

Did We Avoid 'It'?
And Other Mid-Recovery Questions

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In 2002, junior Governor Bernanke of the Federal Reserve gave a speech with the title *Deflation: Making sure 'It' doesn't happen here*, echoing Minsky's earlier title, *Can 'It' happen again?* Bernanke's speech seems to argue that central banks have sufficient tools to answer Minsky in the negative. Before issues about the proper answer, though, comes prior question: Just what is 'It'? Bernanke's version includes deflation, to be sure, but does avoiding deflation, avoid the costs that often accompany it?

We are far from the end of the current episode, and cannot definitively say much about these topics. Nonetheless, we are now roughly a dozen years after the excesses starting emerging and half a dozen years after the critical phase of the crisis. It is, thus, a reasonable time to start assessing how policymakers have done so far: Did we avoid 'It'? And could we do better next time? This paper takes up three such questions,

- 1 Was Bernanke right that a central bank can always avoid deflation?
- 2 Was forward guidance Delphic, Odyssean, or other?
- 3 Do large scale asset purchases provide accommodation in practice? And in theory?

To clarify at the outset, I will not answer these questions. Instead, my goal is to clarify several ambiguities in a way that I think is essential to making best progress on the answers. More specifically, I see some substantial gaps between standard policymaker and researcher perspectives on these questions, and I believe that resolving these differences would itself represent material progress. I also argue that the standard toolbox that economists bring to these questions may tend to deflect attention away from important candidate answers. The paper concludes with a suitably modified set of questions. The analysis starts with careful consideration of the claims in Bernanke's argument and then turns to what the events since that time have revealed.

1 Can a central bank always avoid deflation?

Bernanke asserted,

I am confident that the Fed would take whatever means necessary to prevent significant deflation in the United States and, moreover, that the U.S. central bank, in cooperation with other parts of the government as needed, has sufficient policy instruments to ensure that any deflation that might occur would be both mild and brief.

In the (2002) speech, he argued that the best defense was avoiding deflation, but that if the risk of deflation rose uncomfortably high, the Fed, or any central bank,¹ had a wide array of tools that could stimulate upward movement in prices—even if usual policy interest rate were near the zero lower bound (ZLB²). Most prominent among these tools were forward guidance to affect the expected future path of the short-term policy interest rate, and purchases of longer-term securities intended directly to push up longer-term bond prices.

In the wake of the crisis, the central banks of the major economies most directly affected, the U.S., U.K., and euro area, employed a range of variations on the family of tools described by Bernanke. While there have been, and continue to be, serious concerns about deflation, none of these countries has experienced more than brief and fairly mild deflation. For example, core inflation and proxies for long-term inflation expectations have been quite steady in the U.S., and overall inflation seldom fell below zero (Fig. 1). Inflation in the U.K. has generally been well away from zero, and euro-area inflation has very seldom been negative (Fig. 2). Recent history does provide some problematic cases, such as Japan, however, which I think require us to sharpen the question a bit.

¹Although here we must be careful about specific legal authorities.

²In light of recent events, ZLB in this paper will be taken to mean what is perceived as the effective lower bound

1.1 Can a single-minded central bank avoid deflation?

In practice, discussions of deflation sometimes convey the impression that deflation exerts a tragic pull into some horrible morass.³ I think this perspective is not strongly grounded in evidence or theory, but instead should be viewed as a sort of folk wisdom akin to ancient map makers putting ‘Beyond here there be dragons’ at the edge of maps. The explicit claim is not well founded, but the message correctly conveys that exploring these regions would be risky—the sort of endeavor only warranted by the prospect of substantial gain.

While some economists see such a rationale for deflation (for example, in the logic of the Friedman rule⁴), this paper is written from the perspective that deflation is at best extremely risky viewed through the lens of all of the conventional goals of central banking—e.g., stable prices, robust sustainable growth, and financial stability. In this perspective, a central bank should aggressively and single-mindedly avoid deflation when the risk becomes prominent. Put this way, it is interesting to consider whether history provides us *any* examples of central banks single-mindedly fighting deflation, but nonetheless being drawn into sustained and harmful deflations.

I have couched this strictly as an empirical claim. I interpret Bernanke’s claim this way, and not as an attempt to explain an analytic certainty—economists have created models in which the central bank cannot avoid deflation. Thus, the focus will be on whether it is a robust empirical regularity that single-minded central banks can avoid deflation.

Bordo and Filardo (2005) nicely summarize the historical record, which provides many examples of deflation, including extended mild deflations. These episodes have been associated with a wide range of outcomes, which Bordo and Filardo entertainingly categorize as the good, the bad, and the ugly.⁵ One thing that is clear from this record

³Bernanke (2002) is careful to avoid this characterization, emphasizing that we do not understand deflation very well.

⁴The rule, discussed more fully below, stating that welfare considerations recommend nominal interest rates be set to zero

⁵The good and bad are more are cases where deflation is associated with a range of outcomes typical even in absence of deflation; the ugly, of course, include deep recessions, depressions, and crises.

is that many of the deflations were deliberate policy choices. Many deflations, for example, were the natural outcome of the gold standard, as the monetary gold supply fluctuated relative to the needs of the economy. Several deflation episodes, including some ugly ones, were driven by a government decision to move the price level down in order to return to the gold standard at some parity that had earlier been abandoned. In other cases, some of which are ugly, the deflation was not a deliberate choice, but it is clear that the central bank was not placing an emphasis on avoiding deflation. For example, while analysts differ on various aspects of the very ugly 1936-1938 episode in the U.S., I think nobody would argue that a sharp rise in reserve requirements, or the fiscal policy at the time, constituted aggressively avoiding deflation (Friedman and Schwartz, 1963; Eggertsson, 2008; Romer and Romer, 2013).

Arguably, history gives us little reason to doubt the claim that a determined central bank can avoid deflation. In short, Bernanke was right. The reason I stress this is to shift the focus of our attention to what may be a more important question.

1.2 If Bernanke was right, why have we been so miserable?

Bernanke's speech gives a clue about one thing that seemed to go differently from what he expected:

Deflation of sufficient magnitude may result in the nominal interest rate declining to zero or very close to zero. . . Deflation great enough to bring the nominal interest rate close to zero poses special problems for the economy and for policy.

The ZLB, it seems, would bind when the deflation became sufficiently deep. In the recent experience, inflation and inflation expectations in the U.S., for example, have been remarkably steady (Fig. 1). The Fed, however, lowered the policy interest rate to the ZLB where it remains more than 6 years later. Over this period, the *ex ante* real returns on nominally risk-free Treasury securities at the shortest maturities have been substantially negative, and implied real rates have been negative or near zero over a significant range of maturities. This has been associated with disappointing real-side outcomes. Similar claims apply to the U.K. and euro-area.

Perhaps the question we should be focusing on is something like the following: In the wake of a financial crisis, should lowering interest rates to zero and avoiding a drop in inflation and inflation expectations be sufficient to avoid the slump often associated with ‘It’?

This is not a question about deflation, but one about the effects of real interest rates in the wake of a crisis. Further, it is implicitly a question about whether the stability cushion provided by a 2 percent inflation target is sufficient. Would anchoring inflation 100 or 200 basis points higher—allowing for real rates 100 or 200 basis points more negative—would have made a material difference?

In standard DSGE models, the inevitable logic of Euler equations tends to dictate that one can push growth about where you like if you control the real return on nominally risk free bonds. But we are considering a question for which these models were not designed: What is the efficient transition path back to *normal*, after being deflected far from normal? Further, we must take account of unwinding the misallocations accumulated in the run up to the crisis, as well as the ongoing reworking of the financial system, and a fiscal contraction.

In this context, I think it is reasonable to investigate whether pushing harder on negative real rates would have generated materially faster growth. And if so, would that have been efficient? While researchers have begun pursuing these angles, because they mainly involve the role of messy, nonstandard frictions away from steady state, I think they may not get enough attention. I believe these issues deserve at least as much focus as research positing that we are simply in a new bad steady-state—perhaps since well before the crisis, or perhaps having been pushed there by the crisis.

1.3 Some caveats and details

I have set aside the sustained deflation in Japan. I will only echo Bernanke’s message that the Bank of Japan arguably did not single-mindedly fight deflation at the onset of

the problems.⁶ As for Sweden’s recent period of deflation, I will note only that Svensson (2015) has questioned the single-mindedness of the Riksbank.⁷

One additional point is very important. I have followed Bernanke in only flirting with the role of fiscal policy. Bernanke’s claim about avoiding deflation included the potentially tricky clause, ‘in cooperation with other parts of the government as needed.’ It is clear that the fiscal authority can greatly affect deflationary pressures.⁸ Further, as Leeper (1991), Cochrane (1999) and Sims (1994) regularly remind us, monetary and fiscal policy are always and everywhere deeply intertwined. I have not attempted to disentangle them here. At a minimum, any claim about what a central bank can achieve must be tempered with the proviso that the fiscal authority not work too actively in the opposite direction.

2 Was forward guidance Delphic, Odysian, or other?

Setting aside whether a single-minded central bank could always avoid persistent deflation, the economies of the major central banks have, in fact, avoided it. Because these banks have also made unprecedented use of forward guidance and large scale asset purchases, it is natural to examine how they used these tools and question whether they were used effectively. Central banks and outside researchers have been actively pursuing these questions, but in my view we might miss the most important question by how we frame the problem.

By 2002, many authors were developing the idea that by operating through an expectations channel, a central bank constrained by the ZLB could nonetheless deliver some additional stimulus if it could credibly convey an intention to pursue a more

⁶We have yet to see whether recent more aggressive action will restore Japan persistently into the positive inflation zone. See Ahearne, et al., 2002 for a more complete discussion of the early responses. Further, note that this section and paper are mainly about avoiding persistent deflation and not about the additional challenges that might be entailed in ending a very long period of deflation.

⁷Also, I am focusing on the large economy case or the case in which the set of troubled economies is collectively large enough that relying on a large devaluation of the currency would be problematic. For a small economy in a large, healthy world, I agree with Svensson’s (2003) arguments about the use of devaluation.

⁸As, e.g., in 1937 and perhaps in the recent debates over the consumption tax increases in Japan.

stimulative policy at some point in the future than folks in the private sector would otherwise expect.⁹ Eggertsson and Woodford (2003) worked out the relevant theory most clearly. The basic idea is that at some point in the future, the ZLB is not expected to bind. If the CB convinces people that policy will, at that point, be more stimulative than formerly expected, then private sector expectations for inflation and output growth in the future will rise. Higher expected future inflation, all else equal, reduces the real rate on long-term securities. Higher future activity stimulates current consumption and investment through standard channels.

The Fed started forward guidance rather gingerly in 2008, stating that rates were likely to stay exceptionally low ‘for some time,’ but moved progressively to stronger and more elaborate guidance.¹⁰ The Bank of England and ECB followed similar paths, although the particular content of guidance varied considerably (Bank of England, 2013; Coeuré, 2013).

A great deal of research has investigated whether this guidance was credible in the sense that after the communication, the expected policy rate path was consistent with the guidance. While the results are somewhat mixed across the broad range of cases, it seems pretty clear that in some cases expectations moved after the communication in ways that appear consistent with the guidance.¹¹

To understand the lessons from this experiment, the literature has drawn a distinction regarding whether the guidance, in practice, was Odyssean or Delphic.¹² In the Odyssean case, the central bank is making a time inconsistent promise to deliver a future inflationary boom. When the time comes to deliver that boom, the central bank will have an incentive to take away the punch bowl before the promised party actually gets going.¹³ In Delphic forward guidance, the central bank is simply conveying its view that the economy will be worse than the private sector seemed to be expecting. Thus,

⁹Krugman, 1998; Reifschneider and Williams, 2000; and Eggertsson and Woodford, 2003.

¹⁰Engen, et al., 2015 review this progression in greater detail.

¹¹Engen, et al., 2015 provide a recent summary of this literature.

¹²Campbell, et al. 2012.

¹³The Odyssean label arises because success in carrying out this program will turn on whether the central bank can *bind itself to the mast* and avoid the siren song that draws central bankers to stifle parties.

under its reaction function, the policy path is likely to be more accommodative than previously expected. In both cases, the path of expected future spot rates moves down, but in one case this is associated with good news (we are going to throw a party), and in the other it is bad news (dark times lie ahead).

I believe that the correct answer to the ‘Delphic, Odysian, or other?’ question is very clearly ‘other.’ Consider first the Delphic view.

The Delphic view requires that private sector forecasters believe that the central bank has better information about the state of the economy than private sector forecasters and requires further that those forecasters have to extract that secret information from policy pronouncements. Central banks, however, are pretty forthcoming these days about their forecasts—central bankers more or less continuously make pronouncements on the state of the economy. Second, those forecasts tend to evolve smoothly, whereas the Delphic literature seems to require a significant jump being revealed at the time of the announcement. If there had been such a jump in the forecast, a transparent central bank would surely have explained it. I do not find a clear example—excluding those following the Lehman collapse in late 2008—where a change in forward guidance came with a significant and surprising update about the state of the economy.

Further, it is not clear that private sector forecasters do believe or should believe that the central bank has a significant informational advantage about anything other than its own deliberations. While some work finds that the Fed’s forecast outperforms private sector forecasts over some periods, for example, the advantage is generally so small as to be of questionable importance (e.g., Faust and Wright, 2009, 2013). The results for other central banks are generally no more favorable (e.g., Stockton, 2012). Tests of whether policy announcements are taken as signals about the state of the economy suggest not (Faust, et al., 2004).¹⁴

While the Delphic interpretation is problematic, the Odysian is more so. In light of

¹⁴To forestall a possible question, one might wonder why private sector agents would pay so much attention to the forecasts. One very plausible reason is that they believe that—independent of the quality of the forecast—the forecast conveys something about the beliefs of policymakers that may drive policy.

central banks' professed beliefs in transparency and of the importance of expectations in the Odyssean case, one might imagine that the central bankers would trumpet the likelihood of the coming inflationary boom. Quite to the contrary, policymakers have generally gone out of their way to deny that they were attempting to deliver any such thing.

Coeuré (2013) of the ECB governing council lays out this perspective,

The main challenge of such [Odyssean] guidance is its inherent inconsistency over time and thus lack of credibility. . . . This is a possible explanation why, in practice, central banks have refrained from using forward guidance in a way that implies a major change in strategy. Therefore, central banks forward guidance has rather aimed at providing greater clarity on the reaction function and the assessment of future economic conditions.

Bernanke and Yellen as chairs of the Fed never, to my knowledge, made Odyssean claims, but did reject the idea of intentional overshoots of inflation (Bernanke 2012b, Yellen 2014). FOMC member forecasts never showed a significant overshoot (Federal Reserve Board, various). Finally, the Fed has begun the trimming of accommodation and may soon raise interest rates. Little in the current Fed plans seems consistent with delivering a time-inconsistent boom; the policy does, however, seem broadly consistent with the forward guidance.

Setting aside Delphic and Odyssean guidance, what remains is the rather mundane possibility that the central banks were attempting to explain their evolving understanding of a broadly time consistent reaction function. In particular, they were explaining that this reaction function would dictate significantly more accommodation than the public seemed to be expecting.¹⁵ Note that this sort of guidance is good news from the standpoint of the public: the current outlook will be met by more accommodation than formerly expected. In rational expectations equilibrium, this sort of communication would have no role: everyone understands the decision rules of the central bank. But in practice, nobody had previously been in the post-2008 situation, and it is difficult

¹⁵Note: The Delphic case in Campbell et al., 2012, and other work is often taken as referring to policy under the normal times policy rule (as proxied, say, by a Taylor rule). Few would assert, however, that the normal times rule even approximately constitutes the optimal, time consistent response in the neighborhood of the ZLB (e.g., Yellen, 2015). Thus, the fact that the central bank is communicating a rule that is different from usual need not imply that it is time inconsistent.

to know how agents would have converged on a correct view of the time consistent use of nontraditional tools. Indeed, I think there is no consensus in the profession on this issue even now.

Thus, I think the historical record is pretty clear that central banks did not attempt Odysian guidance. This is potentially immensely important in that the theoretical work suggests that Odysian guidance can greatly lower the costs of periods at the ZLB . If one mistakenly interpreted recent cases as Odysian, one might well falsely determine that the theory exaggerates the benefits.

This raises questions as to why central banks did not attempt such guidance. Well before the crisis, central bankers were expressing considerable doubt over whether Odysian guidance could be credible (e.g., Borio, et al., 2003). According to the minutes of the Fed, the favorable model-based results both on Odysian guidance and its implementation through price level or nominal income targeting were considered by the FOMC. They appear to have been rejected at least in part due to these credibility issues (Federal Reserve Board, 2011).

A key issue may be that the policymaking boards currently have neither the masts nor the rope required to bind themselves. For example, it is not clear under the current governance of the FOMC that it is appropriate for one FOMC to dictate to a future FOMC. It is clear, I think, that such dictates would carry no official force. Outside the Fed, with its fairly symmetric dual mandate, the explicit mandates of some banks complicate the delivery of deliberate inflation overshoots. The ECB is to aim for inflation less than but close to 2 percent (European Central Bank, undated); the bank of England is to aim for 2 percent and ‘subject to that’ consider other goals (Bank of England, undated). The Chancellor of the Exchequer (2013) in commending the Bank of England’s adoption of forward guidance reminds that the 2 percent inflation goal remains ‘at all times.’

Can we make a convincing case that promises about cyclical policy years in the future could be rendered credibly? Would this require revising central bank mandates and governance?

3 Do large scale asset purchases provide accommodation in practice? And in theory?

Many central banks around the world have engaged in a family of market interventions known as quantitative easing (QE). These have involved very large expansion of the balance sheets of many central banks.

There are many rationales for QE—restoring market function, restoring function of the monetary transmission mechanism, providing liquidity to the financial system. I will focus on the variant in which the central bank purchases large quantities of longer-term securities with the intention of directly driving up the market price. To distinguish it from other modes of QE, I'll refer to this form as large scale asset purchases (LSAPs).

The gulf between the common policymaker and academic views seems to be larger for LSAPs than for forward guidance. Revealed practice of the Fed, ECB, Bank of England, and others indicates a belief in the merits of LSAPs, whereas many academics are highly skeptical. The gulf here was never more in evidence than at the Jackson Hole conference in 2012, where Chairman Bernanke (2012) gave a vigorous defense of LSAPs in anticipation of a new LSAP program that would begin in September. His former Princeton colleague Woodford (2012) explained that 'modern models' provide no role for LSAP effects. This led Bernanke (2014) to quip that LSAPs seem to work in practice, but not in theory.

More seriously, we know that theory is almost arbitrarily flexible. Woodford, for example, explained a number of ways to overturn modern theory's dismissal of LSAPs—it is not clear whether we should call these new models 'ultra modern' or 'traditional'. Posen (2012), in discussing Woodford, took up the policymaker view that seems to support the ultra-modern/traditional models.

Let me emphasize that the gulf is not as large as it might appear at first. Woodford's claim seems to be that the belief in LSAPs does not, as he summarized it, have 'a robust theoretical basis.' If we maintain high standards for robust theory, I suspect

that most central bankers might agree.¹⁶ Indeed, many policymakers have expressed considerable uncertainty about the magnitude of the effects.¹⁷ Further, policymakers have emphasized that LSAPs and forward guidance are intertwined such a way as to make it essentially impossible—especially in the short and turbulent available sample—to separately disentangle whether any stimulus was due to forward guidance or LSAPs (Posen, 2012; Engen, et al., 2015).

The reason for emphasizing this issue is that the disagreement over the effects of LSAPs is not some new issue that will disappear after normalization. It is a manifestation of broader questions that have plagued policymaking for decades and are important to resolve independent of the LSAP question. Are there large and highly variable premia in the term structure of interest rates? Do these premia play a significant role in the transmission of monetary policy? Are they manipulable by policy? If so, are there important benefits to exploiting this channel?

3.1 Background on policy and premia

We can always decompose a longer-term interest rate into the average of expected future short rates over the term of the security and a remainder. This remainder often goes under the name risk premium, liquidity premium, or term premium, but these modifiers of ‘premium’ are often very imprecisely defined, so I will proceed without modifier.¹⁸ As Bernanke (2013) explains, a main purpose of LSAPs is to depress the premium in longer-term bonds.

Because expectations and premia are not observed directly, we must rely on proxies in empirical work. It is a robust empirical finding that across a wide range of proxies that premia in, say, 10-year bonds are large and variable, accounting for a substantial part of the variation in the yield. This result impinges on monetary policy in many

¹⁶Until very recently, very little of central banking practice probably satisfied this criterion.

¹⁷Bernanke 2012. The FOMC minutes throughout (e.g. Federal Reserve Board, 2013) the period report ongoing uncertainty about efficacy.

¹⁸For clarity, this discussion is focused on nominally risk free (or very low risk) securities, with government securities of the most credit worthy countries taken as reasonable empirical analogs.

ways.

For example, under the highly implausible plausible the assumption that premia are constant over some period of time, one can deduce changes in market expectations of future short-term interest rates directly from the term structure. It is standard practice inside and outside central banks to do so.¹⁹ Former Fed Vice Chair Blinder (1997, p.16) summarized the tension,

Yet everyone—and here I mean analysts, market participants and central bankers alike—continues [despite the evidence] to “read” the market’s expectations of future short rates from the yield curve, as if doing so made sense. I find it hard to explain why everyone is doing what everyone knows to be wrong.

Issues get even dicier when the purpose of policy is to change the premia as with LSAPs.

It is theoretically possible that the variability of premia might not be of great policy significance. However, proxies for term premia seem to have rich correlation with policy-relevant variables, suggesting that policymakers must take some stand on the premia, even setting aside their intentional manipulation.

The argument I am reviewing is not new; indeed, it is beautifully laid out in an article by Fed economists Rudebusch, Sack and Swanson (2007). The authors begin with an instructive example. From June 2004 through June 2006, the federal funds rate was raised by 425 basis points and yet the 10 year yield moved only marginally. Standard proxies for expected future short-term rates shifted up markedly during this period, as one would expect, implying implies that there must have been a similarly marked decline in the premium on 10-year bonds.

With longer-term yields largely unchanged, policymakers were faced with the question of whether financial conditions had actually been tightened or had been tightened by as much as the rise in short rates might signal. In contrast, following the same logic as Woodford, Rudebusch, et al., note that this question is not difficult in modern models: the path of expected future short rates is sufficient for understanding consumption and investment decisions, and the premium is largely a sideshow.²⁰ Following the logic

¹⁹For example, see the FOMC presentation materials archived at <http://www.federalreserve.gov/monetarypolicy/fomchistorical2009.htm>.

²⁰Some market participants argued that the behavior of long yields was at least partly an LSAP

that would attribute important effects to LSAPs, some argued that the failure of the 10-year yield to increase implied that the Fed was not tightening significantly, and that excessive ease over this period helped fuel the excesses in the run up to the crisis (e.g., Barbera, 2009).

Resolving issues surrounding the role of premia may be of first order importance regardless of the LSAP issue.

3.2 The often implicit role of premia

Standard practice in much empirical analysis gives premia an implicit and often unexplored role, both in academic and policy discussions. For example, to the extent that policy effects are estimated using incompletely specified economic structures, such as structural vector autoregressions, the results leave ambiguous whether policy is affecting premia, and whether those premia induce changes in economic activity and inflation.

If we add to a structural VAR the explicit assumption that private sector agents generate expectations according to the VAR, then it is possible to check whether the movements in interest rates following a monetary policy shock mainly are attributable to movements in premia or to movements in expected future short rates. Roush (2007) explores this issue in the pre-crisis data, and finds that there exist identifications of policy shocks where the variation is mainly due to expected short rates, but that this is by no means a general result.²¹

With the arrival of complete structural DSGE models, nothing is left implicit. Unfortunately, in standard specifications, the term premia are far smaller than seem to be present in the data. Thus, DSGE models generally rely on a weakly motivated²² term premium shock to fit the data. Unfortunately, because we do not have a robust theoretical basis for such premia, the role in the model economy of these premia is a

effect, with the purchaser being the Chinese government (Barbera, 2006). Some evidence on this is provided by Martin, 2013.

²¹Of course, it may be even more important to understand the systematic part of policy: what equilibrium role does the policy rule induce in general equilibrium.

²²Weakly motivated from a microfoundations perspective.

mere modelling choice.

For example, the Federal Reserve system uses many models to inform the policy process, and these models vary widely in their properties. One of the DSGE models (EDO) in use at the Board embeds the assumption that the term premium shock has no effect, e.g., on investment—that is, only expected future short rates matter. Another model, (SIGMA) assumes that investors react to the two components of interest rates—expected short rates and premia—in the same manner. I suspect that I was not below average at the Federal Reserve Board in my understanding of these models, but until the issue of modelling LSAPs came up, I was blissfully unaware of this difference. Of course, for many questions, the difference might be of little significance.

3.3 One additional wrinkle: welfare and premia

A familiar result in monetary theory is the Friedman rule stating that standard welfare considerations argue for a nominal interest rate of zero. A sketch of the logic begins with supposing that real balances offer some sort of liquidity service flow to holders. Since the marginal cost of providing these services with fiat money is zero, the price (opportunity cost) of holding real balances should be driven to zero—hence, a zero nominal interest rate.²³

As Woodford (2012) notes, a principle way of giving LSAPs important effects in theory models is to assume that assets of different maturities each offer their own particular sort of services—3-year bond services, 10-year bond services, etc. Once we do this, however, we inherit a Friedman-rule-like result for each asset.²⁴ Central banks and fiscal authorities, which jointly determine the maturity structure of debt in the hands of the public, should, all else equal, drive the price of all these services to zero.

LSAPs work in exactly the opposite direction, driving down the yield premium and driving up the price of the services. The price of 10-year bonds goes up—to be intentionally provocative—because the private sector is becoming increasingly desperate

²³Friedman, 1969.

²⁴Krishnamurthy and Vissing-Jorgensen (2012) highlight this issue.

for 10-year bond services.

This welfare issue illustrates the many complexities that arise once one begins to contemplate operating on premia. The importance of this welfare effect in practice involves many subtleties.²⁵

3.4 Summary on premia

I sometimes view premia as the metaphorical crazy uncle kept shut away in some upstairs room. People are aware he's there, but don't understand him and try to avoid talking about him directly. With LSAPs, central bankers have invited the crazy uncle to the dinner table. Having done so, some analysts are now explicitly asking whether LSAP-type policies should be a part of normal times policy. In short, some may be finding that the uncle is not so crazy after all. But the jury is clearly still out.

Since LSAPs have brought the issue to center stage, I hope that central bankers and researchers will aggressively pursue the important questions premia raise.

4 Conclusions

The past dozen years have provided us much evidence that will be sifted through for many years to determine how policymakers can best make sure 'It' does not happen again. I started with four questions and suggested a bit of a change in emphasis in examining them. The alternative versions go something like this:

- 1 Can a single-minded central bank always avoid deflation? If so, what outcomes should we expect negative real rates to deliver during recoveries from crises?

²⁵For example, when policy is assumed to materially reduce economic slack, the associated welfare gains of re-employing resources tend to dominate reasonable estimates of these service-related costs for reasons that fall under the argument that, as Tobin quipped, 'it takes a heap of Harberger triangles to fill an Okun gap.' Further, to the extent that an appreciable share of the longer-term securities are held abroad, one must consider sensitive topics regarding how to weight domestic versus foreign welfare effects. Most central banks have mandates focused on domestic welfare. Under this view, the government might, all else equal, want to maximize the surplus extracted from selling the services to foreigners rather than driving the price of services to zero.

- 2 Would things have gone better if central banks had attempted Odyssean guidance?
Do we need to change mandates and governance to allow for such guidance?
- 3 What role do premia in the term structure play in the economy, and what role should they play in policy during crises? And in normal times?

As noted throughout, we have an important start on many of these questions, but I think that further emphasis is called for as we strive to better avoid ‘It’ in the ongoing recovery.

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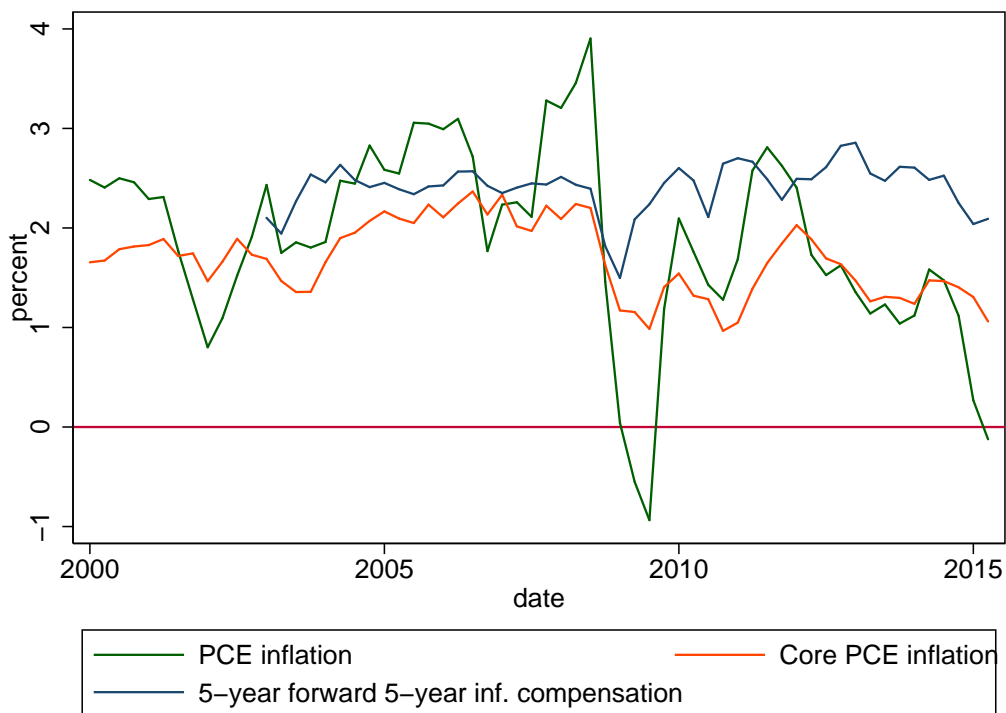


Figure 1: U.S. inflation and a proxy for longer-term inflation expectations. Source: FRED and authors computations. PCE is the personal consumptions expenditures price index, and core PCE excludes food and energy. The 5-year forward, 5-year inflation compensation measure is from the Treasury market. Inflation in all cases is $100 \times$ the 4-quarter logarithmic change in the quarterly-average index.

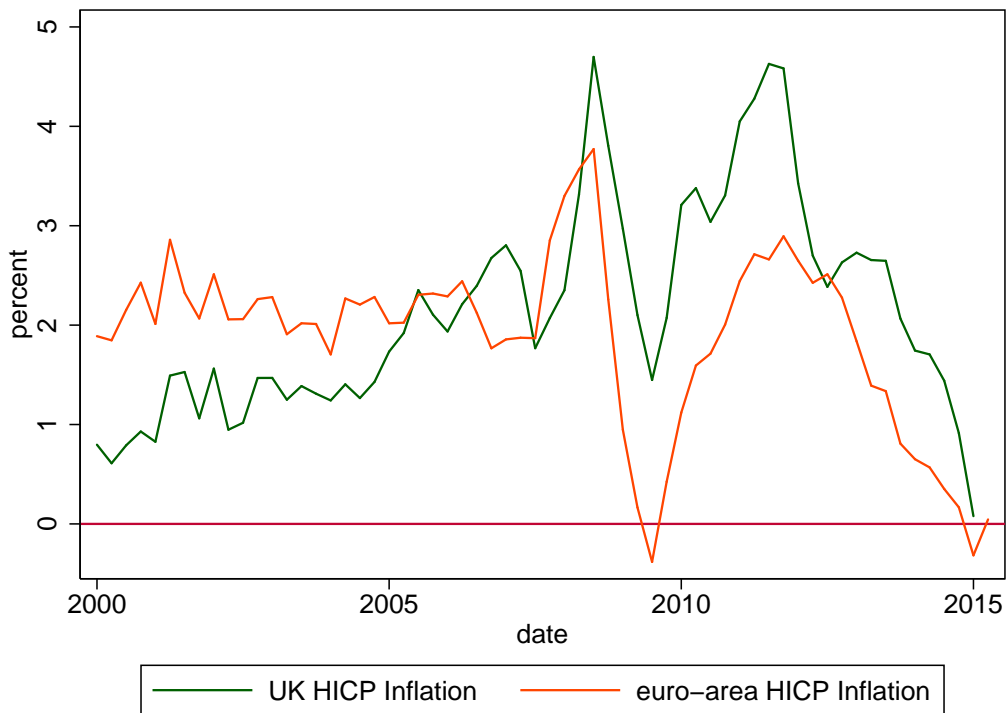


Figure 2: U.K. and euro area inflation. Source: Fred and author's computations. Based on the HICP. Inflation in all cases is $100 \times$ the 4-quarter logarithmic change in the quarterly-average index.