became Prime Minister in 2012, Shinzo Abe—heretofore known as a conservative on many issues—surprised the world by endorsing a fairly radical monetary experiment. “Abenomics” was supposed to contain three “arrows”—fiscal stimulus and structural reform as well as monetary expansion. In practice, however, fiscal policy has if anything tightened slightly, while structural reform, as often happens, is in the eye of the beholder. There has, however, been a very visible shift not just in the Bank of Japan’s actions but in its underlying attitude: while it still professes the conventional 2 percent target, it gives every indication of being willing to be far more adventurous than in the past in its efforts to achieve that target.

And Abe’s policies did achieve some success (see figure 2):

So how is Kurodanomics—a much better description in practice than Abenomics—working? Figure 6 [figure 2 in this paper] shows two indicators, nominal GDP and the real effective exchange rate. Despite being at (or slightly below) the zero lower bound, the Bank of Japan evidently managed to achieve considerable traction. It has not so far managed to achieve the inflation target, but at least the Japanese experiment suggests some support for the view that monetary regime change can be effective even at the zero lower bound. Credibly promising to be irresponsible makes a difference; the problem is that central bankers won’t do it.

Figure 2. A Comparison of Japan’s Exchange Rate and Nominal GDP



Source: Krugman 2018, 19. Republished with permission of the author.

Note: “Kurodonomics,” the original title of this figure, refers to the Bank of Japan’s Governor Haruhiko Kuroda. He became the bank governor in March 2013.

Note that Krugman says “won’t do it” not “can’t do it”—an important distinction. Also note that the partial success of Abenomics occurred without the BOJ ever committing to any of the sort of catch-up inflation that had been recommended by Krugman in 1998 and later by other Princeton economists. The inflation target was raised to 2 percent, but the biggest change was psychological; the BOJ loudly proclaimed a desire to see inflation move higher. The Japanese yen began plunging in late 2012, almost immediately after then-candidate Abe signaled an intention to promote a more inflationary monetary policy.

In recent years, there has been some interest in a model called Modern Monetary Theory (MMT), which posits that monetary policy has little or no effect on inflation. Thus, it is worth noting that Krugman’s 1998 model explains Abenomics much better than does MMT, a theory that suggests it is fiscal policy, not monetary policy, that determines inflation. According to the

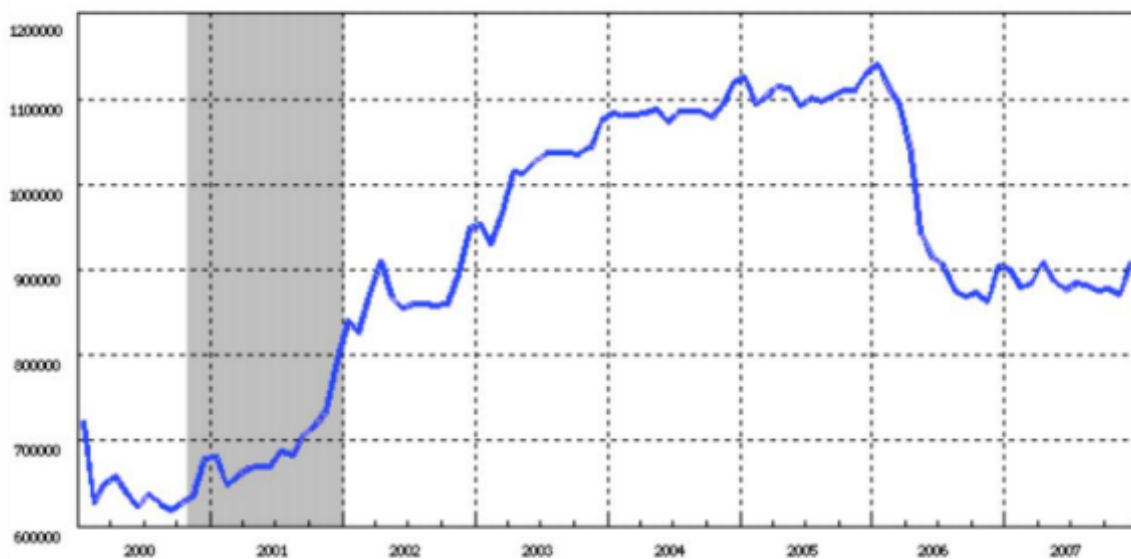
MMT model, Abe’s policies of tax increases and a shrinking budget deficit should have led to a slowdown in Japan. Monetary policy clearly matters, even at the zero bound.

By contrast, Krugman’s 2018 retrospective also found plenty of support for the old Keynesian interpretation of the 1998 Brookings paper:

The result of these simplifications was an extremely minimalist model, with an immediate, striking implication. If, for whatever reason, the natural rate of interest in the first period was negative—that is, it would require a negative nominal rate to achieve full employment—the proposition that money issuance must raise the price level was false. Or if you like, it was missing a word: permanent money issuance would raise the price level. But a monetary expansion the private sector expected to be temporary, to be wound down after the crisis had passed, would do nothing at all: the extra monetary base would just sit there.

Furthermore, it was reasonable for the private sector to assume that even large increases in the monetary base in a liquidity-trap economy would be temporary. We saw this in practice when Japan adopted a policy of quantitative easing in the 2000s. As figure 2 [figure 3 in this paper] shows, this policy was quickly reversed once the economy appeared to be recovering. (See figure 3.)

Figure 3. Japan’s Monetary Base



Source: Krugman 2018, 6. Republished with permission of the author.

This is certainly a feather in the cap for Krugman, because not only did he predict the likely ineffectiveness of quantitative easing (QE); he also described (in 1998) *the specific policy reversal that would explain that failure*. To be clear, this fact doesn't mean that QE "doesn't work"; studies often suggest a modest positive effect. Rather, the point is that it works only to the extent that it is a *signal of future monetary stimulus*; in the case of Japan from 2000 to 2006, the signal was quite weak.

Much of the 2018 paper focuses on the case for fiscal stimulus, which is perhaps not surprising given the way that Krugman's views have evolved over time. In my view, he slightly overstates the extent to which the 1998 paper supports the case for fiscal stimulus— also the empirical evidence in favor.⁵

For instance, there is no discussion of the fact that US economic growth actually sped up a bit after some pretty significant fiscal austerity in 2013, when the deficit plunged from \$1,061 billion to \$561 billion.⁶ In fairness, that decrease is only one data point, and Krugman does cite a cross-sectional study showing the effectiveness of fiscal policy. But these studies rely heavily on individual eurozone countries where there is little prospect of fiscal shocks being offset by monetary policy. That fact is important, because the most likely explanation for the surprisingly strong US growth in 2013 is that the Fed announced some fairly aggressive QE and forward guidance at the end of 2012, partly to offset the effects of the imminent fiscal austerity.

⁵ Ironically, several discussants of his Brookings paper actually criticized Krugman for being too dismissive of fiscal policy. Recall that he had used the assumption of Ricardian equivalence not because he thought it was true, but rather because he hoped to convince conservatives that liquidity traps were real and could occur in even some quite "classical" models.

⁶ I use calendar year deficits, because the fiscal austerity began on January 1, 2013.

Cross-sectional studies of fiscal stimulus would do better to focus on countries with independent central banks.⁷

Although I have some reservations about the case for fiscal policy, there is no denying that Krugman's 2018 paper justifies his preference for fiscal policy with some very insightful observations on the psychology of central bankers:

Given the way experience has undermined much of the original case for a 2 percent inflation target, and given the severity of the economic crisis, you might therefore have expected some revision—a rise in the inflation target, or a shift to some other kind of targeting—price level or nominal GDP targeting. But that hasn't happened.

Even though a 2 percent inflation target is an essentially arbitrary number, it has become a focal point, a sort of token of respectability that almost no central bankers are willing to meddle with. (In this sense it resembles the role once played by the gold standard.)

This is quite remarkable. If the worst economic crisis since the 1930s, one that cumulatively cost advanced nations something on the order of 20 percent of GDP in foregone output, wasn't enough to provoke a monetary regime change, it's hard to imagine what will.

This in turn might seem to suggest that while monetary policy could in principle offer a solution to the problem of the zero lower bound, fiscal policy ends up being the only realistic tool. (Krugman 2018, 17–18)

The second paragraph is Keynesian in both a substantive and rhetorical sense, and is reminiscent of Keynes's famous barbarous relic comment.

I would encourage people to reread Krugman's 1998 Brookings paper and the 2018 follow-up; then read the comments of various discussants at the end of the Brookings paper. In almost every case, Krugman's choices as to modeling strategy and policy recommendation are quite persuasive in hindsight, and a number of the commenters seemed to have underestimated the

⁷ If central banks do offset fiscal policy, then fiscal stimulus in one eurozone country would steal growth from other members of the common currency. Many economists don't think that is likely to occur at the zero bound, but then many economists didn't foresee the Fed's successfully offsetting US fiscal austerity in 2013. State-level cross-sectional studies of fiscal stimulus in the United States also fail to account for monetary offset.

extent to which the zero interest-rate bound could become a semi-permanent problem or the degree to which a radical monetary regime change was appropriate.

Interestingly, Krugman's pessimism about the willingness of central bankers to adopt regime change may have been a bit premature. Indeed, the Fed's 2020 decision to adopt average inflation targeting (AIT) is a sort of vindication for Krugman's 1998 claim that central banks should commit to a period of above-target inflation after exiting from a liquidity trap. The Fed has now committed to a period of above 2 percent inflation as the nation emerges from the COVID-19 recession.

Krugman didn't know about the Fed's recent AIT decision when he wrote the 2018 paper, but nonetheless he takes a well-deserved victory lap in the conclusion:

If economists were like natural scientists, we'd be celebrating the success of our standard model. Confronted with conditions very different from those encountered in the past, the model made predictions very much at odds with the expectations of many policymakers and market participants. And those predictions proved correct. (Krugman 2018, 22)

Paul Krugman was not just a Princeton economist during this period; he was also an important public intellectual with an influential column in the *New York Times* and a recent Nobel Prize. Next, this paper will consider an equally well-known Princeton economist, who had a chance to put his theories into action when he joined the Federal Reserve in 2002.

2. Ben Bernanke's Critique of Policy Paralysis

In the previous section, I argued that Krugman's 1998 paper was more nuanced than readers might suppose and that the policy message was somewhat ambiguous, or at least context specific. Here, I'll argue that Ben Bernanke's contribution to theory and policy has also been misunderstood.

The standard view is that Bernanke was a harsh critic of the BOJ in the late 1990s and early part of the 21st century, and then he discovered that his criticism had been unfair once he joined the Fed and discovered that his preferred monetary strategy was ineffective at the zero bound. Nonetheless, many economists believe that the Fed did a pretty good job in providing monetary stimulus during the Great Recession, given the zero-bound constraint.

In my view, this interpretation is almost completely wrong. Bernanke's earlier criticisms of the BOJ were right on the mark, and the severity of the Great Recession was partly due to the fact that Bernanke was unable to convince other Fed officials to adopt the policy approach he recommended to the Japanese. In terms of its impact on aggregate demand, US monetary policy was effectively contractionary during the Great Recession.

The key document here is a paper by Bernanke (1999) titled "Japanese Monetary Policy: A Case of Self-Induced Paralysis?" The paper makes five important claims:

1. The Japanese were misdiagnosing the liquidity trap as reflecting financial system distress, whereas the more fundamental problem was a lack of aggregate demand. Furthermore, some of the so-called structural problems were themselves made worse by demand deficiency.
2. Japanese monetary policy was not expansionary, because neither interest rates nor money supply changes are reliable indicators of the stance of monetary policy.
3. Central banks never run out of ammunition, because the central bank can buy an unlimited amount of assets. They should buy as many assets as necessary to hit their target.

4. The BOJ was inappropriately worried about balance sheet risk, which is not a serious problem from the perspective of the consolidated government balance sheet.
5. The BOJ should commit to something like level targeting (or average inflation targeting), which involves above-target inflation for a period after exiting the zero bound.

Bernanke begins by citing a wide variety of indicators that suggest a deflationary bias to BOJ policy, including near-zero nominal GDP growth, a strong yen, and falling asset prices (stocks and real estate). Then he addresses the widespread perception that monetary policy is already accommodative:

The argument that current monetary policy in Japan is in fact quite accommodative rests largely on the observation that interest rates are at a very low level. I do hope that readers who have gotten this far will be sufficiently familiar with monetary history not to take seriously any such claim based on the level of the nominal interest rate. One need only recall that nominal interest rates remained close to zero in many countries throughout the Great Depression, a period of massive monetary contraction and deflationary pressure. In short, low nominal interest rates may just as well be a sign of expected deflation and monetary tightness as of monetary ease.

Bernanke suggests that real interest rates are a better policy indicator, but then he adds that even the low level of real rates is misleading because of weak credit demand; he suggests instead looking at the gap between the actual and expected price level. In a speech, Bernanke (2003b) suggested that neither real nor nominal interest rates, nor the money supply, are good indicators of the stance of monetary policy, and he suggested instead looking at both inflation and nominal gross domestic product (NGDP) growth. Correctly evaluating the stance of policy is important, because confusion on this point has led to widespread misunderstanding about what actually happened in Japan, particularly the efficacy of Bernanke's recommendations. Did the BOJ try to inflate but failed during the decade after 2000, or did it not really try at all?

2a. Monetary Policy by the Bank of Japan

In his 1999 critique of the BOJ, Bernanke made two key arguments. First, that a central bank could always create inflation with a suitably large injection of base money:

The general argument that the monetary authorities can increase aggregate demand and prices, even if the nominal interest rate is zero, is as follows: Money, unlike other forms of government debt, pays zero interest and has infinite maturity. The monetary authorities can issue as much money as they like. Hence, if the price level were truly independent of money issuance, then the monetary authorities could use the money they create to acquire indefinite quantities of goods and assets. This is manifestly impossible in equilibrium. Therefore money issuance must ultimately raise the price level, even if nominal interest rates are bounded at zero. This is an elementary argument, but, as we will see, it is quite corrosive of claims of monetary impotence. (Bernanke 1999, 14–15)

In Krugman’s 2018 paper, he criticizes Bernanke for having claimed that printing money is effective at the zero bound. It is true that Bernanke’s 1999 critique of the BOJ has a more monetarist orientation than Krugman’s 1998 paper, and in retrospect Bernanke did seem a bit overly optimistic about the prospects for QE to boost spending. However, I interpret Bernanke’s QE claim a bit differently from how his critics do. Bernanke is not so much suggesting that central banks should buy up an infinite amount of assets; rather, he is pointing out that a determined central bank has the ammunition to hit any inflation target.

If a credible regime of monetary stimulus were adopted, then the size of monetary injections would depend on the demand for base money when inflation expectations are on target. And the higher the inflation target, the lower the demand for base money as a share of GDP (assuming no interest is paid on bank reserves). Ironically, the largest central bank balance sheets will occur in the countries with the lowest trend rates of inflation. In the long run, a central bank with a credible commitment to do “whatever it takes” will likely end up doing *much less* QE than a more timid central bank. I will return to this point in section 5, because confusion about “running

out of ammunition” has led to excessive pessimism about the potency of monetary policy at the zero bound.

Bernanke’s second argument is that the BOJ should commit to a zero interest-rate policy until inflation rises to the 3 percent to 4 percent range:

A problem with the current BOJ policy, however, is its vagueness. What precisely is meant by the phrase “until deflationary concerns subside”? Krugman (1998) and others have suggested that the BOJ quantify its objectives by announcing an inflation target, and further that it be a fairly high target. I agree that this approach would be helpful, in that it would give private decision-makers more information about the objectives of monetary policy. In particular, a target in the 3–4% range for inflation, to be maintained for a number of years, would confirm not only that the BOJ is intent on moving safely away from a deflationary regime, but also that it intends to make up some of the “price-level gap” created by eight years of zero or negative inflation. (Bernanke 1999, 16–17)

In later speech, Bernanke (2003a) was even more explicit, calling for a price-level target rising at 1 percent a year. This rise would force the BOJ to make up for any near-term undershooting of its price level with above-normal future inflation.

Next, Bernanke (1999) addresses the question of whether the BOJ has the tools necessary for boosting inflation. He begins by recommending yen depreciation in the foreign exchange market and responds as follows to those who worry about the effect of this policy on Japan’s trading partners:

Whatever validity this political argument [against depreciation] may have had at various times, it is of no relevance at the current moment, as Japan has recently been urged by its most powerful allies and trading partners to weaken the yen—and refused! Moreover, the economic validity of the “beggar-thy-neighbor” thesis is doubtful, as depreciation creates trade—by raising home-country income—as well as diverting it. Perhaps not all those who cite the “beggar-thy-neighbor” thesis are aware that it had its origins in the Great Depression, when it was used as an argument against the very devaluations that ultimately proved crucial to world economic recovery.⁸

⁸ This window of opportunity closed in 2003, when the United States began pressuring Japan to stop depreciating its currency.

Responding to arguments that the BOJ might be incapable of depreciating the yen, Bernanke again pointed to the *reductio ad absurdum* argument that Japan could theoretically buy up unlimited quantities of foreign assets with zero-interest yen-base money.

Bernanke also discusses several other options, such as money-financed fiscal deficits that increase the money supply (the so-called helicopter drop), and very large open-market purchases of assets (later termed “quantitative easing”). He noted that BOJ officials seemed to be concerned that large asset purchases would expose the BOJ to balance sheet risk and then argued that this sort of “risk” was largely illusory given that a central bank balance sheet is effectively part of the broader fiscal authority balance sheet:

BOJ officials have pointed out that if the BOJ purchased large quantities of long-term government bonds, and interest rates later rose, the Bank would suffer capital losses. Under current law these losses would not be indemnified, even though they would be precisely offset by gains by the fiscal authority. This concern has led the BOJ to express reluctance to consider engaging in such operations in the first place.

Perhaps the Bank of Japan Law should be reviewed, to eliminate the possibility that such trivial considerations as the distribution of paper gains and losses between the monetary and fiscal authorities might block needed policy actions. An alternative arrangement that avoids the balance-sheet problem would be to put the Bank of Japan on a fixed operating allowance, like any other government agency, leaving the fiscal authority as the residual claimant of BOJ’s capital gains and losses.

The 1999 paper concludes with a fairly harsh indictment of the BOJ, which echoes the title of the paper:

Japan is not in a Great Depression by any means, but its economy has operated below potential for nearly a decade. Nor is it by any means clear that recovery is imminent. Policy options exist that could greatly reduce these losses. Why isn’t more happening? To this outsider, at least, Japanese monetary policy seems paralyzed, with a paralysis that is largely self-induced. Most striking is the apparent unwillingness of the monetary authorities to experiment, to try anything that isn’t absolutely guaranteed to work. Perhaps it’s time for some Rooseveltian resolve in Japan.

Some might argue that subsequent events in the United States and Europe showed that Bernanke was too harsh in his criticism of Japan. And, indeed, Bernanke later softened his

criticism when he acquired a better understanding of the political and institutional barriers faced by central bankers contemplating radical change.

Nonetheless, Bernanke's 1999 critique still seems valid, at least in a technical sense. Japan refused to take Bernanke's advice from 1999 and actually adopted an explicitly contractionary monetary policy in the decade after 2000. Indeed, the BOJ *raised interest rates in 2000, and again in 2006*. And as noted earlier, the BOJ sharply reduced the monetary base in 2006. This later decision was especially unfortunate, because Japan's economy was relatively strong at the time and escaping the zero rate bound in 2006 would have been far easier than at any time in the past 12 years.

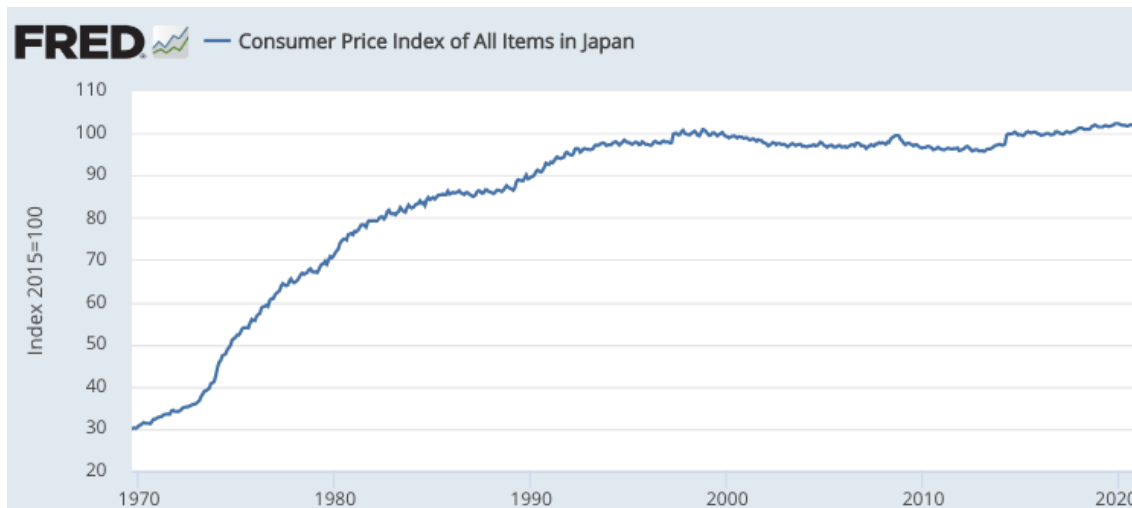
Many pundits missed the fact that Japan had tightened monetary policy in 2000 and 2006, as the interest rate increases were quite modest. Recall, however, that Bernanke had warned that interest rates do not measure the stance of monetary policy; for that stance, you need to look at inflation and NGDP growth. The rate increases did, however, provide evidence of the BOJ's policy intentions; they represented a sort of *confession of contractionary intent*.⁹

A central bank does not raise interest rates unless it is trying to prevent excessive growth in spending or inflation. Because the BOJ's target during the 1990s and first decade after 2000 was "stable prices," because prices (measured by Japan's consumer price index [CPI]) were in fact quite stable after 1993 (see figure 4), and because the BOJ repeatedly raised and lowered interest rates during this period, the inference is that the price level was roughly on target. It wasn't a

⁹ Susan Woodward and Robert Hall (2008) used similar wording in calling the Fed's explanation for its 2008 decision to pay interest on reserves a "confession of contractionary effect," but the term "intent" better fits their argument. Intentions are highly important when evaluating whether policymakers tried to stimulate and failed, or never tried at all.

lack of ammunition; the near-zero CPI inflation rate was what the BOJ was aiming for (before the Abe government).

Figure 4. Japan's Consumer Price Index



Source: International Monetary Fund 2021 data, retrieved from FRED, Federal Reserve Bank of St. Louis.

Although the rate increases of 2000 and 2006 were small, the signaling effect was both important and detrimental. Those moves persuaded the Japanese public that the BOJ would not allow a positive inflation rate. That view created more bearish expectations and had the effect of lowering the natural (equilibrium) interest rate, in nominal terms. A 25-basis-point increase in the policy rate can be highly contractionary if it leads to a 50- or 75-basis-point fall in inflation expectations and hence a 75- or 100-basis-point increase in the gap between the policy rate and the equilibrium rate.

2b. The Perils of Decision-Making by Consensus

There are at least three ways to think about Bernanke's tenure at the Fed. One possibility is that the weak recovery from the Great Recession shows that Bernanke's previous criticism of Japanese policymakers was misguided; his proposed policies were largely ineffective. A second

possibility is that Bernanke misjudged the situation in 2008 and 2009, and he failed to act aggressively enough. A third possibility is that Bernanke saw the problem correctly but was unable to persuade his colleagues of the need for aggressive action.

The first view is based on a misconception. After joining the Fed in 2002, Bernanke was never able to persuade his colleagues to adopt either price-level targeting or the “whatever it takes” approach to asset purchases that he recommended to the Japanese. The Fed was also quite averse to any sort of currency depreciation channel, viewing the exchange rate as the purview of the Treasury. It is not that Bernanke’s 1999 policy proposals failed when tried at the Fed, but rather that the proposals were never tried. Here is Lawrence Ball (2012):

In these early writings, Bernanke advocated a number of aggressive policies, including targets for long-term interest rates, depreciation of the currency, an inflation target of 3–4%, and a money-financed fiscal expansion. Yet, since the U.S. hit the zero bound in December 2008, the Bernanke Fed has eschewed the policies that Bernanke once supported and taken more cautious actions—primarily, announcements about future federal funds rates and purchases of long-term Treasury securities (without targets for long-term interest rates). . . .

In discussing one of Bernanke’s early writings on the zero bound, Christina Romer says, “My reaction to it was, ‘I wish Ben would read this again.’” . . . Paul Krugman (2011b) asks “why Ben Bernanke 2011 isn’t taking the advice of Ben Bernanke 2000.” In criticizing Fed policy, Joseph Gagnon echoes Bernanke’s criticism of the Bank of Japan: “It’s really ironic. It’s a self-induced paralysis.” . . .

[Bernanke’s views] changed abruptly in June 2003, while Bernanke was a Fed Governor. On June 24, the FOMC [Federal Open Market Committee] heard a briefing on policy at the zero bound prepared by the Board’s Division of Monetary Affairs and presented by its director, Vincent Reinhart. The policy options that Reinhart emphasized are close to those that the Fed has actually implemented since 2008; Reinhart either ignored or briefly dismissed the more aggressive policies that Bernanke had previously advocated.

I was also critical of Bernanke back in 2011, but over time I’ve taken a more nuanced position. There is a big difference between being an academic who is free to speak his mind and being in charge of a large conservative institution with highly diverse internal policy views. It is not at all clear that an alternative Fed chair would have done any better under the same

circumstances—or even as well. Indeed, the closest parallel to the large and decentralized Federal Reserve System is probably the European Central Bank (ECB), which did much worse by almost every single metric. And within the United States, the Fed was mostly being criticized for being *too dovish*.

In my view, pundits tend to overrate the influence of the leader of any large organization, whether a head of state or a Federal Reserve chair. Looking back over the past 100 years, Fed policy has usually reflected the consensus view of economists at the time, even when in retrospect it is clear the Fed made serious errors. During the 1930s, most economists did not blame the Fed for deflation, and during the 1970s, most economists did not blame the Fed for high inflation. And almost all major central banks switched to inflation targeting in the 1980s and 1990s, regardless of who happened to head the central bank. Although I agree with Romer and Krugman that a more expansionary policy would have been appropriate in 2011, that opinion was not the consensus view of US economists, a group that, if anything, favored a bit more hawkish policy (Wiseman 2011).

In his memoir, Bernanke conceded that the Fed erred in not cutting interest rates (then 2 percent) at the September 2008 meeting after Lehman failed. It also seems clear that the October decision to pay interest on bank reserves was poorly timed, even if Fed officials deny any contractionary intent.¹⁰ But those decisions were not heavily criticized at the time, because the consensus view (wrongly) assumed the banking crisis was the real problem and that a bank

¹⁰ It is true that the motivation for the payment of interest on reserves (IOR) was to allow the Fed to keep short-term rates at its 1.5 percent target. At the time, the Fed was injecting a large quantity of reserves into the economy to address stresses to the banking system. Given that policy decision, the additional decision to pay IOR was indisputably contractionary, when considered in isolation. An interesting counterfactual thought is whether the Fed would have rescued the banking system without congressional authorization for the payment of IOR. I believe the answer is yes, and hence IOR was contractionary. (Also see footnote 9.)

bailout would fix the problem. When output continued to fall sharply after the Troubled Asset Relief Program was enacted, both the Fed and the broader profession realized that aggregate demand was plunging much faster than had been anticipated, and policy pivoted toward a more expansionary stance.

The quotations critical of Bernanke and the Fed in Lawrence Ball's 2012 paper reflect frustration among "doves" with Fed policy during the long recovery, during which GDP growth was unusually weak. Yet the criticism was not particularly widespread. At the time, it was widely believed that banking crises are usually followed by weak economic growth. Actually, previous US banking crises were generally followed by rapid economic growth (see Bordo and Haubrich 2017). So why wasn't the Fed more aggressive? Why didn't it adopt level targeting to boost inflation expectations or adopt a much more aggressive QE program, or both?

Bernanke never claimed that the Fed was out of ammunition; indeed, he always insisted that it had the ability to do more if necessary. He also made it clear that the Fed desired a more rapid recovery and appreciated help from the fiscal side. So why not do more? When asked, Bernanke was a bit vague, citing "costs and risks" associated with a more expansionary policy.

Some might argue that—to avoid creating even more bearish sentiment in the financial markets—Bernanke was covering up the fact that the Fed was out of ammunition. That coverup is possible, but it seems unlikely that Bernanke had abandoned his earlier view that central banks never run out of ammunition, at least in a technical sense. And why should he have changed his view, which was a correct one? Another hypothesis is that Bernanke had become more aware of institutional barriers to enacting an aggressive policy, and he was unable to be fully candid about the problems. Consider the following three possibilities:

1. Bernanke could not convince a majority of the Federal Open Market Committee (FOMC) that more monetary stimulus would not risk excessive inflation and that if a modest inflation overshoot occurred, it would be appropriate.
2. Bernanke convinced the FOMC that faster growth in spending was desirable, but the committee worried about the costs and risks of an extremely large bond portfolio, which might result in enormous losses if interest rates rose during a recovery.
3. Bernanke was able to convince most of the FOMC, but three or four members refused to go beyond the actual policy that was enacted. Moreover, Bernanke feared that having that many dissenters would reduce the credibility of Fed promises to make up for any shortfall in near-term inflation.

For this perspective, it is easy to understand why Bernanke had a hard time answering questions as to why the Fed wasn't doing more. We know that Bernanke had previously argued (correctly) that the BOJ should not have been concerned about balance sheet risk. But a Fed chair is also a diplomat. If he had worked hard to get as much stimulus through the FOMC as possible, with a minimum number of dissents, it would not be helpful to throw his colleagues under the bus by suggesting that their fears about doing more were based on ignorance. Ball (2012) suggests that Bernanke has a reputation for being polite, but there are also sound reasons for the head of an organization such as the Fed to avoid antagonizing people whose support the head needs to fashion a credible policy.

In my view, the Fed would have done a bit better if Bernanke had had a free hand. But research on the "wisdom of crowds" suggests that, on average, a committee such as the FOMC will make better decisions than will a single individual. To criticize Bernanke for making the

FOMC more collegial is analogous to arguing that a dictatorship is superior to democracy based solely on the impressive results achieved by Lee Kuan Yew in Singapore. A single example doesn't prove a point. Although a few smaller central banks in places like Australia did better than the Fed, it is easier for a small open economy to inflate because the currency depreciation channel is more available than in large countries.

The closest comparison to the Fed is the ECB, which presides over a similar-size economy and is an unusually decentralized central bank. The ECB did far worse than the Fed did—both in terms of policy inputs and in economic outcomes. Even though the global crisis began in the United States and centered on the US housing and banking sectors, the recession ended up being worse in Europe, *even before the failure of Lehman*. Indeed, the ECB actually raised its interest rate target in mid-2008 and then raised rates twice in 2011, triggering a severe double-dip recession (which the United States avoided). The ECB was not even at the zero bound throughout 2008–2012, so those policy failures were not merely errors of omission nor just a failure to do unconventional policies. Rather, the ECB's management of *conventional policy tools*, such as its interest rate target, was quite inept.

In the United States, the Fed faced a great deal of pressure from politicians to do less and very little pressure to do more. Council of Economic Advisers chair Christina Romer suggested that she had difficulty convincing President Obama that the Fed *could* do more.

The Princeton School showed that at the zero lower bound, the expected future path of monetary policy matters far more than does the current policy stance, and this fact made Bernanke's job especially difficult. In the early 1980s, Fed Chair Paul Volcker occasionally forced through policy changes over the objections of a significant number of FOMC voters.

Because there is no upper bound on interest rates, however, a highly contractionary policy was relatively easy to implement (in a technical sense).

In contrast, Bernanke's task was made more difficult by the zero lower bound, hence the need to convince the public that the policy strategy would persist even after he was no longer Fed chair. Bernanke would have needed a high degree of consensus within the FOMC to make a credible "promise to be irresponsible," which would be carried out at a future date when he might no longer be Fed chair.

In 2012, Ball argued, "There is no doubt that Ben Bernanke's views on zero-bound policy have changed over time." Ball cited the fact that Bernanke stopped advocating price-level targeting after he became Fed chair. Today, however, Ball's claim is very much in doubt. After Bernanke left the Fed, he resumed his advocacy of price-level targeting. A much more plausible interpretation is that Bernanke's views on the optimal policy never changed significantly—what changed is his appreciation of the political difficulties facing central bank governors.

Although the Fed's 2020 decision to adopt average inflation targeting is not exactly the temporary price-level targeting regime that Bernanke (2017) proposed, it is relatively close. Academic ideas often must be debated for years or even decades before being adopted as policy, as is appropriate for policy decisions with such powerful effects on the economy. During the 1970s, even inflation targeting would have been regarded as a wildly unrealistic and utopian proposal; by the 1990s, it was standard in much of the world. It is the job of an academic to propose policies that might be politically infeasible at the moment but have a chance of becoming accepted over time. It is the job of a policymaker to do the best that he or she can, given institutional constraints. Bernanke did well in both roles.

3. Gauti Eggertsson and Michael Woodford on Policy Signaling and Level Targeting

Michael Woodford's highly influential *Interest and Prices* (2003) provided a way of thinking about interest rate rules in a New Keynesian framework with rational expectations. In the same year, Gauti Eggertsson and Woodford (2003) were coauthors of a paper that applied this approach to a situation where interest rate policies are constrained by the zero lower bound:

The key to dealing with this sort of situation in the least damaging way is to create the right kind of expectations regarding how monetary policy will be used after the constraint is no longer binding, and the central bank again has room to maneuver. We use our intertemporal equilibrium model to characterize the kind of expectations regarding future policy that it would be desirable to create, and we discuss a form of price-level targeting rule that—if credibly committed to—should bring about the constrained-optimal equilibrium. We also discuss, more informally, how other types of policy actions could help increase the credibility of the central bank's announced commitment to this kind of future policy.

Eggertsson and Woodford describe their model as an extension of Krugman's 1998 paper, featuring a more sophisticated and realistic price-setting process and richer dynamics, which allow for more specific policy recommendations:

These richer dynamics are also important for a realistic discussion of the kind of policy commitment that can help to reduce economic contraction during a liquidity trap. In our model a commitment to create subsequent inflation involves a commitment to keep interest rates low for some time in the future, whereas in Krugman's model a commitment to a higher future price level does not involve any reduction in future nominal interest rates. We are also better able to discuss such questions as how the creation of inflationary expectations while the zero bound is binding can be reconciled with maintaining the credibility of the central bank's commitment to long-run price stability.

This statement doesn't mean Krugman's model was wrong; rather, he used a fairly simple setup to isolate the key policy issues at the zero bound.

Later this paper will consider how NeoFisherian analysis has raised questions about the implications of commitments regarding the future path of interest rates. Does a long period of low rates actually constitute easy money? Nonetheless, Eggertsson and Woodford point out that

this sort of policy commitment is certainly one concrete step available to central banks, even at the zero bound:

Because the central bank can clearly control the future path of short-term nominal interest rates if it has the will to do so, any failure of such a commitment to be credible will not be due to skepticism about whether the central bank is able to follow through on its commitment.

Eggertsson and Woodford also discuss two ways that a helicopter drop could be effective in boosting aggregate spending:

First of all, it is typically supposed that the expansion of the money supply will be permanent. If this is the case, then the function φ that defines interest rate policy is also being changed, in a way that will become relevant at some future date, when the money supply no longer exceeds the satiation level. Second, the assumption that the money supply is increased through a helicopter drop rather than an open-market operation implies a change in fiscal policy as well.

In other words, a helicopter drop might be seen as a commitment to permanently increase the monetary base (which will have implications for the future path of interest rates), or as a commitment to enact a more expansionary fiscal policy, or both.

They repeatedly argue that at the zero lower bound the purely mechanical effects of open-market purchases are almost inconsequential; any important effects are from the signaling channel. However, this claim is actually always true, even when rates are positive:

In fact, the management of expectations is the key to successful monetary policy at all times, not just in those relatively unusual circumstances when the zero bound is reached. The effectiveness of monetary policy has little to do with the direct effect of changing the level of overnight interest rates, since the current cost of maintaining cash balances overnight is of fairly trivial significance for most business decisions.

Thus, in January 2001, September 2007, and December 2007, global equities gained or lost hundreds of billions of dollars within minutes after Fed announcements that were slightly easier or tighter than expected (see Sumner 2020). Clearly, those dramatic market responses occurred because the Fed announcement led to changes in the expected future path of policy, not because

the federal funds rate on that particular day was slightly different from previous market expectations. The adjustment of the fed funds target is, above all else, a *signal of future policy intentions*.

From this perspective, the zero-bound problem is not so much about an inability to further cut interest rates; rather, the central bank's traditional tool for signaling future policy intentions is inoperative. When short-term interest rates cannot be adjusted, a central bank becomes *mute*—unable to signal expansionary policy shifts. It must find a new language for communicating with financial markets. This language might involve commitments to the future path of interest rates, large-scale asset purchases, exchange rate depreciation, or combined fiscal and monetary stimulus. In all four cases, the immediate direct impact is marginal; the signaling effect is paramount.

The most important policy implication of Eggertsson and Woodford is that policy should no longer be purely forward-looking, that is, focused solely on optimizing future outcomes conditional on current conditions. Rather, policy should be *history dependent*, which means that current policy decisions should depend not only on current macroeconomic conditions but also on the previous path of inflation and output. As a practical matter, this principle means that policy should shift from inflation targeting to some form of price-level target, where the Fed commits to return to a previous price-level path after a period where it falls short.¹¹

The intuition behind history-dependent policies is that they create expectations regarding the price level or nominal GDP that are themselves stabilizing for the economy. If the public

¹¹ More specifically, the optimal policy calls for returning to slightly above the previous price-level trend line after a period at the zero bound, although they also argue that this would be difficult to signal to the public and that a simple price-level target path is nearly as effective. In addition, the optimal policy rule would continue to respond to output gaps.

understands that the central bank is committed to reversing previous policy errors, then near-term price-level or nominal spending deviations from the target path are likely to be smaller. For instance, wage negotiations will occur with the understanding that inflation overshoots or undershoots are likely to be reversed in the near future.

One can view a history-dependent policy such as a price-level target as an indirect way of achieving Krugman's promise to be irresponsible but without the negative connotations of that phrase. If policy has committed to a target path for the price level, then a period of catch-up inflation after exiting a liquidity trap will be seen as consistent with the announced price-level target, rather than being inconsistent with an inflation target.

3a. Woodford on Nominal GDP Targeting

By 2012, the United States was in the midst of a disappointingly slow recovery from the Great Recession, and Woodford (2012) revisited the issue with a highly influential paper¹² that examined monetary policy options at the zero bound. Woodford begins by reviewing the policy recommendations of Eggertsson and Woodford (2003), specifically the idea that at the zero bound a central bank should target the output gap–adjusted price level. Then Woodford considers a forward guidance proposal by Chicago Fed President Charles Evans that would have been easier to communicate to the public but that lacks the important catch-up provision of level targeting. In the end, Woodford suggests that nominal GDP–level targeting might represent a good compromise:

An alternative that I believe should be equally easy to explain to the general public, but that would preserve more of the advantages of the adjusted price-level target path, would be a criterion based on a nominal GDP target path. . . . Under this proposal, the FOMC

¹² The *Washington Post* called the paper (titled “Methods of Policy Accommodation at the Interest-Rate Lower Bound”) “the year’s most important academic paper.”

would pledge to maintain the funds rate target at its lower bound as long as nominal GDP remains below a deterministic target path, representing the path that the FOMC would have kept it on (or near) if the interest-rate lower bound had not constrained policy since late 2008. Once nominal GDP again reaches the level of this path, it will be appropriate to raise nominal interest rates, to the level necessary to maintain a steady growth rate of nominal GDP thereafter. . . .

Essentially, the nominal GDP target path represents a compromise between the aspiration to choose a target that would achieve an ideal equilibrium if correctly understood and the need to pick a target that can be widely understood and can be implemented in a way that allows for verification of the central bank's pursuit of its alleged target, in the spirit of Milton Friedman's celebrated proposal of a constant growth rate for a monetary aggregate. Indeed, it can be viewed as a modern version of Friedman's "k-percent rule" proposal, in which the variable that Friedman actually cared about stabilizing (the growth rate of nominal income) replaces the monetary aggregate that he proposed as a better proximate target, on the ground that the Fed had much more direct control over the money supply.

Because NGDP growth equals inflation plus real GDP growth, and because real growth fluctuations are highly correlated with changes in the output gap (at cyclical frequencies), NGDP-level targeting would likely produce outcomes not much inferior to output gap-adjusted price-level targeting. In addition, it would be easier to communicate and would avoid the difficult problem of estimating the output gap.

Although the Fed has not formally adopted NGDP-level targeting, Woodford's paper did seem to have an effect on the 2012 Jackson Hole meetings. Soon after those meetings, the Fed announced an aggressive policy of monetary stimulus, which included more aggressive forward guidance, as well as a third round of QE.

St. Louis Fed President James Bullard is an NGDP targeting proponent and has described the Flexible Average Inflation Targeting (FAIT) regime adopted in 2020 as being "close to" both NGDP targeting and price-level targeting (Beckworth 2020). Fed Vice Chair Richard Clarida (2021) described the new policy as follows:

I believe that a useful way to summarize the framework defined by these five features is *temporary price-level targeting (TPLT, at the ELB) that reverts to flexible inflation targeting (once the conditions for liftoff have been reached)*.

Recall that Ben Bernanke had recommended temporary price-level targeting in 2017. Thus, the Fed’s new FAIT policy has clear links to a line of research that began with Krugman in 1998 and continued in the work of Bernanke, Eggertsson, and Woodford.

If the Fed both wished to *and intended to* adopt NGDP-level targeting, or output gap-adjusted price-level targeting but was worried about the challenges of communicating a new framework that did not include the term *inflation*, then flexible average inflation targeting would be a natural compromise. It would not preclude the Fed from targeting the price level along a path rising at 2 percent a year, because a successful price-level targeting strategy will also generate an average inflation rate of 2 percent. But a FAIT regime would actually contain the phrase “2 percent inflation,” which would help to reassure the public that the Fed was not abandoning its commitment to low inflation.

3b. Eggertsson on the Great Depression

Gauti Eggertsson wrote several insightful papers that applied the Princeton approach to US policy during 1933–1938, a period of near-zero nominal interest rates. Eggertsson and Benjamin Pugsley (2006) argued that a series of policy statements and actions during 1936–1937 signaled that Franklin Roosevelt was abandoning his long-held policy goal of raising prices to pre-Depression levels. Importantly, bearish policy signals are especially important at the zero bound, even if the concurrent policy *actions* have a relatively minor direct effect on the economy.

In the concluding paragraph, Eggertsson and Pugsley offered a prescient warning to the Bank of Japan, which would raise interest rates during 2006 because of fears that Japan’s economy might overheat:

The most obvious similarity is that Japan is also contemplating a transition from zero interest rates to positive ones. The U.S. experience indicates that economic outcomes

can be extremely sensitive to expectations given those circumstances. It appears that Japan might be vulnerable to contractionary spirals. This highlights the importance of clear communication by the Bank of Japan about its future inflationary goals as argued by Eggertsson and Ostry (2005). In particular, the market is very sensitive to signals about the future policy regime. Given the asymmetries documented in the paper, it seems to us more prudent to err on the side of inflation, rather than deflation.

Unfortunately, the BOJ ignored their advice.

From the vantage point of 2021, it is hard not to recall numerous examples of interest rate decisions that seemed inconsequential at the time but may have had a major contractionary impact through the signaling channel. These changes include a small rise in Japanese interest rate targets in 2000 and then again in 2006, similar increases in the eurozone in 2008 and 2011, and even the Fed's decision to pay interest on bank reserves in 2008. Though the direct effects of those actions were presumably quite modest, each policy action signaled complacency about the prospects for achieving moderate inflation, and each action seems clearly mistaken in retrospect. To get a sense of how Eggertsson was going against the conventional wisdom, consider this *New York Times* story from 2006:

Economists applauded the Bank of Japan's interest rate increase, the first in six years, as a long-awaited signal that Japan's \$4.6 trillion economy is finally getting back on track. They said that by moving pre-emptively on Friday, long before a return of inflation is likely to [become] a threat, the central bank was also hoping to demonstrate that it was watching prices carefully, and was therefore up to the task of stewarding Japan's economy, the world's second largest after the United States. (Fackler 2006)

There is a widespread perception that the BOJ tried and failed to raise inflation above zero during the late 1990s and first decade after 2000. This conclusion is somewhat misleading. During that period, the BOJ tried and succeeded in *preventing* inflation from rising significantly above or below zero. Note that at this time the goal of the BOJ was still price stability, before it adopted a 2 percent inflation target in 2013.

In 2008, Eggertsson examined the role of the expectations channel in the recovery from the Great Depression, particularly the radical regime change that occurred after FDR took office in March 1933 and left the gold standard:

[D]espite the fact that neither the nominal interest rate nor the money supply changed much at the turning point, the paper argues that the elimination of the policy dogmas drastically changed the systematic part of monetary policy, i.e., the framework that governed the policy setting going forward. What changed was expectations about how the interest rate and the money supply would be set in the future, leading to a dramatic change in inflation expectations. One way of seeing this in the data is to observe that the short-term real interest rate, the difference between the short-term nominal interest rate and expected inflation, collapsed around the turning point in 1933, dropping from high levels during 1929–1933 to modestly negative in 1933–1937.

Industrial production soared by roughly 57 percent between March and July 1933, and the wholesale price index rose by nearly 20 percent in the 12 months after March 1933, despite high unemployment. The dramatic turnaround in macroeconomic conditions after March 1933 cannot plausibly be attributed solely to concrete actions such as small changes in the money supply and interest rates, or even modest growth in federal spending. Instead, asset prices soared on monetary and fiscal policy news coming out of the Roosevelt administration, especially the decision to leave the gold standard and devalue the dollar.

The decision to leave the gold standard in April 1933 affected policy expectations in a number of ways. Eggertsson emphasizes the asymmetric nature of an international gold standard, which puts a much greater constraint on monetary stimulus than on monetary contraction. (There is no upper limit to gold accumulation when policy is tightened, but gold reserves cannot fall below zero.) By leaving the gold standard, FDR removed one important constraint on expansionary monetary policy.

In addition, the gold standard had been deeply embedded in American policy for many decades, and thus the decision to devalue was a sort of promise to be irresponsible, a clear

indication that the Roosevelt administration was serious about reflation. Indeed, several top administration officials resigned in protest, including the Treasury secretary. Leaving the gold standard (especially when combined with fiscal stimulus) meant switching to an entirely different and more inflationary monetary policy, which is the sort of regime change required to meaningfully affect aggregate demand at the zero lower bound.

Eggertsson suggests that the gold standard was “abolished” but a better description might be “weakened,” because FDR’s action combined devaluation of the dollar with a prohibition on Americans owning gold. FDR gradually raised the dollar price of gold from its long-standing peg at \$20.67 per ounce, and then in 1934 he set a new gold price peg at \$35 per ounce, which would last for decades. This action reduced the US dollar’s value in foreign exchange markets, because foreigners were able to resume exchanging dollars for gold at \$35 per ounce in 1934.

Eggertsson does not put as much emphasis on the exchange rate devaluation aspect of FDR’s decision, mostly because the action does not seem to have had a significant effect on the trade balance. Thus, it is reasonable to view the dramatic turnaround in the economy as being mostly driven by domestic demand. However, devaluation can also affect the domestic economy through the policy signaling channel, even where the trade balance is not affected. Currency depreciation can directly raise inflation via the purchasing power parity effect. In the next section, this study will show how Lars Svensson emphasized those points in developing a “foolproof” method of escaping from a liquidity trap.

4. Lars Svensson on Zero-Bound Policies in an Open Economy

As with the other members of the Princeton School, Lars Svensson (2003a) saw a higher expected future price level as the *sine qua non* in any successful monetary stimulus at the zero bound. To accomplish this rise in price-level expectations, he suggested a policy of currency depreciation.

Svensson's specific proposal relied on the twin concepts of purchasing power parity (PPP) and interest parity:

A higher future price level would imply a correspondingly higher future exchange rate (when the exchange rate is measured as units of domestic currency per unit foreign currency, so a rise in the exchange rate is a depreciation, a fall in the value, of the domestic currency). Thus, current expectations of a higher future price level imply current expectations of a higher future exchange rate. But those expectations of a higher future exchange rate would imply a higher current exchange rate, a current depreciation of the currency. The reason is that, at a zero domestic interest rate, the exchange rate must be expected to fall (that is, the domestic currency must be expected to appreciate) over time approximately at the rate of the foreign interest rate. Only then is the expected nominal rate of return measured in domestic currency on an investment in foreign currency equal to the zero nominal rate of return on an investment in domestic currency; this equality is an approximate equilibrium condition in the international currency market. . . . But then, at unchanged domestic and foreign interest rates, the current exchange rate will move approximately one to one with the expected future exchange rate. If the expected future exchange rate is higher, so is the current exchange rate. Indeed, the whole expected exchange-rate path shifts up with the expected future exchange rate. Thus, we have clarified that the optimal policy to escape from a liquidity trap, which involves expectations of a higher future price level, would result in an approximately equal current depreciation of the currency.

In essence, PPP links future expected price levels with future expected exchange rates, and the interest parity condition links future expected exchange rates with current exchange rates. The combination of these two relationships implies that for any given domestic and foreign interest rate, currency depreciation will boost inflation expectations.

4a. Is Currency Depreciation Effective at the Zero Bound?

Svensson calls this approach a foolproof method for escaping from a liquidity trap (correctly, in my view). But on closer inspection, it is not at all clear *why* this policy would work. As this study has shown, the other members of the Princeton School have also concluded that a commitment to a higher future price level would be essential, but some doubts were raised as to whether central bank promises to achieve this goal would be credible. Exactly how does exchange rate targeting solve the time inconsistency problem? More specifically, exactly how

does the central bank *cause* the domestic currency to depreciate? How does this approach differ from a policy of printing enough money (i.e., doing enough QE) to raise expectations of the future price level? As I will show, there are no easy answers to such questions.

Monetarists often argue that increases in the monetary base can affect a wide variety of asset prices and not just the yield on short-term bonds. Eggertsson and Woodford, however, showed that swapping base money for T-bills not only would fail to boost aggregate spending, but also might have little or no effect on other asset prices at the zero bound. Because exchange rates are an asset price, can we actually assume that central banks are able to depreciate a currency when at the zero bound? Svensson (2003a) points to the fact that while an exchange rate peg may be difficult to defend when speculators are pushing it lower, central banks have unlimited ability to meet the demand of speculators trying to push a currency higher:

If this crawling peg would fail, the domestic currency would appreciate back to the vicinity of the exchange rate before the announcement, making the currency a good investment. Thus, initially, before the peg's credibility has been established, there will be excess demand for the currency. This demand is easily fulfilled, however, since the central bank can print unlimited amounts of its currency and trade it for foreign exchange.

This view is quite similar to Bernanke's thought experiment from 1999. Because a central bank can print unlimited amounts of money, potentially buying up all the assets in the world, there is no question that a determined central bank can create inflation. In that case, currency depreciation is indeed a foolproof method of inflation at the zero bound, but then so is ordinary QE, at least if pursued aggressively enough. Again, I believe Svensson is correct on this point and will defend this view in section 5. But first, we should consider a reasonable objection to this foolproof method.

Here is Krugman in 2010, criticizing the view that the BOJ could simply devalue Japan's currency to generate some inflation:

Oh, and about the exchange rate: there's this persistent delusion that central banks can easily prevent their currencies from appreciating. As a corrective, look at Switzerland, where the central bank has intervened on a truly massive scale in an attempt to keep the franc from rising against the euro—and failed.

One way to reconcile those two views is to think of a liquidity trap not as a zero lower bound on nominal interest rates, but rather as an effective upper bound on the *size of a central bank balance sheet*, perhaps caused by restrictions on the sort of assets the central bank is legally allowed to buy, or perhaps reflecting the maximum amount of risk to its balance sheet to which it is willing to be exposed. Alternatively, trading partners might object to an extremely aggressive currency intervention. Thus, Krugman might concede that a policy of currency depreciation backed by a willingness to buy unlimited assets would indeed succeed in creating inflation, while simultaneously questioning whether such a policy was politically feasible for real-world central banks at the zero bound.

From this perspective, currency depreciation is not so much a tool to be used to achieve an objective; rather, it is essentially the *objective itself*. An assumption that a monetary policy achieves substantial currency depreciation is tantamount to an assumption that the policy is successful in creating higher inflation. A sufficiently depreciated currency will certainly create some inflation—imagine 1,000 yen to the dollar. But that assumption begs the question of whether central banks can actually depreciate their currencies.

Conversely, in mid-2011 (soon after Krugman's comment), the Swiss did succeed in modestly depreciating the franc and then pegging it to the euro for a period of three and a half years. Denmark has maintained such a peg for decades, even at the zero bound. Section 5 revisits the question of whether a whatever-it-takes approach to monetary stimulus is feasible in the real world.

One argument against Svensson's (2003a) foolproof plan is that it would represent a sort of beggar-thy-neighbor policy, stealing growth from the affected country's trading partners. But Svensson points out that any policy expected to boost the future price level will, by that very act, lead to currency depreciation:

However, we have already seen that the optimal way to escape from a liquidity trap, which involves expectations of a higher future price level, would directly lead to a corresponding depreciation of the currency. . . . Thus, opposing a currency depreciation is an argument against any expansionary monetary policy—which seems nonsensical.

This view is shared by other members of the Princeton School. Svensson also points out that the substitution effect (switching away from more expensive imported goods) is likely to be roughly offset by the income effect (faster growth in domestic demand drawing in more imports). Thus, currency depreciation need not hurt a country's trading partners.

Nonetheless, a highly aggressive policy of currency depreciation might require extremely large purchases of *foreign financial assets*, and C. Fred Bergsten and Joseph Gagnon (2016) provide evidence that such purchases would also boost both domestic saving and the current account surplus because of imperfect substitutability between foreign and domestic assets. Thus, the political feasibility of such a strategy for Japan remains in doubt.

In my view, the most interesting aspect of the Svensson proposal is its effect on domestic interest rates. In the optimal version, nominal rates are held at zero during the recovery, but he also discusses an almost-as-effective alternative—sharp depreciation followed by a fixed exchange rate peg, which would actually involve the domestic nominal interest rate *rising* to the level of foreign interest rates:

[T]he constant peg would not be consistent with a zero domestic interest rate; instead the domestic interest rate would have to be raised to equal the foreign interest rate (in order to fulfill the equilibrium condition of approximate equality of the expected rate of return on investments in domestic and foreign currency mentioned above). But, the higher expected future price level and thereby higher expected inflation compensates for the

higher interest rate, so the real interest rate would still equal the optimal one. (Svensson 2003a)

The intuition is simple. If Japan starts with 0 percent inflation and the United States has 2 percent inflation, then raising expected Japanese inflation to US levels will result in an exchange rate that is expected to remain fairly stable in the long run (assuming changes in the real exchange rate are mostly unforecastable). With expectations of no change in the nominal exchange rate, the interest parity condition requires that Japanese interest rates *immediately* rise to the level of US interest rates. In section 5, this study will consider how this example relates to the NeoFisherian hypothesis.

4b. Forecast Targeting as an Alternative to the Taylor Rule

Lars Svensson's critique (2003b) of the Taylor rule may end up being even more influential than his foolproof plan for escaping a liquidity trap. In his paper, Svensson argued that "targeting rules" are superior to "instrument rules." The abstract to a more recent version of the proposal (Svensson 2019) does a nice job of explaining the concept:

Forecast targeting means selecting a policy rate and policy-rate path so that the forecasts of inflation and employment "look good," in the sense of best fulfilling the dual mandate of price stability and maximum employment, that is, best stabilize inflation around the inflation target and employment around its maximum level. It also means publishing the policy-rate path and the forecasts of inflation and employment forecasts and, importantly, explaining and justifying them. This justification may involve demonstrations that other policy-rate paths would lead to worse mandate fulfillment. Publication and justification will contribute to making the policy-rate path and the forecasts credible with the financial market and other economic agents and thereby more effectively implement the Federal Reserve's policy. With such information made public, external observers can review Federal Reserve policy, both in real time and after the outcomes for inflation and employment have been observed, and the Federal Reserve can be held accountable for fulfilling its mandate. In contrast to simple policy rules that rely on very partial information in a rigid way, such as Taylor-type rules, forecast targeting allows all relevant information to be taken into account and has the flexibility and robustness to adapt to new circumstances. Forecast targeting can also handle issues of time consistency and determinacy. The Federal Reserve is arguably to a considerable extent already practicing forecast targeting.

With an instrument rule, there is a predetermined formula for adjusting the central bank's policy instrument, which is the variable directly under its control. The most famous examples are variants of the Taylor rule, where the short-term interest rate target is adjusted according to past levels of inflation and the output gap. But other policy instruments have also been proposed, including the monetary base and the exchange rate. The exchange rate was the policy instrument in the Svensson proposal discussed in the previous section.

Svensson argued that rather than rely on a rigid formula for adjusting the policy instrument, it is generally preferable to set the instrument at a level expected to produce the optimal outcome, such as 2 percent inflation. Under this *targeting rule* approach, all information relevant to forecasting inflation would be used when setting interest rates—not just the information used in something like a Taylor rule. Thus, forecast targeting involves equating the central bank's goal (target) with the central bank forecast. If the policy goal is 2 percent inflation, then the policy rate is set at a level where the central bank forecasts 2 percent inflation.

Svensson's proposal turned out to be very well timed, because the steady decline in global interest rates has made the Taylor rule approach increasingly problematic. When interest rates fall to zero, the short-term interest rate is no longer a feasible policy instrument. Although a Taylor rule could be modified to allow for QE at the zero bound, doing so would likely involve a move toward a more discretionary policy, which weakens the argument for an instrument rule. An even bigger problem occurs when the equilibrium interest rate is declining, because the Taylor rule formula assumes a stable equilibrium real rate of interest. In recent decades, the equilibrium interest rate has been trending downward. In this environment, a rigid application of the Taylor rule could easily lead to an excessively high policy interest rate and hence a policy that is too contractionary.

A good example of Svensson's forecast targeting approach occurred in 2019. During that year, the Fed cut its policy rate three times to only 1.75 percent, a relatively low level for a booming economy. The cuts were not motivated by Taylor rule considerations, because unemployment was at the unusually low level of 3.5 percent and inflation was only slightly below target. Instead, there were widespread forecasts that President Trump's trade war with China was hurting US manufacturing and investment and was slowing the economy. The rate cuts seemed successful, as shown during early 2020 (before the COVID-19 slump) when the economy continued to behave well, with no indication of overheating or rising inflation, even in forward-looking indicators such as Treasury inflation-protected securities (TIPS) spreads.

Svensson served as a deputy governor of the Swedish Riksbank from 2007 to 2013. Unfortunately, he was unable to convince his colleagues of the merits of forecast targeting, and he clashed with his fellow governors when the policy rate was set at levels expected to produce suboptimal results, even according to *the Riksbank's own internal forecasts*. It was as if a ship captain heading across the Atlantic had set the steering wheel at a position expected to result in the ship being 200 miles off course when it reached the other side of the ocean. Subsequent events showed that Svensson was correct and that the Riksbank had been too contractionary during the recovery from the Great Recession. There is evidence that the Fed made a similar error in the fall of 2008 (see Sumner 2021).

5. The Princeton School, NeoFisherism, and Market Monetarism

A macroeconomic model can often be better understood by comparing its key tenets with alternative theories, especially when there is some overlap between the models. In the past decade, two heterodox theories have attracted some attention in the economics blogosphere. In each case, there are interesting points of overlap and divergence with the Princeton School. This

section first discusses the NeoFisherian model and then considers a set of ideas dubbed “market monetarism.”

NeoFisherian adherents claim that lower interest rates actually represent a disinflationary monetary policy stance, which conflicts with not just the Princeton School but with mainstream macroeconomics in general.¹³ This view also seems to contradict real-world practice among central bankers, where an increase in the policy rate is generally viewed as *contractionary*. And yet as noted earlier, one of Svensson’s suggestions for a foolproof monetary stimulus involved *higher* nominal interest rates, even in the short run. Thus, we need to reconcile the two views.

Market monetarists are associated with a bundle of ideas including an advocacy of nominal GDP targeting, a preference for using market prices as a guide to monetary policy, and a high degree of optimism regarding the effectiveness of monetary policy at the zero bound. Because of this optimism, the monetarists are more likely to blame demand-side recessions on the failure of monetary policy (often errors of omission) rather than on exogenous shocks to the economy. As this study will show, market monetarism also has important connections with the Princeton School.

5a. Interest Rates as a Policy Instrument and Indicator

A 2015 paper by Mariana Garcia-Schmidt and Michael Woodford criticized the NeoFisherian model. They began by discussing the fact that countries with persistently low nominal interest rates, such as Japan, often also experience relatively low rates of inflation, but then they cautioned against drawing any causal implications from this fact:

But some have proposed an alternative interpretation of these experiences, according to which low nominal interest rates themselves may cause inflation to be lower. In this

¹³ John Cochrane (2015, 2017) has extensively discussed this view (albeit without necessarily endorsing the idea), as has Stephen Williamson (2016).

view, the monetary policy reactions to these crises may have actually prolonged the disinflationary slumps by creating disinflationary expectations. Under such a view, actually promising to keep interest rates low for a longer period than would otherwise have been expected—as both the Fed and a number of other central banks have done in the recent period—would be the worst possible policy for a central bank worried that inflation will continue to run below its target, and some (beginning with Bullard, 2010, and Schmitt-Grohé and Uribe, 2010) have proposed that such a central bank should actually raise interest rates in order to head off the possibility of a deflationary trap. As the period over which the U.S. has kept its federal funds rate target near zero has continued, views of this kind, that some have taken to calling “neo-Fisherian,” have gained increasing currency, at least on the internet.

At first glance, the NeoFisherian hypothesis might seem reminiscent of the traditional monetarist critique of using low interest rates as an indicator of easy money. Here’s Milton Friedman in 1997:

Low interest rates are generally a sign that money has been tight, as in Japan; high interest rates, that money has been easy. . . .

After the U.S. experience during the Great Depression, and after inflation and rising interest rates in the 1970s and disinflation and falling interest rates in the 1980s, I thought the fallacy of identifying tight money with high interest rates and easy money with low interest rates was dead. Apparently, old fallacies never die.

Notice the use of past tense in the claim that “money has been easy.” In a monetarist model, an easy money policy will initially reduce interest rates because of the liquidity effect, but it may eventually push rates higher because of the Fisher effect. But the NeoFisherian proponents make a much more radical claim—that a persistent reduction in interest rates is itself disinflationary.

In the previous section, one of Lars Svensson’s proposals for escaping from a liquidity trap was seen to actually involve higher nominal interest rates, *even in the short run*, which is consistent with the NeoFisherian hypothesis. Conversely, Svensson is clearly not an adherent of NeoFisherism. And, indeed, seemingly NeoFisherian policy outcomes can occur in a wide variety of New Keynesian models. So how can the two views be reconciled? Why do New Keynesians reject the NeoFisherian view of causality between interest rates and inflation?

To compare NeoFisherism with the mainstream view, consider a monetary shock at time = t that is expected to produce each of two paths (see figures 5 and 6) for the exchange rate.

Figure 5: Exchange Rate Path 1 after Announcement

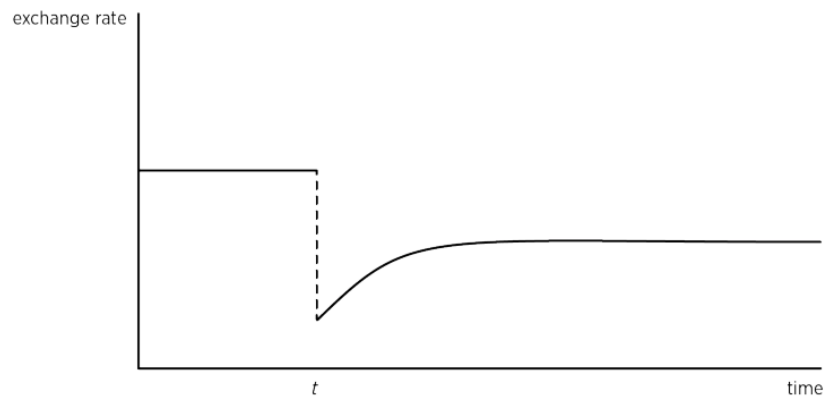
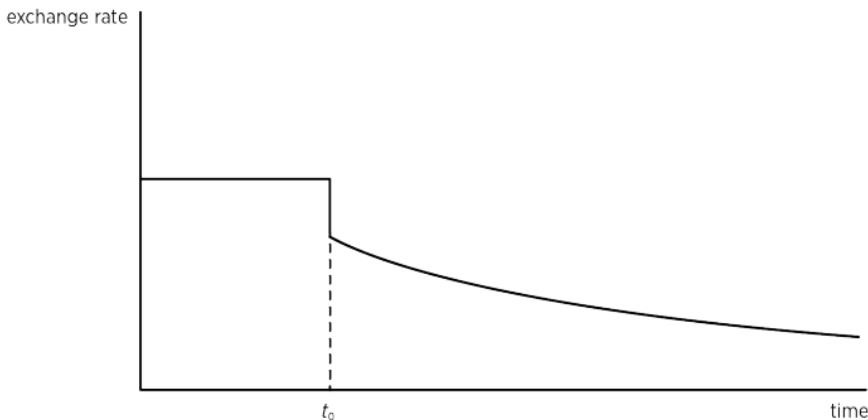


Figure 5 illustrates the famous Dornbusch overshooting model (1976), where an expansionary monetary shock depreciates the exchange rate in the long run, thus producing higher expected inflation. But it also leads to lower nominal interest rates, thereby producing an expected appreciation in the currency after the initial overshoot to the downside. This case is consistent with the mainstream view that lower interest rates represent an inflationary monetary policy. An example occurred in March 2009 when the Fed's first QE announcement pushed the dollar sharply lower against the euro. At the same time, US interest rates fell relative to foreign interest rates. Because of the interest parity condition, the declines meant that the spot exchange rate for the dollar fell more sharply than did the forward exchange rate.

Figure 6: Exchange Rate Path 2 after Announcement



In case 2, illustrated in figure 6, the exchange rate also falls on the policy announcement. But this time the exchange rate is expected to fall farther over time. According to the interest parity condition, the domestic nominal interest rate must then increase. This increase leads to a NeoFisherian outcome, where higher nominal interest rates coincide with higher expected rates of inflation. This scenario might occur when a political shock in a developing country (say fear of a populist government) leads to a sharp currency depreciation combined with higher domestic interest rates.

Garcia-Schmidt and Woodford (2015) are skeptical of the NeoFisherian view, particularly as a guide to policy in the United States:

Is there, then, reason to fear that a commitment to keep nominal interest rates low for a longer period of time will be deflationary, rather than inflationary? There is one way in which such an outcome could easily occur, and that is if the announcement of the policy change were taken to reveal negative information (previously known only to the central bank) about the outlook for economic fundamentals, rather than representing a pure change in policy intentions of the kind analyzed above. This may well have been a problem with the way in which “date-based forward guidance” was used by the U.S. Federal Reserve during the period 2011–12, as discussed by Woodford (2012); but it is not an inherent problem with announcing a change in future policy intentions, only with a particular way of explaining what has changed.

If we return to Svensson's proposal for the Japanese to create inflation by devaluing and then pegging the yen to the dollar, we can see one other reason that a NeoFisherian outcome could occur—without any necessary causal implications for the higher nominal interest rates. In that example, the central bank did not have private information about economic fundamentals, but it did have private information about *its own future policy* regarding the exchange rate.

A good example of this phenomenon occurred in Switzerland in January 2015. After pegging the Swiss franc to the euro at a fixed rate for a period of three and a half years, the Swiss National Bank (SNB) unexpectedly allowed the franc to sharply appreciate. At the same time, the SNB reduced the policy interest rate by 50 basis points. This reduction in the Swiss interest rate (to a level even below the eurozone interest rate) led to expectations of further Swiss currency appreciation. One might almost call the two Swiss policy moves a *foolproof way of remaining in a liquidity trap*. The SNB produced lower interest rates via the Fisher effect, resulting in tighter money.

It is misleading to talk about the effect of a change in interest rates without first examining what caused the interest rate to change, just as it is misleading to discuss the effect of a change in the price of a good without first considering whether the price change was caused by a shift in supply or a shift in demand. A fall in the nominal interest rate can occur with an expansionary monetary policy, but it can also occur in response to a set of policy signals from a central bank that led market participants to expect disinflation, as in the Swiss case.

As this paper will show, many of the points of disagreement between the Princeton School and market monetarists revolve around the question of how to interpret interest rates and the stance of monetary policy, and hence how to think about the role of central banks in the business cycle.

5b. Monetary Policy Effectiveness Pessimism

Market monetarists share a number of views with the Princeton School. Following Krugman, market monetarists acknowledge that temporary monetary stimulus is mostly ineffective and that effective monetary stimulus requires a commitment to higher future inflation or NGDP growth (see Beckworth 2017). Like Woodford, they believe that NGDP level targeting is reasonably close to the optimal policy (see Beckworth 2019). Like Eggertsson, they believe that FDR's decision to devalue the dollar was much more important than contemporaneous changes in the money supply or interest rates (see Sumner 2015). Like Svensson, they advocate forecast targeting (see Sumner 2016). And their explanation of the Great Recession in the United States is eerily similar to Bernanke's diagnosis of Japan's policy failures during the 1990s (see Sumner 2021).

Perhaps the biggest difference between the two groups revolves around the question of what causes modern business cycles. Mainstream economists often see business cycles as being caused by demand shocks, and they view the Fed as an institution with a responsibility to come in and clean up the mess after instability occurs in the broader economy. Market monetarists also see business cycles as being mostly demand driven (COVID-19 excepted), but they see the demand instability as being *caused by bad central bank policies*.

Princeton School economists are probably somewhere in between, seeing business cycles as being initially caused by exogenous shocks, but also putting some of the blame on central bank policy regimes that are not sufficiently history dependent.

Paul Krugman was often critical of Fed policy during the 2010s and yet frequently argued that whereas earlier US recessions had been caused by tight money policies, recent recessions (including 2008) were caused by investment shortfalls after the bursting of asset bubbles.

Those differing perspectives have echoes of an earlier dispute over the causes of the Great Depression. Up until the mid-1960s, most economists assumed that the Great Depression was evidence of the inherent instability of capitalism and that monetary policy had been largely accommodative during the Depression. This view largely reflected the fact that nominal interest rates had been very low throughout most of the 1930s.

The standard view of the Depression was challenged by Friedman and Anna J. Schwartz in their highly influential *Monetary History* (1963, 1971). They argued that the Fed erred in allowing a large decline in the monetary aggregates and that this error turned a mild recession into a major depression. Indirectly, they were also challenging the hypothesis that a market economy is inherently unstable. Market monetarists made a similar claim about the Great Recession, although they focused on the sharp decline in NGDP growth expectations and not on the monetary aggregates.

At an event celebrating Friedman's 90th birthday, Bernanke (2002) seemed to acknowledge that the Fed was mostly to blame for the Great Depression:

Let me end my talk by abusing slightly my status as an official representative of the Federal Reserve. I would like to say to Milton and Anna: Regarding the Great Depression. You're right, we did it. We're very sorry. But thanks to you, we won't do it again.

As far as I know, none of the Princeton School economists blame the Fed for causing the early stages of the Great Recession—nor do most mainstream economists. But why not? One possibility is that economists distinguish between errors of commission and errors of omission. In 2008, the Fed cut interest rates, and in 2009 it engaged in quantitative easing. Economists who focus on those concrete steps might argue that the Fed didn't cause the recession; at worst, the Fed didn't do enough to moderate the slump.

Conversely, one could make a similar errors of omission argument about Fed policy in the 1930s. Indeed, Krugman suggested that Friedman and Schwartz had overstated the Fed's role in causing the Depression, pointing to the fact that the Fed actually increased the monetary base sharply during the 1930s and that the decline in the broader monetary aggregates reflected a fall in the money multiplier.¹⁴ Something similar happened in Japan in the decade after 2000 when large increases in the monetary base had only a small effect on the broader monetary aggregates.

Indeed, a breakdown in the money multiplier is one implication of Krugman's (1998) paper; unless the central bank can boost long-term inflation expectations, QE will not merely fail to boost the overall economy, it will not even boost the monetary aggregates. Thus, it is not clear that the errors of omission versus commission distinction can explain why the Fed's performance in the Great Recession is widely seen as being far superior to its performance during the Great Depression.

This isn't to suggest that the Fed's performance in 2008 was no better than in the early 1930s, rather that the profession doesn't seem to have a consistent criterion for evaluating the role of central banks in causing business cycles. What does a central bank-caused recession look like?

The question of the Fed's role in the business cycle raises some very difficult issues of causality, where terms like *policy stance* and *errors of omission* have unclear meaning. One year after his speech honoring Friedman, Bernanke (2003b) spoke of the difficulty of measuring the stance of monetary policy:

The imperfect reliability of money growth as an indicator of monetary policy is unfortunate, because we don't really have anything satisfactory to replace it. As emphasized by Friedman . . . nominal interest rates are not good indicators of the stance of policy. . . . The real short-term interest rate . . . is also imperfect. . . .

¹⁴ Krugman (2007) actually made two arguments. First, the Fed might not have been able to offset the decline in the money multiplier. Second, later in his life Friedman oversimplified what was a fairly nuanced account in the *Monetary History*. I'm not convinced by either claim, but these are complex issues with no easy answers.

Ultimately, it appears, one can check to see if an economy has a stable monetary background only by looking at macroeconomic indicators such as nominal GDP growth and inflation.

The fact that we don't have an unambiguous indicator of the stance of monetary policy means that it is not clear how to evaluate the role of the central bank in the business cycle. If there were a single widely accepted monetary policy indicator, then the question of whether the private economy is inherently unstable could be resolved by looking at how the economy behaved when monetary policy is in some sense stable, or neutral. But during periods when the central bank does not change the money supply, the interest rate will fluctuate. If the interest rate is held stable, then the money supply will fluctuate. Bernanke pragmatically defines a stable monetary policy in terms of inflation and NGDP growth, but those criteria also make it almost a tautology that central bank policy failures are a major cause of demand-side recessions.

Here is Nick Rowe (2012):

Some people argue about whether the macroeconomy is inherently stable or unstable. I don't think that's a very useful question. Because . . . it depends. And one of the things it depends on is monetary policy. And that *is* a useful discussion to have, because we can actually *do something* about monetary policy.

To see why the errors of omission perspective is not a useful way to think about monetary policy, consider the following thought experiment. Imagine that an economic crisis in Mexico during the mid-1990s led to a big increase in the demand for US currency notes. Also suppose the Fed did not accommodate that demand, keeping the monetary base relatively stable; as a result, interest rates soared much higher, pushing the US economy into recession.¹⁵ Would people call that an error of omission because the Fed didn't actually do anything to the monetary

¹⁵ Note that the thought experiment uses the period before the Fed began paying interest on reserves, which would change the result.

base? Probably not. The Fed would be widely blamed for raising interest rates sharply. What looks like an error of omission from one perspective looks like an error of commission if a different policy indicator is used.

So then why do Princeton School economists and market monetarists differ about the role of Fed policy in the Great Recession? Ultimately, this is a dispute about what the Fed can do. It makes no sense to blame the Fed for causing recessions if it lacks the tools to prevent them. Therefore, the issue of Fed culpability hinges on how one thinks about what type of policy could have been successfully implemented. Market monetarists are somewhat more optimistic than are Princeton economists (and are far more optimistic than are most mainstream economists) about the question of the extent to which the Fed could have prevented a serious recession in 2008 with a more expansionary monetary policy.

In the first section, this paper showed that Krugman's 1998 model had two interpretations. The more optimistic (New Keynesian) interpretation suggested that a central bank could boost aggregate demand by committing to higher future inflation, even at the zero bound. Subsequent research showed that this move might take the form of a price-level or NGDP-level target path. The more pessimistic (old Keynesian) interpretation emphasized the difficulty in convincing the public that a conservative central bank would wish to push inflation higher in future years—the time inconsistency problem. According to this view, a central bank may be unable to stimulate the economy at the zero bound.

The market monetarist hypothesis can be seen as a fairly extreme version of the optimistic interpretation of Krugman 1998. Recall that in 1999 Krugman was highly critical of the Bank of Japan for not being more aggressive, and he was somewhat skeptical of the need for fiscal stimulus. In the same year, Bernanke wrote his critique of Japanese monetary policy, essentially

blaming the BOJ for the problem of deflation. Both articles were written at a time when New Keynesian economics was near its peak of influence among Western economists.

Over the next two decades, however, mainstream opinion became much more skeptical of the efficacy of monetary stimulus at the zero bound. This skepticism can be attributed partly to the fact that the zero-bound problem began to seem less like a temporary phenomenon facing only one country and more like a long-term problem facing many developed economies. Equilibrium interest rates in developed economies have been trending lower for decades, with no end in sight. And the failure of some large QE programs to boost inflation led to even more pessimism about monetary policy, which increased economists' interest in fiscal stimulus.

So why do the market monetarists see the empirical evidence differently? Why do they continue to view monetary policy as being highly effective at the zero bound? Recall that Bernanke had argued that if monetary policy actually were ineffective at the zero bound, then a central bank could buy up an unlimited quantity of assets without creating inflation. The Bank of Japan could print yen and buy up the entire world. Conversely, the BOJ has purchased an extraordinarily large quantity of assets, including equities, without creating much inflation. Eggertsson and Kevin Proulx (2016) looked at this problem and reached the following conclusion:

We first show that, at least in theory, open market operations in real assets can be a useful tool for overcoming a liquidity trap because they change the inflation incentives of the government, and thus change private sector expectations from deflationary to inflationary. We argue that this formalizes Ben Bernanke's arbitrage argument for why a central bank can always increase nominal demand, despite the zero lower bound. We illustrate this logic in a calibrated New Keynesian model assuming the government acts under discretion. Numerical experiments suggest, however, that the needed intervention is incredibly high, creating a serious limitation of this solution to the liquidity trap. Our experiments suggest that while asset purchases can be a helpful commitment device in theory, they may need to be combined in practice with fiscal policy coordination to achieve the desired outcome.

Their study provides strong support for the widespread pessimism about monetary policy at the zero bound among mainstream economists. But this sort of analysis needs to be interpreted with caution. Eggertsson and Proulx are not arguing that monetary stimulus at the zero bound would necessarily require unrealistically large asset purchases. In their model, it is still true that commitments to produce future inflation can be highly effective. Rather, they suggest that if central banks are unable to commit to higher future inflation, then the sort of *brute force* approach of unlimited QE discussed by Bernanke and others might require asset purchases many times larger than GDP, which would presumably impose unacceptable balance sheet risks on the central bank. As a result, monetary policymakers may need assistance from fiscal policy.

To better understand this issue, consider the recent case of Japan. After Prime Minister Abe took office in 2013, the BOJ engaged in a more aggressive policy of monetary stimulus, including massive asset purchases that have increased their balance sheet to more than 140 percent of GDP. And yet inflation rose only very slightly, averaging below 1 percent. Given those facts, how large would the BOJ balance sheet have to be in order to push Japanese inflation up to 10 percent? How many more assets would the BOJ need to purchase?

I don't see any definitive way of answering this question. In models where the effects of QE are linear, the answer would presumably be a very large figure. But this answer cannot be the entire story, because a policy that successfully raised inflation to 10 percent would certainly raise nominal interest rates well above zero. If the BOJ were to refrain from paying interest on bank reserves, then this sort of inflation would cause the demand for base money in Japan (both currency and reserves) to fall sharply, probably from 140 percent to below 10 percent of GDP. So the answer to the question "How much QE would it take for the BOJ to generate 10 percent inflation?" might well be "less than zero." As soon as the public understood that the BOJ would

buy as many assets as required to generate high inflation, the demand to hold yen would fall sharply.

Eggertsson and Proulx rule out this sort of regime change by focusing on the case where central banks fail to use the expectations channel. It is hard to fault them for this assumption given that the BOJ has already boosted its balance sheet by an extraordinarily large amount, without meaningfully shifting inflation expectations. But I worry that their analysis may be misinterpreted. A central bank that adopts a whatever-it-takes approach to using QE to boost inflation will succeed in shifting inflation expectations if the policy is credible. In that case, the amount of QE required will be much lower than the figures cited by Eggertsson and Proulx.

In the previous thought experiment, I assumed policy success and then worked backward to consider the demand for base money if the Japanese public were actually convinced that the central bank would do whatever it took to create high inflation. In contrast, Eggertsson and Proulx assume a skeptical public and estimate how many assets a central bank would need to purchase if it were unable to create expectations of higher future inflation. These are two quite different approaches that use different baseline assumptions. It is not just a question of policies having nonlinear effects; the bigger problem is that there are multiple equilibria, and seemingly ineffective policies can suddenly become highly effective if they can coordinate the public's expectations on a new equilibrium.

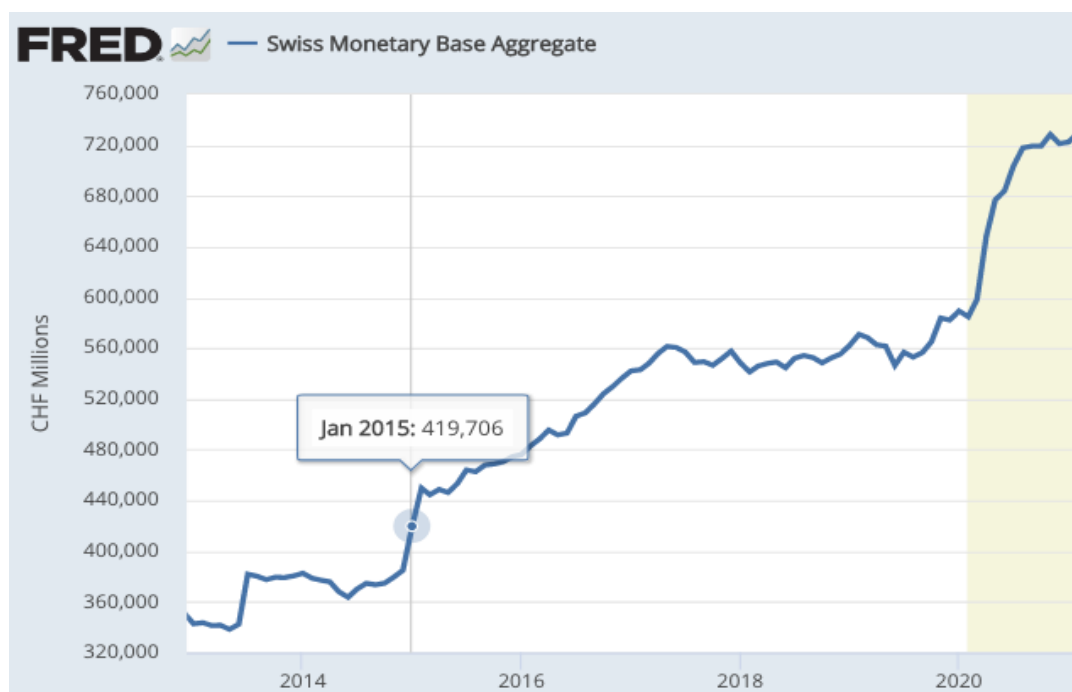
The difference between those two perspectives is easier to see in Eggertsson and Proulx's interpretation of recent policy in Switzerland:

As another example, the Swiss National Bank bought foreign currency on the order of 90 percent of GDP in order to fight deflation during the crisis, leading to an 800 percent increase in its money supply [monetary base]. They eventually abandoned this policy since the magnitudes involved had become so high that the central bank faced strong political pressures to do so. The effect of this policy on the price level was negligible at

best, although for a while the Swiss National Bank did manage to prevent an appreciation of the Swiss franc relative to the Euro.

Market monetarists have a very different interpretation of that episode. In the view of market monetarists, the Swiss balance sheet has become unusually large mostly because investors correctly understand that the Swiss franc will be allowed to gradually appreciate over time, making the franc an attractive asset (see Sumner 2020). Much of the balance sheet increase occurred at the beginning of 2015, when investors correctly anticipated that the SNB was about to abandon the exchange peg that had held for three and a half years, and also in subsequent years when the franc was allowed to float. (See figure 7.) Today, the decision to break the peg looks like an unforced error. In contrast, the Danish central bank did not give in to speculative pressure in early 2015, and demand for Danish krone subsided once investors realized that their currency would not appreciate.

Figure 7. The Swiss Monetary Base



Source: Swiss National Bank, Swiss Monetary Base Aggregate, retrieved from FRED, Federal Reserve Bank of St. Louis.

Mainstream economists see ultra-low interest rates and large QE programs as a sign of extreme monetary stimulus, and then they ask how much more it would take to actually hit a 2 percent inflation target. Market monetarists see ultra-low interest rates as a side effect of extremely low inflation and excessively tight money, and they see the large central bank balance sheets as reflecting the high demand for base money when the opportunity cost of holding cash and reserves falls to zero. They point to countries such as Australia, which never cut rates to zero (and thus avoided QE) during the Great Recession, *precisely because their monetary policy was more expansionary than in the United States and Europe*, allowing for higher trend rates of NGDP growth.

The point here is not that Eggertsson and Proulx are wrong; there are very good arguments to be made on both sides of the issue, and recent history tends to support their pessimism about the ability of QE to be effective unless accompanied by regime change. Rather, the thought experiments demonstrate the sensitivity of this issue to assumptions about what determines policy expectations. In the world of the zero lower bound, successful central banks can do much less in the form of concrete steps and still get by if they can convince the public that their desire to inflate is genuine. That dependence on expectations makes it almost impossible to make hard-and-fast empirical claims about how much QE is necessary, how long interest rates must be held at zero, or how much assistance from fiscal policy is required. A BOJ promise to buy as many assets as necessary might itself shift expectations in the direction of higher trend inflation, and this rise could actually result in *higher* interest rates and a smaller monetary base.¹⁶

¹⁶ Uribe (2020) uses a New Keynesian model and “finds that 50 percent of the variance of inflation changes is accounted for by monetary shocks that induce positive short-run comovement in the interest rate and inflation.”

5c. Targeting the Market Forecast

In his 2019 paper advocating the policy of forecast targeting, Svensson insisted that central banks could not simply rely on market forecasts and would still need to rely on a structural model of the transmission mechanism to predict the effect of changes in the policy instrument:

The policymakers need to have a view or a “model” of the transmission mechanism and the determination of future inflation and unemployment.

In contrast, market monetarists advocate the targeting of an asset price linked to the policy goal, precisely because the true model of the economy is not understood. They view the market forecast of inflation or NGDP growth as the optimal forecast (see Sumner 2006).

Bernanke and Woodford (1997) provided a framework for reconciling the two approaches.

At first glance, the Bernanke and Woodford article seemed to support Svensson’s perspective:

An interesting possibility is that the central bank might target current private-sector forecasts of inflation, either those made explicitly by professional forecasters or those implicit in asset prices. . . . In a dynamic model which incorporates both sluggish price adjustment and shocks to aggregate demand and aggregate supply, we show that strict targeting of inflation forecasts is typically inconsistent with the existence of rational expectations equilibrium, and that policies approximating strict inflation-forecast targeting are likely to have undesirable properties. . . . We conclude that, although private-sector forecasts may contain information useful to the central bank, ultimately the monetary authorities must rely on an explicit structural model of the economy to guide their policy decisions.

They argued that targeting market forecasts of inflation would create a circularity problem.

If the markets knew that policy would be adjusted to keep inflation expectations on target, then market signals of inflation (such as TIPS spreads) would never deviate from 2 percent in the first place. The circularity problem occurs any time markets are watching policymakers to determine asset prices at the same time that policymakers are observing asset prices for guidance on policy.

Fortunately, not all market forecast targeting proposals suffer from a circularity problem.¹⁷ Rather, a number of market monetarist proposals envisioned the central bank pegging a CPI or NGDP futures price and then allowing the monetary instrument to adjust as needed to keep this asset price constant. In this sort of regime, the targeted asset price doesn't change and hence doesn't provide policy guidance. Rather, the market is implicitly predicting the *instrument setting required to achieve the policy goal*. It is analogous to a fixed exchange rate regime where the market is essentially telling the central bank the level of the monetary base and the short-term interest rate that will keep the price of gold or the foreign exchange rate pegged at a constant level.

Interestingly, Bernanke and Woodford (1997) also saw the advantage of this approach:

However, these conclusions do not rule out the productive use of private-sector forecasts in policy making. One can again show that, if forecasters make predictions of variables other than inflation, the central bank may be able to use the information implied by these additional forecasts even if the additional variables being forecasted do not enter the central bank's loss function. For example, suppose that there are available private-sector forecasts of the short-term nominal interest rate, as well as of inflation.

The information that is actually of value to policymakers is not the unconditional private sector forecast of inflation; rather, it is the forecast of the policy instrument, *conditional on the inflation forecast being on target*. The central bank wishes to know what interest rate setting is most likely to produce 2 percent inflation.

Ironically, Svensson's (2003a) proposal for a foolproof method of escaping a liquidity trap also (implicitly) relied on targeting the market forecast, or at least targeting an asset price closely linked to the market forecast of inflation:

[W]hy would the peg induce expectations of a higher future price level? Once the peg is credible, since the expected exchange-rate path has shifted up by the initial depreciation, the private sector must believe that the future exchange rate will be higher. But then

¹⁷ Note that I (Sumner 1989, 2016) proposed targeting an NGDP futures contract, and Kevin Dowd (1994) proposed targeting a CPI futures contract. Neither of us recommended that the central bank look at changes in a volatile asset price for policy guidance, and hence both avoided the circularity problem.

internal consistency requires that the private sector must also expect a higher future price level (since they have no reason to believe that the future relative price between domestic and foreign goods will move in any particular direction). Thus, the initial depreciation, the credible peg and internal consistency forces the private sector to expect a higher future price level.

Svensson is saying that there is no good reason to expect the real exchange rate to either appreciate or depreciate over time. In that case, a forecast of future inflation is roughly equivalent to a forecast of the future nominal exchange rate. And because of the interest parity condition, controlling the current exchange rate is equivalent to controlling the future expected exchange rate.

In practice, central banks are unlikely to adopt the market monetarist proposal to simply peg the price of CPI or NGDP futures contracts. However, central banks already rely to some extent on market forecasts for policy guidance. Here's Richard Clarida (2020):

Market- and survey-based estimates of expected inflation are correlated, but, again, when there is divergence between the two, I place at least as much weight on the survey evidence as on the market-derived estimates.

As noted earlier, the Fed cut interest rates three times in 2019, despite a booming economy, mostly for forecast targeting reasons. In this case the Fed decision was at least partly based on *market* forecasts, because sharp declines in various asset markets during the trade war with China provided a signal of a slowdown in manufacturing and investment.

In my view, modern central bank policy is moving increasingly in the direction of forecast targeting, with the specific approach being somewhere between Svensson's structural modeling approach and the market monetarist's target-the-market-forecast approach.

6. Future Prospects for the Princeton School

Dramatic changes in the macroeconomic environment invariably lead to changes in macroeconomic theory and policy. The Great Depression led to Keynesian economics, and the

Great Inflation gave increasing prominence to monetarist ideas. In the 21st century, the decline in equilibrium interest rates to zero or below has forced economists to rethink the issue of stabilization policy.

The Princeton School has played by far the most important role in rebuilding monetary theory for a low interest rate environment, with Krugman's 1998 paper providing the essential framework for much of the subsequent research. Going forward, it is useful to think about two questions. First, to what extent will the Princeton School influence real-world monetary policymakers? Second, how will we know whether those ideas are effective?

There are already some answers to the first question. The Fed's recent decision to adopt average inflation targeting was clearly influenced by Krugman's paper and also by subsequent level targeting proposals by Eggertsson, Woodford, and Bernanke. The new policy isn't precisely level targeting, but it is quite possible that the Fed has informally decided to adopt temporary price-level targeting, while preserving the more familiar "inflation targeting" label. There is also some evidence that the Fed is moving away from the Taylor rule approach and toward Svensson's forecast targeting framework, particularly in its 2019 decision to aggressively cut interest rates during a period of 3.5 percent unemployment.

If the policy recommendations of the Princeton School are successfully implemented by central banks, then inflation should be averaging close to 2 percent over the 2020s, and some moderation in the business cycle should be present. It may be difficult to isolate the effect of a new monetary regime, however, because there has also been a recent change in the consensus view on fiscal policy. During the 1990s and first decade after 2000, there was great skepticism as to the efficacy of fiscal policy in an environment where central banks were targeting inflation at 2 percent. Since 2008, governments have become increasingly willing to use fiscal stabilization

policy; during the COVID-19 recession, the size of the fiscal stimulus in the United States was unusually large, even as a share of GDP.

Policymakers seem increasingly drawn to a sort of belts-and-suspenders approach to stabilization policy, where there is aggressive use of both monetary and fiscal policy. Thus, aspects of both the old and New Keynesian interpretations of the Krugman 1998 paper are having an influence on policy. In this new regime, policymakers commit to higher future inflation during a zero-bound episode, and they accompany that policy with fiscal stimulus in case the expectations channel for monetary policy is not sufficient.

As shown in my study, Krugman's 1998 paper can be interpreted as being relatively optimistic or pessimistic about the effectiveness of monetary policy at the zero bound, depending on one's assumptions regarding the ability and willingness of central banks to adopt bold regime change. Although it's not entirely clear which interpretation of monetary policy efficacy will win out in the long run, it is almost certain that the approaches to monetary policy developed by Krugman and his colleagues at Princeton will continue to shape monetary theory and policy in the 21st century.

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