THE MYTH OF NORMAL: THE BUMPY STORY OF INFLATION AND MONETARY POLICY*

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August 18, 2015

ABSTRACT

Policymakers are well aware that disparate confounding dynamics underlie time series data to make interpretations difficult. Despite this awareness, analytical and quantitative models at central banks for the most part reflect academic research that reduces monetary policy behavior to a response of the policy interest rate to a low-dimensional summary of the state of the economy—gaps in inflation and output. We argue that disparate confounding dynamics are ubiquitous features of economies, even during "normal" times like the decade 1995–2005, and that those dynamics are more important for policymaking than are the normal cyclical dynamics that currently dominate policy analyses. Central banks would benefit from efforts to integrate disparate confounding dynamics more fully into the analytics of policymaking.

*Prepared for the Federal Reserve Bank of Kansas City's Jackson Hole Symposium, August 2015. Faust thanks many people at the Fed for valuable lessons including Ben Bernanke, Bill English, Thomas Laubach, Trevor Reeve, Michelle Smith, David Wilcox, and Janet Yellen, and also thanks Bob Barbera and Jonathan Wright for useful comments. Leeper thanks Jim Nason, Bruce Preston, Ellis Tallman, Anders Vredin, and Todd Walker for helpful discussions. We thank Maggie Jacobson for research assistance and the Bank for International Settlements for providing its estimates of risk premia.

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> There was a time, not too long ago, when central banking was considered to be a rather boring and unexciting occupation. In the era of the "Great Moderation," mostly seen as the period between the mid-1980s and the beginning of the global financial crisis, inflation was tamed and macroeconomic volatility was contained. Some thought that monetary policy could effectively be placed on auto-pilot. I can confidently say that this time has passed.
>
> Mario Draghi (2013)

1 INTRODUCTION

Normalization. No matter your views about when, how, and at what pace various economies will achieve monetary policy normalization, the ideal of normalcy is undeniably comforting. With the Federal Reserve now (data dependently) on the brink of normalization, it seems like a good time to refresh our memories on just what is the normal interplay between inflation dynamics and monetary policy.

A natural starting point is to look at history—surely normal is what was, well, normal. The history of monetary policy running through the gold standard era, Bretton Woods, and the subsequent more recent triplet of Greats—Inflation, Moderation and Recession—is rich, varied, and, we must admit, peppered with tragic episodes. What does not necessarily stand out, however, is any extended period one would want to take as *normal*.

One hopeful theme, to which we subscribe, is that policymakers and academics are learning important lessons and that economies are continually moving toward a better normal in monetary policymaking and inflation dynamics. Regardless of one's views about the "new normal" for structural issues such as secular stagnation—matters that monetary policy cannot much address—one would hope that basic issues of everyday monetary policymaking might return to something like life in the decade or so before the crisis.

As Draghi notes in the introductory quotation, that period presents an attractive possible normal in several respects. The Great Inflation conquered and its lessons added to those garnered from the gold standard and Bretton Woods eras, central bankers had by the early 1990s internalized a core focus on price stability. After important innovations in New Zealand in the early 1990s, the flexible inflation targeting framework evolved rapidly and the core focus had been filled out into a fully operational scheme for policymaking. A new class of models—DSGE models—was added to the suite of models regularly considered by central banks.[1] By 2005 about a decade of experience with this scheme had been associated with unprecedented stability in inflation and real activity. For good reason, King (2003) labelled this the NICE decade—NICE: noninflationary consistently

[1] Smets and Wouters (2003, 2007) probably marked the breakthrough of these models into practical policy relevance.

expansionary. Perhaps we had learned the key elements of appropriate monetary policy in normal times, and perhaps we might expect to return to such a period.

There seems to be nearly universal agreement that some very important lessons had been learned. Foremost among these is that price stability is a central component of sound monetary policy and that systematic and transparent policy are the best way to promote all goals of policy. These elements are what Bernanke (2003b) describes as the key lessons of the inflation targeting framework; they are now universally accepted and no longer the sole possession of any camp or brand.

We will challenge several other aspects of what we see as the conventional view of normal-times policy and inflation dynamics, a view that has strongly influenced both academic work and policymaking since the early 1990s. This conventional perspective, which we will call the *nice view*, marries a particular account of normal business cycle dynamics to a notion of appropriate monetary policy. In this view, central banks best promote inflation stability by behaving in a simple and systematic manner, responding mainly to the states of inflation and aggregate real activity. Policy behavior is roughly described by some type of Taylor rule. So long as central bank behavior is simple and predictable, normal cyclical dynamics produce inflation that shows modest and transitory fluctuations around its target value and real activity whose fluctuations are likewise modest. As we'll explain more fully below, this *nice view* can accommodate a broad range of macro models and perspectives—new Keynesians, old Keynesians, monetarists; those who believe there are few policy-exploitable tradeoffs, and those who believe in quite active policy.

There is an alternative view of the world, which may share much with the nice view, but differs in one major respect. Aggregate inflation and real-side dynamics reflect disparate and persistent movements in myriad variables, and the policy implications of these movements are not well captured by two (or a very small number of) conventional summary statistics for headline aggregates such as inflation and real activity. We label this problematic variation in macro variables *disparate confounding dynamics* (DCD), where *confounding* refers to complicating any conventional interpretation of normal cyclical dynamics and the assessment of appropriate monetary policy.

What variables display disparate confounding dynamics? Productivity and output growth of both nations and economic sectors fluctuate persistently relative to one another; closely related, the inflation rates of housing, goods, services, energy, food, and, medical care differ widely and persistently through time. Debt of various sectors grows persistently and stochastically at rates that differ from that of income. Term and risk premia in financial markets show large and persistent variation. And so forth.

Disparate confounding dynamics are blindingly apparent in the data; if you look at raw data, they are mainly what you see. And none of this is news to policymakers or central bank staffers; we do not pretend to herald the discovery of new objects in the policymaking firmament.

We will, however, argue that a conventional view of normal cyclical dynamics too strongly colors much policy analysis and that elements showing DCD are not integrated sufficiently well into the analysis. Most academic work on monetary policy in *any* conventional perspective abstracts entirely from confounding elements like those just listed. Academics among us know the proper defense: models must be idealizations; the art is to strip away superfluous details to focus on the essence. Normal cyclical dynamics, in this view, are the heart of the matter.

This paper is an invitation to reconsider just which parts of macro dynamics are—and historically have been—at the heart of good and/or bad policymaking. To put it provocatively, we'll argue that if we must accept the conventional partitioning of macro dynamics into bins labelled *main focus* and *other*, we should probably reverse the labels relative to how the conventional view would categorize things. But an approach that fully integrates the bins would be even better.

After framing the issues more concretely, we start with some summary (nonstructural) evidence suggesting that the conventional view of normal cyclical dynamics has historically been of essentially no value in predicting inflation dynamics. These results build on the work of Faust and Wright (2013). The paper then surveys the history of policymaking and inflation dynamics in an attempt to understand this result. This history points us toward two families of issues.

First come real-time measurement problems. Applying the *nice view* to policy and normal cyclical dynamics requires first filtering out the part of any measured data series that is not the normal business cycle. For example, one attempts to look through food and energy price shocks and must separate trend from cycle in real activity. Any wisdom captured by the *nice view* may be of limited value if the extraneous bits cannot be measured well in real time.

Second comes a set of issues that arise if business cycle and other dynamics interact in a way that cannot be disentangled, either in principle or in real time. For example, the ratio of household debt to income in the United States rose fairly steadily from 1950 through 2007 [figure 1]. This trend was absent in conventional business cycle models. We know of no theories that tell us which parts of this trending variable policy should ignore and which parts may affect cyclical dynamics.

We argue that in the typical historical case—perhaps most especially during the NICE decade—understanding DCD is the key to understanding inflation dynamics and that the variation captured in the *nice view* of normal cyclical dynamics plays a decidedly secondary role.

Few of the ideas in this paper are new—most have been articulated at this symposium in the past. But we came to them while participating in central bank policymaking and analyzing communication during the current recovery. We see a significant shift, with central banks focussing on and communicating about the disparate confounding dynamics—persistent changes in term premia in financial markets, puzzles over trend versus cycle components in labor force participation, trends in demographics and globalization, and the like.

We strongly support what we see as a pronounced shift in emphasis of applied policy analysis

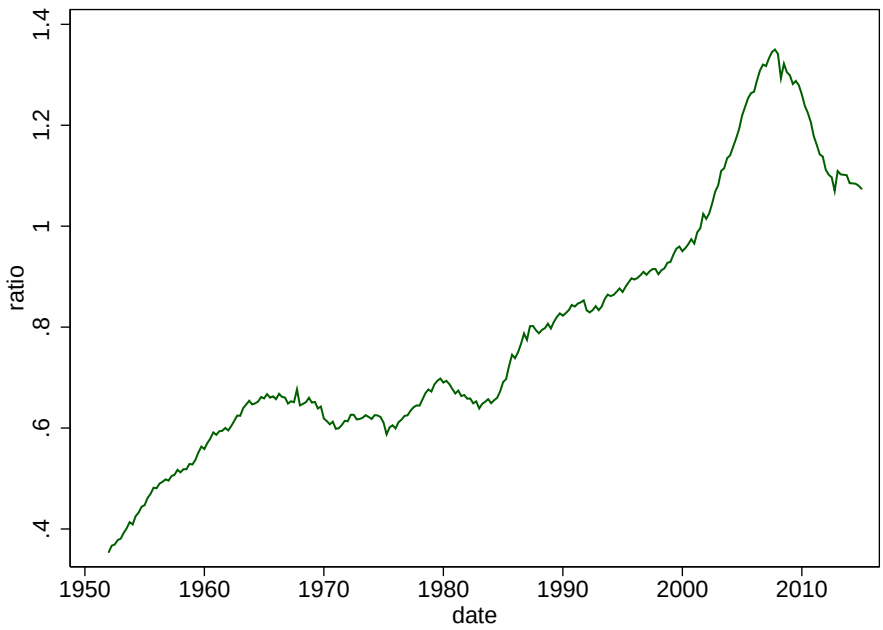


Figure 1: Ratio of credit market debt of households and nonprofits to personal disposable income. Source: Federal Reserve via FRED, authors' calculations.

at major central banks. From the standpoint of policy analysis, reurning to what served as normal in the NICE decade would be a setback. A new and better normal in monetary policy analysis at central banks is already settling in. We will offer some suggestions about how best to capitalize on the progress already obtained.

2 The Nice View and Normal Cyclical Dynamics

The *nice view* brings a perspective on normal cyclical dynamics together with implications for how monetary policy can best contribute to limiting the costs of those dynamics. The key is the stance on economic dynamics; policy results follow fairly directly. Central to normal cyclical dynamics is that aggregate inflation and real activity tend toward regular fluctuations around some normal values—for inflation it is the central bank's target; for real variables it is some notion of full or maximum sustainable resource utilization, governed, say, by the growth in potential output. Recognizing that dynamics and policy cannot be separated, a more complete statement is that the dynamics just described hold under a wide range of sensible policy behavior. The goal of policy is to pick from among sensible policy options the one that best limits the costs of the cyclical fluctuations.

The primary link between inflation and activity, in this view, runs from slack in aggregate resource utilization to inflation. This link is taken to be predictable and exploitable by policy. When

demand is higher relative to productive capacity, slack is lower and inflation tends to move up relative to the target. When, say, technical innovation raises capacity relative to demand, slack rises and inflation falls relative to the target. This behavior may be forward looking, so that expected slack affects inflation today.

Monetary policy in the *nice view* can best contribute to economic welfare, first, by not adding uncertainty to the economy. Policy should be systematic and transparent and have a predictable relation to underlying conditions. As noted in the introduction, enshrining this principle along with price stability at the heart of good policy has been one of the hallmarks of true progress.

How best can the central bank avoid injecting gratuitous noise while it attempts to limit the harmful effects of cycles? The holy grail of monetary economics has been to find a simple recipe. Friedman (1960) argued that something like a constant monetary growth rule might be the best that policy can do. More recently, the focus has turned to the price instead of the quantity of liquid assets, and researchers have discovered that in models of normal cyclical dynamics, simple interest rate rules deliver good macroeconomic performance.

Taylor (1993) famously noted that a simple rule that responds to inflation and real activity mimicked the behavior of the Federal Reserve during a period generally recognized as successful for policy. A large body of research grew up documenting that across a wide range of models of normal cyclical dynamics, a reaction function in which the central bank adjusts the policy interest rate in a simple (linear) way to some indicator of aggregate inflation and aggregate slack performs well. Such rules can even provide outcomes that are extremely close to the optimum that could be achieved in these models. That is, policy delivers an inflation rate that fluctuates benignly around its target and minimizes inefficient business cycle variation to the extent possible with the blunt tools of monetary policy.

Taylor and Williams' (2010) excellent review documents that the near optimality of simple Taylor-type rules holds not only in small abstract models that are the grist for much insight in basic research, but also in larger old- and new-fashioned models of the business cycle, including models that central banks use in the policy process.

One remarkable aspect of the *nice view* is that it may be palatable to a wide range of audiences: Keynesians—new and old—monetarists—modern and traditional—real business cycle advocates, even inflation nutters. Convergence of views arises so long as one does not dig too deeply into just what we mean by limiting the costs of *inefficient business cycle variation*. The policy prescriptions of old Keynesians and new Keynesians are similar, even though unemployment is a focal concern of old Keynesians, while new Keynesians often use models that have nothing the old Keynesians would recognize as unemployment. Similarly, so long as it is an empirical regularity that slack predicts inflation, the simple policy rule may be palatable to monetarists and inflation nutters alike. Real business cycle folks may believe that misguided central bank policy is itself the primary

source of inefficient business cycle variation, and they too can go along—at least the behavior is simple and systematic. This helps us understand Levin and Williams' (2003) stunning conclusion:

> The main finding from our model-based analysis is positive: it is possible to find policy rules that perform very well in a wide range of macro models as long as the policymaker cares about both inflation and output variability. Or, put differently, the members of a policymaking committee that share similar preferences for stabilizing fluctuations in inflation, output, and interest rates, but who have quite different views of the dynamics behavior of the economy, can relatively easy [sic] come to a mutually acceptable compromise over the design of monetary policy. [Levin and Williams (2003, p. 969)]

The policymaking world in the *nice view* is very nice indeed.

Notice how narrowly the *nice view* circumscribes the policy problem: minimize fluctuations of inflation and output about their normal values, appropriately defined. The problem is elegant in its simplicity. In practice, the simplicity emerges only after determining normal values for inflation and something like potential output, but that is still a low-dimensional problem.[2]

Somehow the many variables that grow persistently at disparate rates do not matter, except insofar as they affect one's assessment of inflation or slack. Factors behind disparate secular ups and downs may average out—monetary policy is a blunt tool focussed on aggregates. Or they change too slowly to be important for monetary policy. Policy, after all, has its main effects one to two years in the future. Or the other dynamic factors are somehow safely viewed as separable from the normal dynamics that are the subject of policy.

2.1 The Nice View and Real-World Policymaking

Advocates of the *nice view* as represented in academic research, of course, fully realize that those models omit much that may be important. Taylor emphasized that the policy prescriptions of policy rules should not be taken literally, but used as guides.[3] Svensson (2003) formulated a forecast-based approach to implementing policy in the *nice view* that provides a natural way to fold otherwise inconvenient aspects of reality into the discussion. These other factors are incorporated insofar as they affect the forecasts of inflation or aggregate activity. Bernanke (2004) and Yellen (2003) expressed a preference for a hybrid forecast-based approach informed by Taylor-type rules.

An important practical question is how large and frequent the deviations would be (in normal

[2] In DSGE models this would usually be interpreted as the level that would obtain absent sticky price and wage distortions.

[3] For example, Taylor (1993) points to historical instances when the Fed consciously deviated from the simple rule to react to information contained in oil prices or bond-market developments.

times). Levin and Taylor (2010) seem to imply that deviations would be rare.[4] More generally, academic work on models of normal cyclical dynamics, central bank analyses, and actual policy frameworks suggest that focussing narrowly on stabilizing inflation (or perhaps even better, the price level) captures the essence of good policy. Woodford (2004) makes a thorough theory-based case for this view. As for real-world policy frameworks, the clearest case is the Bank of England, where the Governor is charged with writing a letter of explanation to the Chancellor of the Exchequer whenever inflation moves more than one percentage point away from the target. Presuming that the Exchequer was not simply looking for a quarterly pen pal, this condition was surely thought to be an exception warranting special attention. The Swedish Riksbank and Bank of England have at times both summarized this logic in the rule of thumb that inflation should usually be expected to return to target within two years.[5]

In short, the *nice view* seems to involve a strong presumption that central banks can and should assiduously focus on simple, systematic behavior that stabilizes inflation.

2.2 Since the Crisis, Isn't This View Dead?

The crisis showed emphatically that large shocks can drive us away from desired values for quite a long time. It also exposed limitations in the models that support the *nice view*. In the ever-contentious world of academic macroeconomics, some have been eager to proclaim the death of many of the models, in particular new Keynesian DSGE models, referred to in the previous section.

Sargent (2010) gives the right response on behalf of DSGE models:

> The criticism of real business cycle models and their close cousins, the so-called New Keynesian models, is misdirected and reflects a misunderstanding of the purpose for which those models were devised. These models were designed to describe aggregate economic fluctuations during normal times when markets can bring borrowers and lenders together in orderly ways, not during financial crises and market breakdowns.

For example, models amended to deal with (what we hope are) once-a-century events might well have normal-times dynamics similar to those in existing models.[6] More importantly, Sargent gives a plausible reason to defend a normal-times perspective. A crisis does not necessarily refute the value of those foundations in normal times.

[4] For example (p. 33), "On occasion, of course, policymakers might find compelling reasons to modify, adjust, or depart from the prescriptions of any simple rule. . . ."

[5] While recognizing that how long inflation takes to return to target is state-dependent, the Riksbank's description of the principles of monetary policy states, "The Riksbank's ambition has generally been to adjust the repo rate and the repo rate path so that inflation is expected to be fairly close to the target in two years' time" [Sveriges Riksbank (2010)].

[6] Del Negro et al. (2015) is one example of such work.

We think that the key elements in our characterization of normal cyclical dynamics may have survived largely intact. The core of this characterization is that in normal times, policy-relevant business cycle variation is well captured in summary measures (perhaps forecasts) of the state of inflation and real activity relative to potential.

3 Normal Cyclical Variation and Disparate Confounding Dynamics in Reality

The *nice view* of normal cyclical dynamics carries with it some implicit assumptions. First, it assumes that we can meaningfully separate the trend and cycle components in real time, and second, the relevant cyclical components can be summarized in the state of two variables—one summarizing inflation and the other real activity. Together, these two have a strong implication for the myriad other variables in the economy that show stochastic trends that are not a simple function of trend output and inflation. Somehow these other trending variables are separable from the monetary policy problem and can be disregarded.

We are all familiar with the practical problems of identifying the cyclical component of real variables, especially in real time.[7] In practice, this often involves forming a measure of potential output growth or the natural rate of unemployment. It is difficult to measure these variables in the middle of a long historical sample, even with access to heavily revised data and information about the trend both before and after the period of interest. In real time, the data for the current period will be subject to revisions and the policymakers have no data on where the trend will be in the future.

3.1 Reality: A Cornucopia of DCD

While real-time trend measurement has been much discussed, the fact that there are many stochastically trending variables following patterns that are not well summarized by potential output or inflation is a problem that gets less attention. The debt-income ratio of households in the United States, mentioned in the introduction, is an example of such a variable [figure 1]. This ratio rose at a persistent but varying pace for much of the period since 1950. While this feature played no important role in standard models used to demonstrate the merits of the *nice view*, there was never a clear case stated for why this was irrelevant to understanding business cycle dynamics.

Term premia in sovereign debt markets are another example. While there is general agreement that it is hard to measure these premia with precision and that different plausible approaches yield somewhat different answers, there is also general agreement that, however measured, these premia are quite variable at high frequencies, business cycle frequencies, and lower frequencies [for example, Wright (2011)]. Term premia patterns in figure 2 are typical, exhibiting both cyclical

[7] For a recent look at how this problem manifests itself around recessions see Martin et al. (2014).

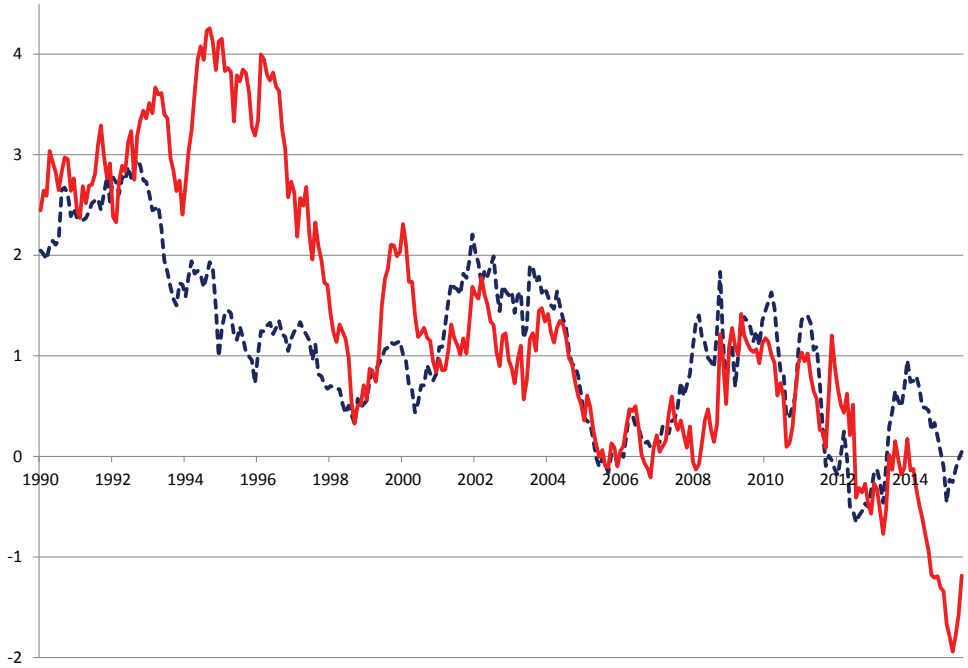


Figure 2: Term premia on 10-year nominal government bond yields in the United States (dashed) and France (solid). Source: Hördahl and Tristani (2014).

variation and a notable downward trend. Wright (2011) argues that these are robust features across a number of countries during this time period. In standard accounts of *nice view* policy, interest-rate based policy operates strictly by affecting the path of expected future short-term interest rates and premia—the differences between longer-term rates and the average of expected future short rates—play no essential role.[8]

Relative prices of broad categories of goods and services also show stochastic trends—that is, the categories display persistently different inflation rates. To illustrate this point, we can partition the consumption basket into six broad categories—food, energy, medical, housing, other goods, and other services, and examine the inflation rates during the NICE decade [table 1]. Over this period, headline inflation was 1.95 percent, close to what is now the Fed's stated objective.[9] The average rates across the categories varied widely, spanning the range from -0.75 percent to nearly 7 percent. The food and energy categories are known to have inflation rates that are highly variable relative to the others. Medical care and housing inflation are also special in various respects, with housing cost inflation diverging at times from general price inflation and medical care inflation consistently running much higher than general price inflation.

The other goods and other services categories probably come closest to matching the sort of

[8]Woodford (2012) thoroughly explained that this was true in conventional modern models.

[9]Throughout the paper, we have computed inflation as the annualized change in the natural logarithm of the underlying price index.

category	Ave.	Min.	Max.	share
all	1.95	−0.03	4.40	100
food goods	2.12	−0.88	4.60	8
energy goods	6.90	−57.20	79.80	3
housing and utilities	3.11	1.40	7.05	18
medical	2.81	0.75	4.98	14
other services	2.53	0.47	3.98	32
other goods	−0.74	−3.46	0.88	25

Table 1: U.S. inflation as measured by the personal consumption expenditures, 1995–2005. Average, minimum, and maximum are all for annualized quarterly rates. The six sub-categories are nonoverlapping and exhaustive of the total. The column labelled *share* is the average nominal budget share of each category over this sample. Source: BEA and authors' calculations.

items envisioned in our standard stories of price dynamics. But over the NICE decade the services part had an inflation rate of nearly three percent and the goods part of nearly minus one percent. Moreover, the inflation rates of other goods and other services show great variation relative to one another at both low and higher frequencies [figure 3]. In the crisis, for example, the inflation rate on other services dropped sharply, as conventional theory would suggest, perhaps signalling a major contraction. In contrast, the rate on other goods rose briefly and sharply. The work of Gilchrist and Zakrajšek (2015) may shed light on this phenomenon.

If the headline inflation rate falls because oil becomes cheaper relative to other goods, conventional wisdom says that we should look through oil prices for the implications for measured inflation. What about when headline inflation falls because the relative price of other goods falls relative the overall measure, as in the early 2000s? Should the central bank seek to boost the inflation in other categories in order to stabilize the headline index? There is not a clear answer from the *nice view* models because they omit all of this variation.

We have presented a sampling of some variables showing DCD that we will carry through the paper. The list is by no means exhaustive. One pragmatic defense of leaving such dynamics unexplained in *nice view* models is that the models seem to work pretty well without taking account of these features. The next sections cast some doubt on this claim.

3.2 Some Suggestive Evidence on the Importance of DCD Elements

In 1992 Victor Zarnowitz, one of the seminal contributors to the field of modern forecast analysis, took up the topic of why macro forecasting had such a poor record. In an article entitled "Has Macro-Forecasting Failed?" he attributed the problem basically to disparate confounding dynamics:

> Business cycles are persistent and recurrent, but they are by no means predetermined

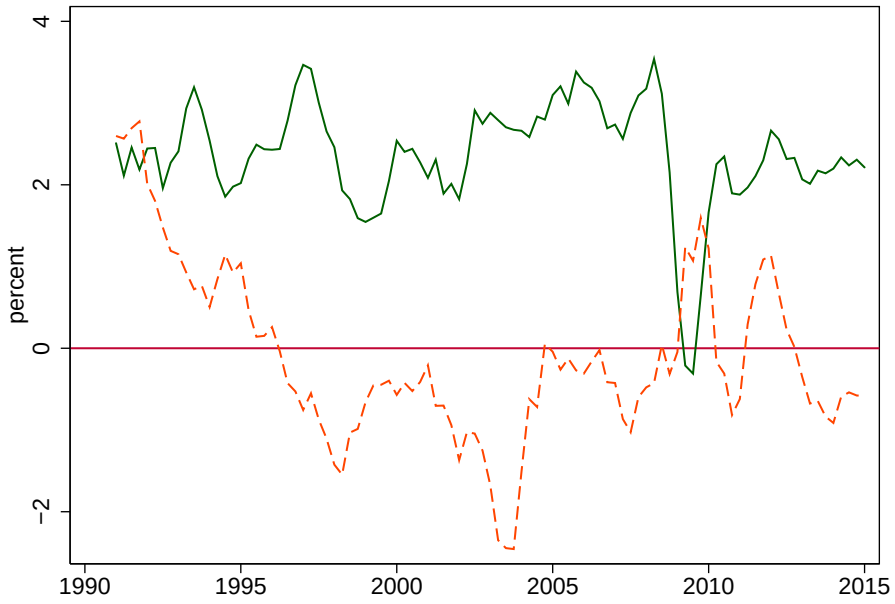


Figure 3: Annual inflation as measured by the personal consumption expenditures deflators for *other goods* (dashed) and *other services* (solid), both of which involve removing any food, energy, medical and housing components. Source: Bureau of Economic Analysis, authors' calculations.

> or periodic. They tend to be pervasive but affect different variables and sectors in different ways. Fluctuations and long trends in growth and inflation interact with each other and have stochastic elements. The economy in motion is a complex of dynamic processes, subject not only to a variety of disturbances but also to gradual and discrete changes in structure, institutions and policy regimes. No wonder there are few, if any, constant quantitative rules. . . to help the macro-forecaster effectively and consistently over more than a few years or from one business cycle to another. [Zarnowitz (1992, p. 130)]

Bottom line? There are multiple and shifting trend and cycle components and these interact and, as a result, any normal business cycle component many not be dominant and systematic enough to yield much predictive power.

3.3 A Forecast-Based Approach to Assessing the Prominence of Two Kinds of Dynamics

In the context of inflation forecast evaluation, Faust and Wright (2013) propose an exercise very much in the spirit of Zarnowitz's view. They conceptualize the forecast path of inflation in terms of a starting point, an ending point, and the particular path in between. Inflation at the starting point—say inflation in the quarter the forecast is made—is not known, but can be viewed as predetermined. In forecasting, this start value is generally called a *nowcast*. The

endpoint of the forecast path is where inflation is after all predictable components—normal and abnormal dynamics—have died out. For a committed inflation targeter, this is presumably the inflation target. For others, this value may not be explicit.[10] Any forecastable dynamics are then reflected in the particular path between the two endpoints of the forecast.

Based on any real-time forecast, we can get some sense of the importance of systematic and predictable elements by building an alternative benchmark forecast as follows. Start with the nowcast from the original forecast and some proxy for the endpoint of that forecast.[11] Then simply connect the two with a smooth path, completely disregarding information on the state of the economy. In particular, Faust and Wright look at forecasts in which 70 percent of the distance is closed each period regardless of the state of the economy.[12] This benchmark makes no attempt at all to exploit systematic dynamics in inflation; the forecast commentary would always read, "we forecast that inflation will return smoothly from its current value to its longer-run value."

This alternative forecast is designed to exploit all the wisdom of the original regarding the nowcast (where are we now?) and the long run (where are we ultimately headed?). But after that, the forecast is entirely mindless. It uses no data at all to inform the path of inflation over the horizons usually forecast by central banks.

To make a long story short, Faust and Wright find that the alternative generally performs at least as well as the best practical alternatives. This is over various samples and for various measures of inflation. It is not simply that they cannot reject the hypothesis that the alternative is equally accurate; the point estimate of accuracy tends to be very close to (and is often a bit better than) the best alternatives.[13] Faust and Wright (2013) make this result one of the centerpieces of their *Handbook of Economic Forecasting* article on inflation forecasting, documenting it in a variety of ways.

3.4 Some Evidence on Forecasts of Policy Institutions

This section presents a sampling of Faust-Wright-style results based on forecasts from three policymaking institutions—the

[10] Nason and Smith (2015) explore more careful modelling of the longer-run.

[11] Practical real-time forecasts are often only reported for a short horizon and the endpoint is thereby implicit, leading to a need for a proxy.

[12] Specifically, the one-period ahead forecast at time t is,

$$y^f_{t+1} = norm_t + \rho(norm_t - now_t) \tag{1}$$

where now is the nowcast and $norm$ is current normal. Longer-horizon forecasts are given by,

$$y^f_{t+h} = norm_t + \rho(norm_t - y^f_{t+h-1}) \tag{2}$$

Taking the case of $\rho = 0.3$, these equations imply that 70 percent ($1 - \rho = 0.7$) of any remaining gap between the variable and its normal value is expected to dissipate each period.

[13] It is not essential to our point in this paper, but the best forecasts seem to be the subjective forecasts of central banks and private sector forecasts, with mechanical statistical models coming in well behind.

Fed, the Bank of England, and the IMF. Given our emphasis on normal times, we focus on the pre-crisis period.[14] The alternative benchmarks follow.

The Fed's Greenbook (Tealbook) Forecast. As Faust and Wright (2013) discussed more fully, the Fed's Greenbook forecast has been widely studied and is generally thought to be at or near the frontier of forecast accuracy. To construct the alternative benchmark, Faust and Wright take the Fed's nowcast. Over the period we are studying, the Fed had no explicit inflation target. As a crude proxy for the longer run, Faust and Wright take the forecast of average inflation 5–10 years in the future, which is published twice a year by Blue Chip economic indicators. The path between these endpoints is as described above. Faust and Wright found that over various sample periods and horizons, the root mean square prediction error (RMSPE) of this type of forecast is very close to that of the Greenbook forecast.[15]

The Bank of England's Monetary Policy Committee Forecast. Since 1998, the Bank of England has published a quarterly forecast in its inflation report based on a market path for interest rates. Our alternative benchmark uses the MPC nowcast and the Bank of England's inflation target for the longer-run.[16]

The IMF's WEO Forecast. Each spring and fall the IMF publishes the World Economic Outlook, which includes a forecast for member nations. In a review of the WEO, Faust (2013) examines the following Faust and Wright-style benchmark. Take the IMF nowcast. For the longer-run value, follow the approach used for the Greenbook analysis by using the 6–10 year ahead forecast published by Consensus Forecasts. Of course, the nature of this benchmark makes little sense for nations in the midst of secular disinflation,[17] so Faust selects a subset of the matched WEO-Consensus Forecast sample that had relatively stable inflation. For the work reported here, this leaves a group of 20 national economies.

The results for the Greenbook and MPC forecasts appear in table 2. The Greenbook and MPC forecasts over the sample in the NICE decade fit Faust and Wright's pattern. The accuracy of the alternative is somewhat better in two cases and very slightly worse in one other. The alternative forecast is also considerably less variable than the original: the alternative forecast tends to have a standard deviation that is around 60 percent of the original. To put it in simple terms, the original forecast shows extra wiggles relative to the alternative, but these wiggles do not seem to help forecast accuracy.

[14] Many forecasting results are much different for the period of the crisis, and in particular, we would not expect our assumption that inflation will return smoothly to its normal value to be appropriate around the time of a crisis.

[15] For CPI inflation, the RMSPE of the alternative is generally smaller; for the GDP deflator, Greenbook's RMSPE is often a bit lower.

[16] The preferred inflation index and target changed in our sample period. The work reported here simply makes the switch in the first quarter of 2003.

[17] Because in 6–10 years we expect to be in a very different place from where we are today.

		RMSPE		Rel.	
Forecast	Sample	Orig.	Alt.	SD	#
GB, CPI	1995–2005	1.10	0.85	0.45	83
GB, GDP Def.	1995–2005	0.78	0.79	0.62	83
MPC	1998–2005	0.60	0.56	0.57	32

Table 2: A comparison of inflation forecasts of policy institutions versus an benchmark alternative described in the text. In all cases, inflation is a 4-quarter log change and the forecast is for the 4-quarters starting one-quarter after the period in which the forecast is made. GB is Greenbook, GDP Def. is the implicit GDP deflator, MPC is the forecast of the Bank of England's monetary policy committee, RMSPE is root mean squared prediction error, Orig. signifies the institution's forecast, Alt. is the benchmark alternative, Rel. SD is the relative standard deviation of the alternative forecast relative to the original, and # is the number of oberservations available in the stated sample period. Source: Federal Reserve, Bank of England, Blue Chip Economic Indicators, and authors' calculations.

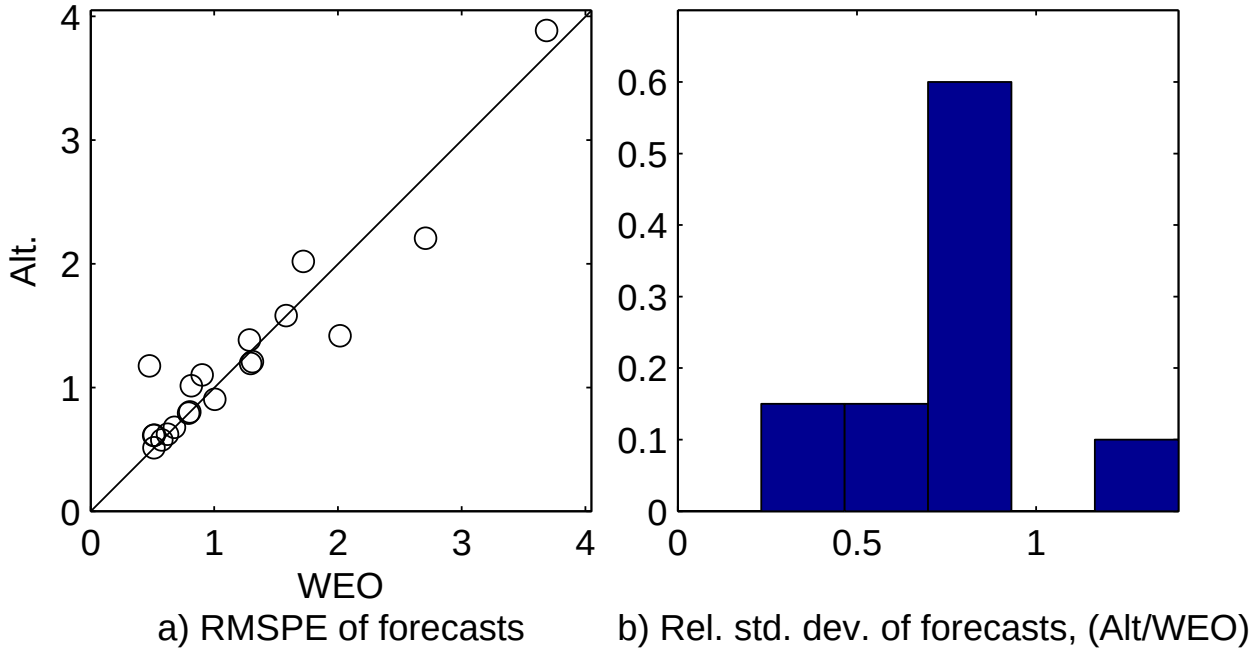


Figure 4: Comparison of IMF WEO forecast to benchmark alternative. In panel (a), each point represents a country in the matched WEO-Consensus forecast database. Panel (a) shows the RMSPE of the two forecasts. Panel (b) is a histogram of the relative standard deviation of the two forecasts; each underlying point is the ratio of the standard deviation of the forecast error of the alternative forecast relative to that of the WEO. Source: these data and computations are from Faust (2013).

The results for the 20 economies in the WEO sample are summarized in figure 4, and tell very much the same story. All points near the 45-degree line in panel (a) are cases where the alternative and WEO forecasts are similarly accurate; for points on or above this line, the alternative is at least as accurate—10 of the 20 cases. As with the Greenbook and MPC forecasts, the original forecast for most of the 20 countries has considerable extra wiggles relative to the alternative (panel b), but there is no meaningful accuracy gain to show for it.

3.5 WHAT DO THESE RESULTS MEAN? Those who have read private sector and policy institution inflation forecast summaries know that these reports are filled with details about slack and momentum and special factors informing the shape of the near-term forecast path for inflation.[18] A lot of high-powered analysis goes into forming these forecasts. Yet the effort that goes into crafting these wiggles in the path between nowcast and longer-run yields no benefit in terms of accuracy.

Should this conclusion surprise us? Perhaps, but it is the sort of result that Zarnowitz describes.

The alternative benchmark in the forecast analysis could be thought of as having two handicaps relative to the full forecast. First, it makes no attempt to exploit normal cycle dynamics. Second, it ignores any special events or technical factors that may have led to predictability in the sample—changes in VAT, droughts, and so forth. If we accept that the forecasters sensibly exploit these special factors, it means that the benchmark could be made to look even better relative to the original if we continued to ignore normal cyclical dynamics, but took account of *ad hoc* elements.

What does it mean if one forecast is less variable than another, but they are equally accurate? One might think that the *extra wiggles* in the more variable forecast are superfluous, unrelated to the target. If this were the case, however, the more variable forecast would be strictly less accurate. Instead, the extra wiggles must be somewhat associated with the target, but, loosely speaking, any given wiggle is equally likely to degrade as to improve the forecast so that there is no net benefit.[19] This would be consistent, for example, with the core story of standard models being correct, but with the confounding dynamics swamping the signal that can be extracted in real time.

We started this section by stating some practical assumptions that must be satisfied for the *nice view* of policy and normal dynamics to be usefully applied in practice. We think that the evidence summarized here suggests that these assumptions may not be met in practice. With this as a jumping off point, we next present a quick survey of monetary history, emphasizing the role of disparate confounding dynamics.

[18] For those unfamiliar with forecast commentaries, any of the Greenbook citations below illustrate this point.

[19] Adding to a forecast noise that is uncorrelated with the target must raise the RMSPE. Adding a component that combines pure noise with a similarly variable component of pure signal, however, will raise the forecast variance with no net effect on accuracy.

4 In Search of Normal: A Selective Historical Review of Inflation Dynamics and Monetary Policy

We break history into four periods (i) 1850-1971: the beginning of modern monetary economies to the end of Bretton Woods; (ii) 1965-1995: the Great Inflation and disinflation; (iii) 1995-2005: the NICE decade; (iv) 2005-present: the crisis and unconventional monetary policy.[20] The precise year boundaries we have chosen are not critical; the periods tend to blend into one another. For example, the Great Inflation commenced in the mid-1960s, but did not spell the end of Bretton Woods until 1971. Similarly, we will date the end of the Great disinflation around 1995, despite the fact that, depending on the economy in question, one might put the date earlier or later. Finally, it is not clear when we should say that the NICE decade gave way to excesses that (*ex post*) clearly were unsustainable, but we choose 2005.[21]

4.1 Inflation Dynamics and Monetary Policy: 1850-1972

From the dawn of modern industrial economies sometime in the 1800s until the Bretton Woods system unraveled, some version of fixed exchange rates underpinned by, or defined in terms of, the gold standard was the dominant monetary arrangement.[22] In the idealized case, countries operating under the arrangement maintained a fixed price of gold, and cross-border payments imbalances could ultimately be settled in gold. In all its incarnations the system was managed (sometimes well, sometimes poorly) so that the link between money and gold was not strict [Bernanke and James (1991), Eichengreen (1992)].

We are looking only for gross facts about monetary policy and inflation dynamics in this section, and the primary lesson is that stability of inflation and/or the general price level were, by design, not priorities in this system.

The gold standard is sometimes viewed as akin to a price level target, but this is wrong both conceptually and in practice. The general price level is out of the hands of the central bank in this system, and with the price of gold fixed, the general price level is left to wander where it might. The price level is governed only by the supply of gold relative to the monetary demands of the economy. Defenders of the "gold as price level target" view might fall back on the argument that changes in relative prices do not constitute inflation, but nothing prevents divergent trends in demand and supply from leading to very persistent (or even permanent) periods of general price inflation or deflation. And long periods of deflation were familiar features of the gold standard

[20] The Federal Reserve has provided a useful annotated timeline of many of these events in association with the 100^{th} anniversary celebrations. This can found at `http://www.federalreservehistory.org/Events`.

[21] For two excellent summaries of the historical time series properties of U.S. inflation, see Cogley and Sargent (2015) and Nason (2006).

[22] See, for example, Bernanke and James (1991), Eichengreen (1992), and Kindleberger (1973). Especially through the first part of the period, bi-metalism played a role and it was always waiting in the wings.

[Bordo and Filardo (2005)]. It is regularly noted that the price level in England was approximately the same in 1821 and 1914 [Bordo (1981)], but this was not a design feature of the gold standard, it was an accident of the pace of economic development versus those of discoveries of gold and advances in mining technology.

In the *nice view*, inflation is stable and, indeed, it seldom deviates for very long by more than one percentage point from the inflation objective. By these criteria, the gold standard was a hideous failure. General price stability, however defined, was not a design criterion.

What did the system provide? The gold standard flourished in the late-1800s when industrialization was underway. Growth (and thereby investment) prospects of different nations diverged widely. To a modern economist this divergence suggests that—if the proper institutions are in place—we should see large capital and trade flows. Sweeping many contentious issues regarding particulars under the rug, the gold standard through this period was the attempt by thinkers of the day to establish a workable system to facilitate these persistently divergent dynamics. The evolution of the gold system ended with the Bretton Woods system, which proved to be an uncomfortable attempt to marry the fixity of the gold standard with domestic flexibility.[23]

A second lesson from this period, then, is that persistently fluctuating differential growth rates of nations are a prominent feature of the world economy. The world monetary system must accommodate this. Three additional points are worth noting given their relevance to today.

First, it is folly to think of monetary arrangements as chosen and then fixed for all time. Perhaps this should have been obvious from the regular suspensions of gold convertibility over the entire gold standard period, but this conclusion surely should have been clear by the end of Bretton Woods in 1971. Nonetheless, it is still common to see these monetary systems modelled as if fixed for all time. Further, we hear policymakers make statements that amount to the claim "there is no plan B as far as monetary arrangements are concerned."[24] Plan Bs are always there, even if policymakers don't want to talk about them. Political systems are in part designed to make certain structures "sticky," but disparate dynamics in the world economy very regularly put severe stresses on such efforts.

Second, as Meltzer (1999) reminded Jackson Hole audiences and is more thoroughly documented in Bordo and Filardo (2005), the deflations that were an inevitable part of life under the gold standard were far from uniformly tragic. Some periods of deflation were quite painful, but others were more normal or even boom times. The relevance of these periods of benign deflation to

[23] Eichengreen (2004).

[24] Sometimes the statement is literal. On April 4, 2013 ECB President Mario Draghi responded to a question about the possibility of a country's exit from the Eurozone with the statement: "[T]hey keep on asking questions like: 'If the Euro breaks down, and if a country leaves the Euro.' It's not like a sliding door. It's a very important thing. It's a project in the European Union. That's why you have a very hard time asking people like me 'what would happened if.' No Plan B."

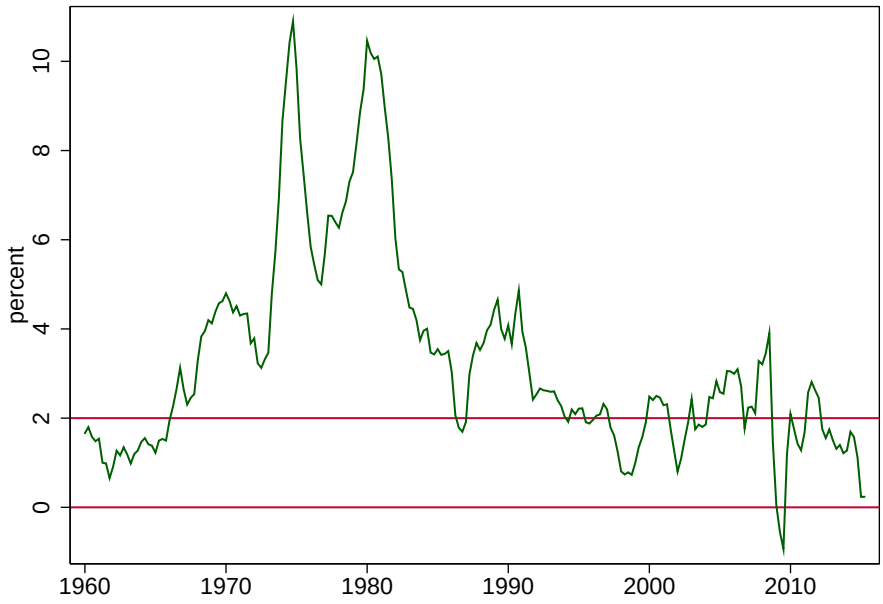


Figure 5: U.S. Annual PCE Inflation. Source: BEA via FRED, authors' computations.

today is arguable of course; today's vastly different institutions may imply that different outcomes might be observed.

Third, and more tentatively, it is not clear that any economy faced anything one would call a deflationary trap during this period. Many of the deflations were essentially policy induced, either by adherence to the gold standard or by desires of nations to return to the gold standard at some former parity. Faust (2015) echoes Meltzer in arguing that it is not clear that any nation that assiduously attempted to avoid deflation failed to do so. We return to this point briefly below.

4.2 NORMAL(!?) INFLATION DYNAMICS AND MONETARY POLICY: 1965-1995 Inflation began to rise in many economies around 1965, and Bretton Woods gave way shortly thereafter. There began a nearly worldwide rise in inflation that did not begin to turn until about 1980.

We date the end of the Great Inflation at 1995, but those who are focused on the United Sates or on the remarkable drop in output volatility that seemed to occur around 1985 might pick an earlier date. Whether or not the moderation in output volatility was attributable to policy, it occurred well before anyone had a clear picture that the United States or other economies would achieve price stability as it is now conceived. That is, inflation was not clearly fluctuating in a narrow range of two percent for almost another decade after the growth moderation began in the United States [figure 5]. In much of the rest of the world, the disinflation was clearly not complete before 1995 and, especially outside the most advanced economies, the high inflation period extended at least for several more years [Faust (2013), Rogoff (2004)].

Bernanke (2003a) argues,

> The primary cause of the Great Inflation, most economists would agree, was over-expansionary monetary and fiscal policies, beginning in the mid-1960s and continuing, in fits and starts, well into the 1970s.

Just why policymakers made these mistakes has been the subject of fascinating discussion at this symposium. For example, Romer and Romer (2002) give a major role to economists and policymakers unlearning and re-learning that there is no long-run employment benefit from higher inflation. In response, Sargent (2002) gives a more prominent role to bad shocks and the need to learn about deeper issues, rather than re-learn basic ones. Many others have weighed in on this topic.[25]

One indisputable lesson from this experience, however, is reflected in a deep and broad conviction among policymakers and academics that price stability—generally interpreted as low and stable inflation—is the central objective of monetary policy.

We have deliberately painted this new view of monetary policy as a near polar opposite of the design criterion under the gold standard. In the gold standard, international considerations dominate and the domestic price level is left to wander where it might. In the new view, the domestic price level is the primary consideration and just what this means for international imbalances is in the background. Some adherents to the *nice view* may presume that—even in a world of disparate persistently divergent growth—global stability would be the norm if central banks all ignored each other and simply aimed at domestic price stability. Any such presumption is not based on actual historical experience that we are aware of.

The 1965–1995 period also provided another lesson pertinent to our theme of disparate confounding dynamics. Two major oil price shocks occurred in the 1970s. The importance of these shocks in the Great Inflation is disputed, but it is unquestionably true that when important relative prices change dramatically, the near-term implications for appropriate policy may be subtle. This period ushered in the notion of core inflation [Gordon (1975)], and central banks began to routinely attempt to *look through* the effects oil and food price shocks.

But looking through is not always so easy. For example, some argue that the oil shocks were associated with a productivity slowdown [Nordhaus (2004)] and that misperceptions of the productivity effects by the Fed contributed to the Great Inflation [Bullard and Eusepi (2003)].[26] The

[25]For other perspectives on policymakers learning and on the role of fiscal policy, see Davig and Leeper (2006), Primiceri (2006), Eusepi and Preston (2013), and Bianchi and Ilut (2014).

[26]Bullard and Eusepi use a learning model to argue that misperceptions of trend productivity were central to the Great Inflation. Learning can itself be a confounding source of dynamics, as Eusepi et al. (2015) show when agents hold subjective beliefs that macro data contain low-frequency drift. Also see Eusepi and Preston's (2015) thorough survey about the implications of imperfect knowledge. An alternative to learning that also confounds sources of synamics is the heterogenous beliefs that Kasa et al. (2014) and Rondina and Walker (2014a,b) develop.

relative price of oil also interacted in dramatic ways with our theme of divergent dynamics in growth and capital flows. The conventional story goes like this:

> Petro dollar recycling is a familiar story from the 1970s. When oil prices rose sharply in the fall of 1973, oil exporting countries were faced with a windfall in export receipts. Much of these funds were saved and deposited with banks in industrial countries. The banks, in turn, lent on a large part of these fund to emerging economies, especially in Latin America.... When the oil boom subsided in the early 1980s, bank flows to emerging markets reversed sharply, triggering the Latin American debt crisis. [Wiegand (2008, p. 4)]

In turn, it could be argued that the blossoming of the Latin American debt crisis led (for better or worse) to a significant easing of U.S. monetary policy, thereby slowing (for better or worse) the disinflation in the United States.

To put this more generically: stochastic trends in relative prices can greatly complicate monetary policy. In an interconnected, general equilibrium world, these trends may interact in complicated ways that are not easy to "look through" by simply filtering out some component of key variables as in the focus on core inflation.

Finally, demographics played a subtle role in this period, as the demographic cohort known as the baby boom probably reached its largest net nominal debt position during this period and benefitted handsomely from the Great Inflation's effect on the value of this debt.[27] While few would argue that the boomers consciously conspired to engineer the inflation, the inflation may have been much easier to sustain politically given the benefits that this large cohort received [Eichengreen (1992), Faust (1996)]. More generally, Bullard et al. (2012) make a political economy argument that when a large segment of the population is young, we may expect to see high inflation, but as it ages, low inflation is the more likely outcome.

Around 1995, the Great Inflation yielded to the NICE decade. We set this period aside for deeper consideration in section 5, and turn now to the crisis and recovery.

4.3 2005–????. Financial Crisis and the Zero Bound

Growth slowed in many economies in 2007; the crisis bloomed to full intensity in the fall of 2008; and the critical phase of the crisis was over by mid-2009. The crisis both put a spotlight on and worsened certain sovereign debt issues in the euro area, which remain a source of stress.

The period of recovery that continues to this day has not involved what anyone would hope is normal policy. If we are keeping score purely in terms of inflation, however, the period from 2008 through 2014 does not look so bad—especially relative to most prior history. While there have

[27] This is most true where fixed interest rates predominated, as in the United States.

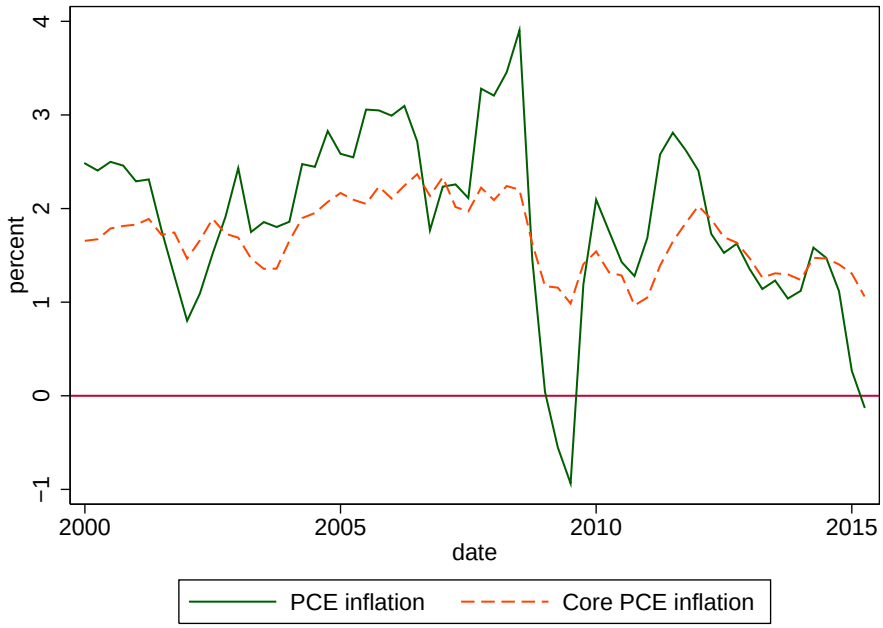


Figure 6: U.S. Core and headline PCE inflation; core excludes food and energy components. Source: BEA and authors' computations.

been, and continue to be, serious concerns about deflation, the United States, United Kingdom, and euro area have not experienced more than very brief and mild bouts of actual deflation. For example, core inflation has been quite steady in the United States, and overall inflation seldom fell below zero [figure 6]. Inflation in the United Kingdom has generally been well away from zero, and euro-area inflation has rarely been negative [figure 7].

These inflation outcomes are consistent with the view that no nation or central bank that diligently or single-mindedly attempted to avoid deflation has ever failed. To be clear, we agree with Bernanke (2012) and others that the Japanese do not provide an example of single-mindedly trying to avoid deflation. Ito and Mishkin (2006) detail the many instances between 1998 and 2003 when the Bank of Japan's rhetoric and actions raised doubts about its commitment to raise inflation [see also Ito (2006) and Hausman and Wieland (2014)]. We make no presumption that nations *should* single-mindedly avoid deflation; rather, we emphasize that there is a major difference between a deflation trap and simply having other priorities than stopping deflation. Perhaps economies can slide from normal times into a deflationary trap just as some theories describe, but as Bernanke (2012), Faust (2015), and Meltzer (1999) argue, the competing view that single-minded central banks have, in practice, avoided deflation may deserve more attention.

Although the disparate confounding dynamics which are our major theme surely played a starring role in the crisis, we will largely set aside this period. It is too easy to draw a distinction between normal times and crises and cordon off confounding dynamics as only relevant in crisis

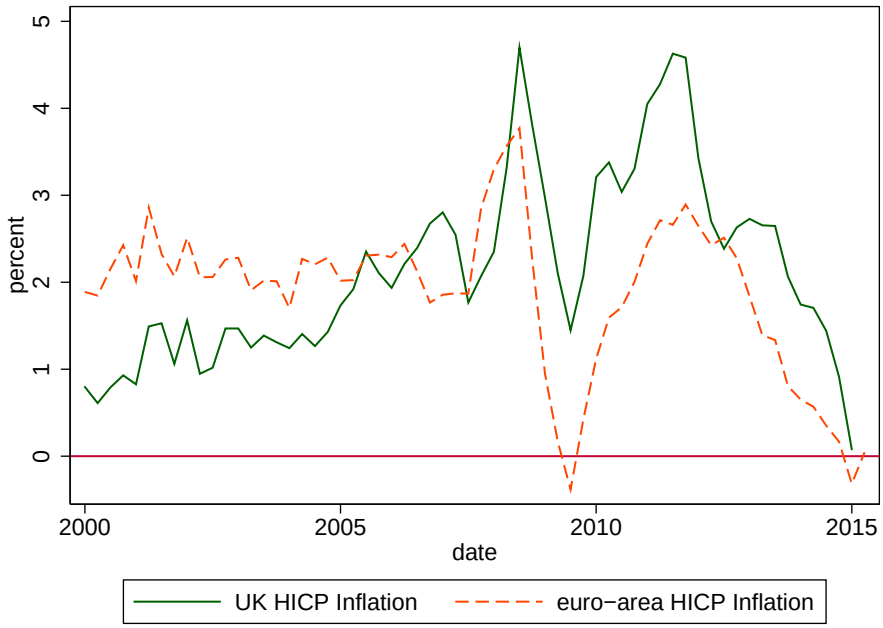


Figure 7: U.K. and euro area inflation. Source: National authorities via FRED and authors' computations.

times. To minimize the risk of this, our quest to understand normal policy and inflation dynamics will generally set aside the crisis.

5 Normal Found? A Closer Look at 1995–2005

The period from 1995–2005 was the subject of much attention at the 2005 Jackson Hole Symposium on the Greenspan legacy. A clear consensus emerged: this was an outstanding period for monetary policy. And by the metric of headline aggregates and historical standards, the outcomes were very favorable indeed. Sadly, the ink on the conference volume was barely dry before the world was descending into a tragic mess; we suspect that some participants might put a somewhat different spin on things today. And Rajan (2005) put a different spin on things even then.

Reviewers of the period before the crisis now comb through the evidence looking for sins of omission and commission that may have contributed to the subsequent downfall. Our purpose is different, and we will not directly comment one way or the other on the quality of policy over this era. We seek to make two main points.

First, whatever the merits of policy between 1995 and 2005, the period is not an example of the *nice view* and of normal cyclical dynamics. The simple world referred to by Draghi in the introductory quote was more myth than reality. If we are looking for a period to illustrate the empirical relevance of the *nice view*, we will have to look elsewhere.

Second, we will argue that the *nice view* set the tone in many policy discussions. DCD were identified and much discussed, but lacking an analytical role in the conventional perspective, their policy effects turn out to be *ad hoc* and unclear. This argument is necessarily highly subjective, and we mainly invite you to form your own opinion.

The primary *ad hoc* deviation from the conventional view arose when Chairman Greenspan more or less single-handedly convinced the FOMC in the second half of the 1990s to abandon its view of normal cyclical dynamics in favor of a "new economy" view. The notoriety that this period generated is testament to how rarely such deviations occur.

We focus on the U.S. experience, touching on events elsewhere at the end only to suggest that similar issues arose in other countries. The bounty of DCD that the short 1995–2005 period offers up can be usefully divided into three episodes. From about 1995–1998, conventional reasoning pointed to diminishing slack and rising inflation, but Greenspan convinced the FOMC to forbear the rate increases called for under standard reasoning. As this episode ended, the dot-com bubble episode ensued; the bubble eventually burst in 2000. In response to the associated economic contraction, the Fed lowered the federal funds rate to one percent and, with slack pointing to worrisome declines in inflation, the third episode began. That episode was dominated by deflation worries, innovative use of forward guidance, and the conundrum in long-term interest rates. Each of the episodes is filled with what, up until the crisis, passed for high drama in advanced economy central banking; each has spawned important literature.

Digging a bit deeper into the forecast evidence in section 3.4 provides a useful backdrop for the discussion. As already noted, the Fed's inflation forecast (among the best on record) was no more accurate than an alternative benchmark forecast path informed by no data at all beyond the endpoints. Figure 8 shows the Greenbook forecast of CPI inflation for the year beginning one quarter in the future. For clarity, only the first and middle Greenbook forecast for each year are reported. The corresponding actual value is plotted at the date of the forecast, not the date when it was realized.

The first and third episodes show a very clear pattern of forecast error. Inflation came in consistently lower than predicted in the first, new economy, episode and inflation came in consistently higher than forecast in the deflation scare episode. We now attempt to shed some light on how the *nice view* of normal cyclical dynamics may help us understand this period.

5.1 THE GREENSPAN NEW ECONOMY EPISODE As the early 1990s recession turned to expansion, conventional measures of tightening slack pointed to rising inflation. This view was reflected in the Greenbook forecast,[28] but also in the Consensus Forecasts forecast and the IMF's WEO forecast. According FOMC transcripts and other accounts [Meyer (2006), Blinder and Yellen

[28] It is important to note that the Greenbook forecast is a staff forecast, and did not reflected conventional wisdom rather than Greenspan's view.

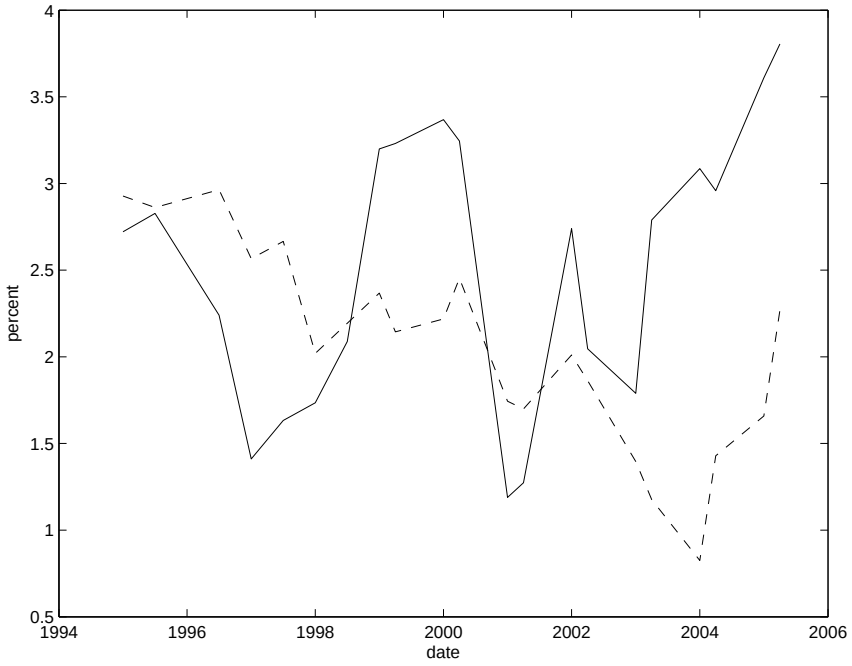


Figure 8: Actual (solid) and Greenbook forecast (dashed) of CPI inflation for the year starting one-quarter in the future. We plot only the first (January or February) and middle (June or July) forecast and outcome for each year. Source: Federal Reserve, authors' calculation

(2001), and Blinder and Reis (2005)], Chairman Greenspan sensed an unprecedented period of rapid productivity growth and more or less single-handedly convinced the FOMC to "forbear" the policy rate increases recommended under the *nice view*.[29] That this was a deviation from standard reasoning seems clear. As Blinder and Reis (2005, p. 58) put it:

> Was that the *optimal* policy response? Who really knows. (Though we suspect it was close.) But it certainly wasn't the *obvious* policy response. In fact, we believe that few central bankers would have had the nerve to stand by calmly as the unemployment rate dipped (and stayed) that low. And we know from firsthand accounts that Greenspan was holding back an FOMC that was eager to raise rates.

Blinder and Reis report evidence, based on the fit of Taylor rules, that the Fed's behavior was most consistent with a Taylor rule in which the natural rate of unemployment was dropping rapidly over this period. Dornbusch (1999) agrees that this was not policy as envisioned under the *nice view*, but suggests a greater concern with confounding dynamics:

> The Fed's experimentation in disregarding Phillips curves and placing great confidence in their better understanding of the New Economy is a key part both in high funda-

[29] As Blinder and Yellen note, the new economy miracle was not really in the macro data until a major revision in 1998.

> mental values in the extra bubble part. Surely, too, their willingness to see or suspect increased productivity—in part, quite possibly, in response to high valuation of assets and their effect on investment and innovation and, hence, on the supply side—makes what otherwise would be a bubble possibly more nearly fundamental value. [Dornbusch (1999, p. 132)]

We will not get into the validity of the claim that Fed policy may have helped fuel the dot-com bubble, but we will highlight Dornbusch's view of confounding dynamics. He speculates that bubble-induced buoyancy in the economy could have supply-side effects that, in turn, moderate any signs of excess that might otherwise appear in indicators of slack.

In any case, the Greenspan Fed deviated from the policy that the *nice view* would have prescribed. Some analysts would argue, at least in retrospect, that the Fed should not have deviated; others might argue for a different deviation. In any case, this period illustrates our view that sorting out DCDs are regularly the the key to policymaking.

The forebearance episode blended smoothly into the dot-com bubble. The NASDAQ began a steep ascent in 1999, peaking around March of 2000 and then falling through most of 2002 to less than one-third of its peak value.

In the *nice view*, policy responds to the state of inflation and some summary of real activity. Bubbles are not on this short list, and several FOMC members, including Greenspan (2002), stated the conventional wisdom that using monetary policy to battle bubbles was inappropriate.

Under the *nice view* policy can be sensitive to asset prices, but only insofar as they affect the the two key indicators for policy, inflation and real activity. As Bernanke and Gertler (1999) put it at Jackson Hole:

> Given a strong commitment to stabilizing expected inflation, it is neither necessary nor desirable for monetary policy to respond to changes in asset prices, except to the extent that they help to forecast inflationary or deflationary pressures. [Bernanke and Gertler (1999, p. 115)]

Given that the dot-com bust gave rise to a deflation scare, it may be of some interest to see how the confounding dynamics of the bubble affected the FOMC's view of its dual mandate objectives.

At the December 1999 FOMC meeting, Michael Prell presented a very rosy macro forecast for both output growth and inflation—the economy was, from a monetary policy standpoint, "performing splendidly." But Prell commented on rising equity values, warning, "We believe that the economy may be getting seriously overheated and in some ways significantly distorted."

Consistent with the *nice view*, the FOMC was, he reminded them, monitoring slack as a key indicator of the problem:

> This Committee has, of course, announced its focus on the mounting pressures in the labor market as the most likely potential source of deteriorating inflation performance and thus cyclical instability. [Federal Open Market Committee (1999)]

Regarding diminishing slack, evidence was mixed, but "the official data actually show decelerating wages."

At the risk of boiling things down too far, one might summarize this discussion as saying that the stock market is worrisome, but we do not see it yet in slack. Starting from the *nice view*, there is not a natural or easy pathway from a possible bubble to slack and, hence, on to policy.

To get further into the nitty gritty, the FOMC baseline focusses on modal outcomes. The popping of a bubble in any given forecast window will, almost by definition, never be the modal scenario, so any implications of bubbles for dual mandate objectives are discussed in alternative scenarios. In March 2000, about at the peak of the bubble, the modal Greenbook outlook remained favorable. Productivity growth had again been marked up and was used to explain an absolute decline in unit labor costs. On standard macro grounds, there was little to complain about. However, Prell made clear,

> I still find the valuations of many so-called tech companies—and the rationales analysts give for them—rather wacky. The fact is, though, that at yesterday's close the Wilshire 5000 was up fully 4 percent from the 13,500 level prevailing a week ago, when we locked into our Greenbook assumption of a flat stock market through the projection period. [Federal Open Market Committee (2000)]

The possible implications of a fall in stock prices were covered in two alternative scenarios in Greenbook, neither of which involved significant disruption [Federal Reserve Board (2000)]. Some commentators accuse central banks of being unaware of worrisome developments. We think awareness is seldom the issue. But if one starts the discussion by giving primacy to the *nice view* of normal cyclical dynamics, it may be difficult for other issues to gain traction.

In the aftermath of the bubble and recession, the federal funds rate was lowered to one percent. Inflation was low and, with standard estimates suggesting that there was significant slack, inflation under the *nice view* was expected to fall further. This was worrisome given the starting point. Throughout 2002 and 2003, real-side outcomes tended to meet or exceed the Greenbook forecast, but surprising productivity growth was a key part of the good news. More rapid productivity growth meant that the economy could expand more quickly without taking up the slack. With the period of slack lasting longer, the inflation forecast was progressively marked down as the real side was marked up.

The June 2002 Greenbook forecast summary states,

> Given the slack in labor and product markets that has opened up over the past year, we anticipate that wage and core price increases will be somewhat smaller in 2002 and 2003 than in 2001.... Core PCE inflation is anticipated to slow to 1.4 percent in both 2002 and 2003, compared with 1.6 percent in 2001. [Federal Reserve Board (2002, pp. I-12–I-13)]

In the January 2003 summary:

> All told, we have upped our projection of GDP growth about 1/4 percentage point, to 3-1/2 percent, this year and about 1/2 percentage point, to 4-3/4 percent, for 2004. [Federal Reserve Board (2003a, pp. I-1–I-2)]
>
> Despite the faster growth of real activity over the forecast period as a whole, we are now projecting a larger gap in resource utilization than we projected in the December Greenbook, reflecting upward revisions to our potential output.... This path for the unemployment rate and our assumed increase in structural productivity are projected to be sufficient to keep inflation trending down. In particular, we are forecasting that core PCE inflation will decline from a bit above 1-1/2 percent in 2002 to around 1-1/4 percent in 2003 and 2004, a projection that is down slightly from our previous one. [Federal Reserve Board (2003a, pp. I-1–I-2)]

From the June 2003 Greenbook summary:

> After increasing at a 1-1/2 percent annual rate in the first half of the year, real GDP is expected to grow at a 4-1/4 percent annual rate in the second half, about 1/3 percentage point more than in the April Greenbook.... These positive influences have led us to raise our 2004 real GDP projection to 5-1/4 percent. Although such a rapid pace of economic growth would be a far cry from recent experience, it reflects our view that the powerful sources of macroeconomic stimulus will lead to a more durable step-up in the pace of final demand and that business spending and hiring will gain momentum by the turn of the year. But the rapid expansion we are projecting for next year also reflects importantly our above-consensus forecast for the growth of potential output....
>
> Slack in resource utilization is expected to put further downward pressure on price inflation over the next year and a half. Following this year's deceleration of about 1/2 percentage point, core PCE inflation edges down a bit further next year, to just under 1 percent. [(Federal Reserve Board, 2003b, pp. I-1–I-2)]

At the June 2003 FOMC meeting, the staff "put the probability of deflation at about 15 percent for this year, just short of 40 percent for 2004, and about 40 percent for 2005" [Federal Open Market Committee (2003, p. 75)].

In light of the concern with deflation, in his July 2003 Humphrey-Hawkins testimony, Chairman Greenspan ventured into the world of forward guidance, uttering the immortal words "considerable period:"

> In the judgment of the Committee, policy accommodation aimed at raising the growth of output, boosting the utilization of resources, and warding off unwelcome disinflation can be maintained for a considerable period without ultimately stoking inflationary pressures. [Greenspan (2005)]

The policy tightening that began in June 2004, was presaged in the May FOMC statement with the further forward guidance, "At this juncture, with inflation low and resource use slack, the Committee believes that policy accommodation can be removed at a pace that is likely to be measured…" [Federal Open Market Committee (2004a)].

The FOMC then commenced two years in which the federal funds rate rose reliably 25 basis points each FOMC meeting. The federal funds rate went from one percent to 5 1/4 percent over this period, but over the same period, yields on long-term Treasury securities were essentially unchanged. It is now generally agreed that there was a substantial fall in the term premium over this period [Backus and Wright (2007)].

At the December 2004, Vice Chairman Kohn raised this issue,

> I also find the recent behavior of bond yields hard to understand. While this Committee has become increasingly confident of the vigor of the expansion over recent months, long-term yields have actually declined, and most of this decrease is accounted for by the decreases in real rates. [Federal Open Market Committee (2004b)]

Kohn (2005) noted the possible policy implications of term premia falling:

> For example, the decline in term premiums in the Treasury market of late may have contributed to keeping long-term interest rates relatively low and, consequently, may have supported the housing sector and consumer spending more generally.

This unusual (dare we say "confounding"?) dynamic was labelled *the conundrum* in Greenspan's June 2005 monetary policy testimony. Calling this a conundrum was another way to say it does not fit in the *nice view* of normal cyclical dynamics in which term premium dynamics play no real role, as Rudebusch et al. (2007) noted and Woodford (2012) emphasized.

Some commentators, including president President Dudley of the Federal Reserve Bank of New York, have subsequently commented that the Fed was, in fact, tightening less than intended

and, perhaps, should have done more.[30] Whether the Fed's gradualism helped to fuel the housing bubble remains hotly debated.

5.2 ADDITIONAL CONFOUNDING ELEMENTS Let us return briefly to the elements of disparate confounding dynamics present in section 3 and discuss the roles they played in the NICE decade. Early in the 2000s, Federal Reserve policymakers were closely monitoring the rising household indebtedness [figure 1]. As Greenspan (2004) commented

> [Many analysts] have been disturbed particularly by the rising ratio of household debt to income and the precipitous decline in the household saving rate. The analysts point out, correctly, that the ratio of household debt to disposable income has risen especially steeply over the past five years and, at 1.2, is at a record high.

He continues,

> To be sure, some households are stretched to their limits. The persistently elevated bankruptcy rate remains a concern, as it indicates pockets of distress in the household sector. But the vast majority appear able to calibrate their borrowing and spending to minimize financial difficulties. Thus, short of a significant fall in overall household income or in home prices, debt servicing is unlikely to become destabilizing.

Of course, relative house prices, too, were showing an unprecedented surge.

Term premia, trending down for many years, fell sharply starting around 2004 giving rise to the conundrum [figure 2]. Under the *nice view*, the central bank sets its policy rate systematically based on output and inflation, presuming we suppose that longer-term rates will behave in some *normal* way. Turner (2013) characterizes the role of long-term interest rates—as distinct from the path of expected future short rates—as "benign neglect." He argues that information in long rates can lead to fresh interpretations of several episodes between 1990 and the financial crisis.

As shown in figure 3 part of the softness in inflation during the 2002-2004 period is attributable to the inflation rate in other goods falling from around zero to below minus two percent; other services inflation rose modestly over the same period. A variety of work reported here at Jackson Hole suggests that increasing competition from China and elsewhere in the emerging world may have played a prominent role in this drop in goods inflation [Rogoff (2004)].

Of course, in a general equilibrium world, all of these may interact. All those cheap goods from abroad were associated with a large U.S. trade deficit. The flip side of the trade deficit was a

[30] Dudley is quoted as saying: "…this was probably a period where the Fed should have done a bit more because we probably should have been tightening financial conditions over that period" [Fleming (2015)]. Barbera (2009) also makes this case.

capital account surplus. The capital inflows, according to Bernanke (2005), may have contributed to the lower term premia and promoted household borrowing.[31]

Our message once again is that a conventional view of normal cyclical dynamics and of the supposed reliable relation between slack and inflation played a central role in policy deliberations over the period. Of course, the slack-based inflation predictions over this period did not materialize. The fact that things do not turn out according to the modal forecast in any one episode is not evidence of much of anything. This is why we documented the more general properties of standard inflation forecasts above. These examples may, however, help flesh out the role reasoning about normal cyclical dynamics played in generating forecasts that performed no better than a forecast path that largely ignores the state of the economy.

The experience of the United States was not unique over this period. For example, in assessing the first decade of Bank of England independence, a report to the Treasury commented favorably on the nice headline outcomes but noted all the main features we have emphasized,

> We cannot guarantee that the next ten years will be so "nice." Many of the benefits of globalisation have already worked through, and the adverse impact on commodity prices of the development of China and India is now being felt. And the effective labour force is unlikely to grow as rapidly as it has done over the past decade or so. Moreover, some aspects of the global economy look unsustainable, particularly the pattern of global current account imbalances and the low level of real interest rates and risk premia. So the macroeconomic context is likely to be somewhat less benign. [Bank of England (2007, p. 21)]

5.3 BOTTOM LINE ON THE NICE DECADE So far we have attempted to make an objective case that potentially policy relevant DCD elements are ubiquitous in the policy world, and a highly subjective case that policy would be improved if these played a more central role in policy deliberations. The nice headline outcomes for a brief time during the NICE decade resulted in part, we believe, from a favorable confluence of disparate confounding dynamics. Any policymakers focussed mainly on domestic slack and aggregate inflation, as the *nice view* recommends, would have been blissfully unaware of most of the story. But, in our experience, central bankers are never blissful and seldom unaware. These confounding elements were the subject of extensive and thoughtful discussion.

We have tried to make a case for our subjective view that these factors, which were extensively discussed, played a minor role relative to the conventional views of slack and inflation when it came to the policy decisions. This latter claim is *merely* an assertion based on our experiences in central banking and our reading of documents associated with policy deliberations. The mapping

[31] Barbera (2006) raised this argument at the time.

from policy discussions and conceptual frameworks to real-world policy decisions is necessarily quite opaque, and we can do little more than provide illustrative examples of our view.

In the remainder of the paper, we explore the possible implications of the perspective that we are recommending.

6 Doing Better in the Coming Normal

Most conventional applied academic work on policy accepts that there are complexities in reality that are not modelled, but essentially leaves as an exercise how to determine when those complexities warrant deviating from the baseline, simple policy prescriptions. Under the presumption that academic research should focus on the hard parts, leaving the easy parts for policymakers to sort out, then macroeconomists seem to have gotten it backwards by focusing on simple solutions to the case when economic dynamics are simple and regular.

There are much more interesting questions. Why are these disparate confounding dynamics so prominent? How can a formal policymaking framework take account of them? There are great opportunities for productive basic research on questions like these, and in section 7 we will illustrate some examples of work that is making progress on such questions. But, to borrow a phrase from Sims' (1980) "Macroeconomics and Reality," *a long road remains* to be travelled before these DCD elements are integrated in our standard analytic framework.

In the meantime, policy must be made, and in this section we explore how DCD elements can more systematically be integrated into regular policy discussions—even before research provides a comprehensive analytic framework.

6.1 Policy Analysis: Is the New Normal Here Already?

Fortunately, history offers us an episode that illustrates what normal policy analysis might look like in the perspective we advocate: the current recovery. To be clear, the tools that policymakers are using to implement policy do not, we hope, constitute a new normal. And, as throughout the paper, we are not taking a stand on whether the particular policies that have recently been followed are optimal in any sense. But the framework for policy analysis is very much in the spirit that we are suggesting.

The paper started with Draghi's summary of the *nice view* of policy and the NICE decade. Of the more recent period, he argues

> [T]here is little doubt that our simpler understanding of monetary policy in the past will not readily return. Policymakers are operating in a more complex and heterogeneous environment. Structural breaks and model uncertainty imply that the regularities of the past can no longer be relied upon. This in turn means that judgement plays a greater role in decision-making. [Draghi (2014)]

Our only nitpick with this statement echoes Zarnowitz: at least as far as inflation dynamics are concerned, the reliability of those regularities in the past may be more myth than reality.

Yellen (2014a, pp. 3–4) recently argued,

> The assessment of labor market slack is rarely simple and has been especially challenging recently. Estimates of slack necessitate difficult judgments about the magnitudes of the cyclical and structural influences affecting labor market variables, including labor force participation, the extent of part-time employment for economic reasons, and labor market flows, such as the pace of hires and quits. A considerable body of research suggests that the behavior of these and other labor market variables has changed since the Great Recession. Along with cyclical influences, significant structural factors have affected the labor market, including the aging of the workforce and other demographic trends, possible changes in the underlying degree of dynamism in the labor market, and the phenomenon of "polarization"—that is, the reduction in the relative number of middle-skill jobs.

As the speech makes clear, these elemenents not only are being discussed, they are clearly affecting policy choices regarding issues such as the timing and pace of normalization. This is is very much in the spirit we are advocating.

Perhaps the clearest example of change is in the treatment of term premia in policymaking. After his stint at the Fed, (Blinder, 1997, p. 16) complained of "everyone—and here I mean analysts, market participants and central bankers alike" simply reading expectations off of the term structure of interest rates, despite the fact that this is "wrong" in a world of large and variable term premia.

In the wake of the crisis, Bernanke (2013) made a clear case that term premia are large and volatile and manipulable by policy and that taking account of them is an essential element of policymaking. Since the crisis, the often confusing dynamics of term premia have become a regular feature of policy discussions, with policymakers incorporating views on substantial changes in premia in their interpretation of interest rate movements. For example,

> [A]lthough market-based measures of inflation compensation have declined appreciably since last summer and bear close watching, I suspect that these declines are primarily driven by changes in risk premiums and market factors that I expect to prove transitory. Yellen (2015)

These quotes are merely indicative of a much richer picture of macroeconomic dynamics we see reflected in policymaking over the last several few years.

6.2 BARBARIANS The line of reasoning that policymakers must use judgment and take a stand on things that basic research has not yet incorporated into a well-established analytic framework rightly brings fears of "seat-of-the-pants" policymaking and, for the more excitable, of barbarians at the central bank gates. Once again, the best solution to this very real risk is for researchers to integrate the disparate confounding dynamics that dominate the practice of central banking into standard models.

Until that happens, policymakers *must* take a stand (either explicitly or implicitly) on what these DCD mean for policy. While history and a large body of research convincingly demonstrate the virtues of constrained discretion, no work shows that the constraints should include ignoring economic dynamics that dominate the data. Instead, the literature on simple policy rules demonstrates that in models in which dynamics are simple, policy can be as well. There has been no clear historical episode of any appreciable duration in which simple Taylor-rule like behavior resulted in benign outcomes.[32]

What is needed is to develop a more robust framework for integrating these elements systematically into policy deliberations. The Fed has taken some important initial steps in this regard. For example, under Bernanke's leadership, the Fed adopted a statement of longer-run goals and strategy for the first time stating an explicit longer run price stability objective and explaining,

> [T]he maximum level of employment is largely determined by nonmonetary factors that affect the structure and dynamics of the labor market. These factors may change over time and may not be directly measurable. Consequently, it would not be appropriate to specify a fixed goal for employment; rather, the Committee's policy decisions must be informed by assessments of the maximum level of employment, recognizing that such assessments are necessarily uncertain and subject to revision. The Committee considers a wide range of indicators in making these assessments. [Federal Open Market Committee (2015)]

This is a start, but just a start. Despite the Fed's efforts, there has been a regular refrain from astute policy observers that the Fed has been "moving the goal posts" as it explains its evolving assessments of the state of the labor market.[33] To an audience steeped in the *nice view* in which policy can be based on two relatively well measured sufficient statistics—perhaps the unemployment rate and core inflation—the new approach does look like moving the goalposts. And without a clearer framework for applying the new approach, central bank policy could easily devolve into regular goalpost moving.

[32] Advocates of such rules can rightly point out that this may be because the approach has not yet been given a real chance. But the fact remains that any claims that NICE-decade outcomes would result are not based in historical experience.

[33] Google "federal reserve" and "moving the goalposts" for a sampling of such analyses.

While commending central banks on integrating DCD elements more thoroughly into policy analysis, we are also strongly advocating that they formulate and communicate a clearer framework for how these elements are likely to affect policy.

While our main topic is the coming normal, readers may naturally wonder what our analysis might imply, say, for the timing and pace of liftoff in the U.S. Any serious treatment of this topic would require another paper, but for clarity let us say the following. One key question will surely be the degree of confidence policymakers have that inflation will be returning to target. We can sketch two variations on a view that might support liftoff sooner rather than later. First, we can be confident based on our slack measures that inflation will soon be rising. Second, we are confident that slack is diminishing and that, at some point as slack diminishes this will provide upward pressure on inflation. We believe we are nearing that point. Statements like the first probably are not warranted; statements like the second arguably are. In our view, recent Fed communication has sounded more like the latter.

7 The Longer-Run: Research and DCD Issues that May Be Prominent in the Future

From a modelling perspective, the issues we are emphasizing regarding disparate secular or persistent dynamics have been core issues since the beginning of the field of applied macro modelling. Like many modern modellers, Klein sought to model the economy as on a balanced growth path with the balance reflected in "great ratios." In a fascinating article, Klein and Kosobud (1961) report their efforts to assess these ratios in a theory-consistent manner. They carefully explore the savings rate, labor's share of income, labor force participation, and then they ask about the role of the real interest rate in determining whether growth is balanced between workers and capitalists.

A quick summary from a more modern perspective is that measurement is difficult, but that there may be very persistent change in these ratios, change that may be difficult to disentangle from cyclical variation.

There are two ways of dealing with inconvenient stochastic trends in variables. First, ignore them entirely—for example, assume that the Great Ratios are fixed. Central banks seldom take this approach, but it is common in academic research. Second, assume that slow-moving variables cannot matter much for near-term policy analysis. Often this amounts to reasoning based on changes and assuming that the slow-moving component does not change much at policy relevant horizons. This is common in policymaking.[34]

Academic and policy researchers have begun to move beyond the *nice view* models to integrate disparate confounding dynamics into otherwise conventional monetary policy models. This section

[34]For example, Summers (1996, p. 39) makes this argument about secular change in term premia; see also the discussion of demographics below.

considers three prominent examples of DCD whose importance to policymakers is likely to grow in coming decades. We explore how these phenomena, once integrated into the analytics, are likely to affect the appropriate stance of monetary policy.

7.1 LABOR'S SHARE OF INCOME Although in Klein and Kosobud's work from 50 years ago labor's share of income displayed important cyclical variation, it did not contain a significant trend. Recent evidence suggests that labor share shows very persistent—that is, secular—stochastic variation. By several measures, labor's compensation as a share of total income has declined considerably in the United States [figure 9]. Feestra et al. (2015) document that declining labor share of income is a wide-spread phenomenon among advanced economies. Among the world's eight largest economies, seven have experienced declining labor shares since 1975.[35] The cyclical component in this ratio is also still prominent, as the figure makes clear.

From a societal perspective, the secular change in this share can be related to important debates over the income and wealth distribution in our economies, a topic many monetary policymakers have noted with concern in recent years,[36] citing reasons that center on what Carney (2014) calls "delivering a basic social contract comprised of relative equality of outcomes; equality of opportunity; and fairness across generations."

The consensus among policymakers, with which we agree, is that monetary policy can do little to affect secular variation in labor share and that focusing on stability in growth and inflation at least provides favorable background conditions against which society can grapple with this issue.

But trends and cycles can interact in subtle ways—once again, it is difficult to "look through" the secular variation to see the cyclical part. Suppose, for example, that underlying secular forces have turned and are tending to promote a return of labor's share to prior levels. In accounting terms, the most obvious way for this to happen is for nominal wages to grow faster than the sum of inflation and productivity growth. In the *nice view* there is no secular movement in labor share, and this wage behavior signals diminishing slack and rising inflation. Tighter monetary policy could nip this in the bud.

In the real world that we might soon face, policymakers may have to take a position on whether the rising wages are a natural part of a secular re-balancing in labor share or instead a sign of cyclical overheating. A sharp monetary policy response to what happens to be secular pressures could have the undesired consequence of slowing the economy and pushing off the secular rise in

[35] Karabarbounis and Neiman (2014) report that, in increasing order of size of decline, the seven are: United States, Japan, Canada, France, Italy, Germany, and China. Great Britain is the only large economy in which labor share has risen (slightly).

[36] Bernanke (2007), Carney (2014), Mersch (2014), Yellen (2014b), and Haldane (2015). Not everyone agrees there is an immediate empirical link between labor share and income or wealth distribution [Gordon and Dew-Becker (2008) and Jacobson and Occhino (2012)].

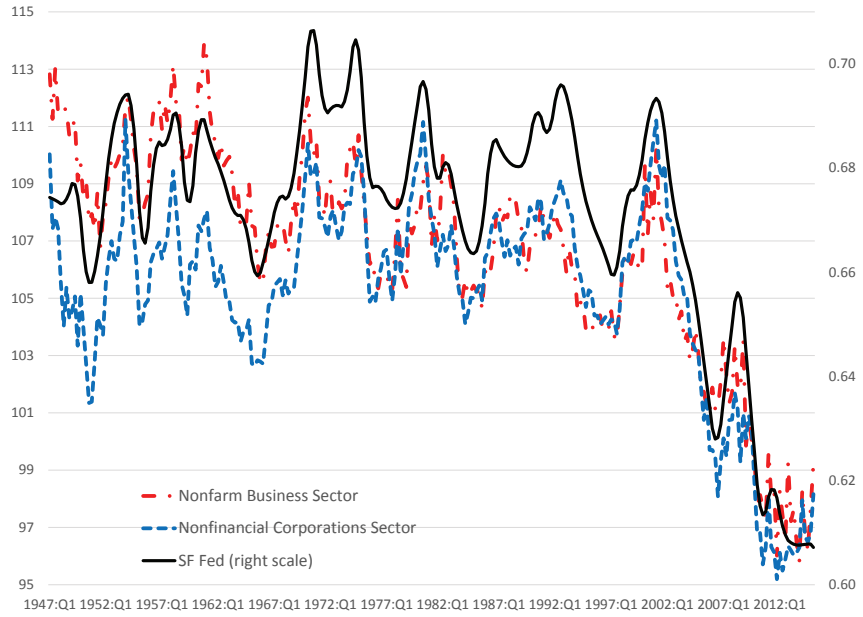


Figure 9: Measures of labor share in the United States. Labor shares for non-farm business sector (dotted-dashed line, left scale) and nonfinancial corporations sector (dashed line, left scale), 2009 = 100; exponent on quality-adjusted hours (solid line, right scale). Source: Federal Reserve Bank of St. Louis FRED and Federal Reserve Bank of San Francisco http://www.frbsf.org/economic-research/total-factor-productivity-tfp.

labor's share.[37] In short, a central bank intending to lean against inflationary winds could instead find itself resisting a secular revival of labor's share.

7.2 DEMOGRAPHICS Demographics probably provide the canonical case of slow-moving variables that may be immensely important to understanding longer-run dynamics and welfare, but have few clear shorter-run implications. As Bean (2004, p. 449) put it: "…the glacial nature of demographic changes appears to suggest that the implications for monetary policy should be modest."

Demographic developments and projections have been thoroughly discussed at this symposium.[38] As those works document, the major economies are generally aging, but at disparate rates. Japan is now the world's oldest advanced economy, with Germany and Western Europe close behind [figure 10]. The U.S. population is older than China's, but that ranking is projected to reverse in 25 years, as China's population ages rapidly in coming years. While we agree with Bean, we

[37] As Goodhart and Erfurth (2014) note, there are other possible confounding dynamics here. Setting aside the secular change, from a purely cyclical perspective, tight policy may raise labor's share: recessions hurt profits, but if firms retain labor, recessions hurt wages less, so labor's share rises. In short, labor gets a bigger piece of a shrinking pie.

[38] Lee (2014) is an excellent exposition of demographic trends from last year's symposium; Bloom and Canning (2004) and Bryant (2004) are more detailed analyses from a decade earlier. Bryant is packed with analytical insights about the economic implications of demographic change, with special emphasis on international dimensions.

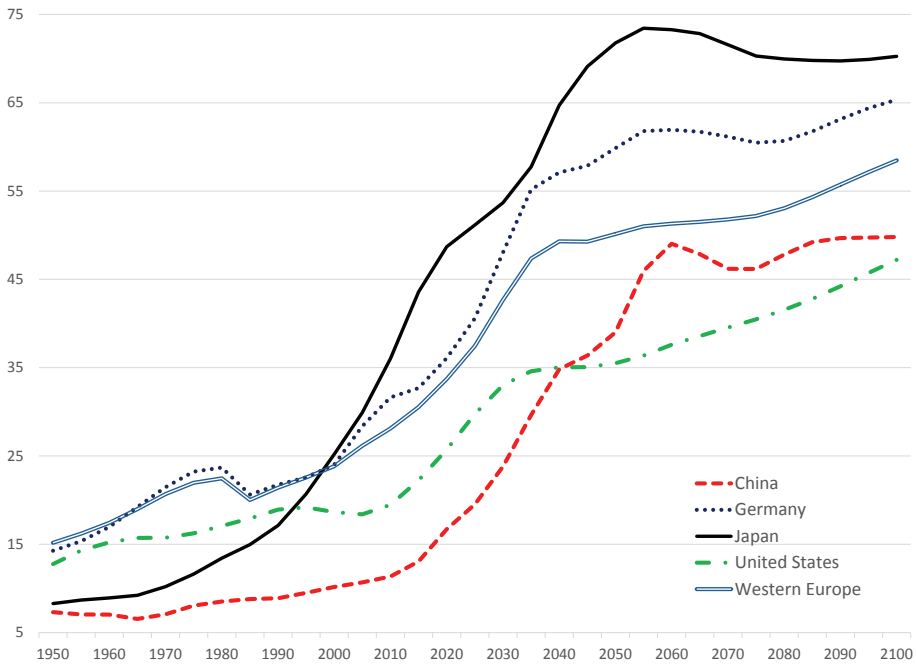


Figure 10: Elderly dependency ratio, defined as the population older than 64 as a percentage of working age, 15–64. Source: United Nations.

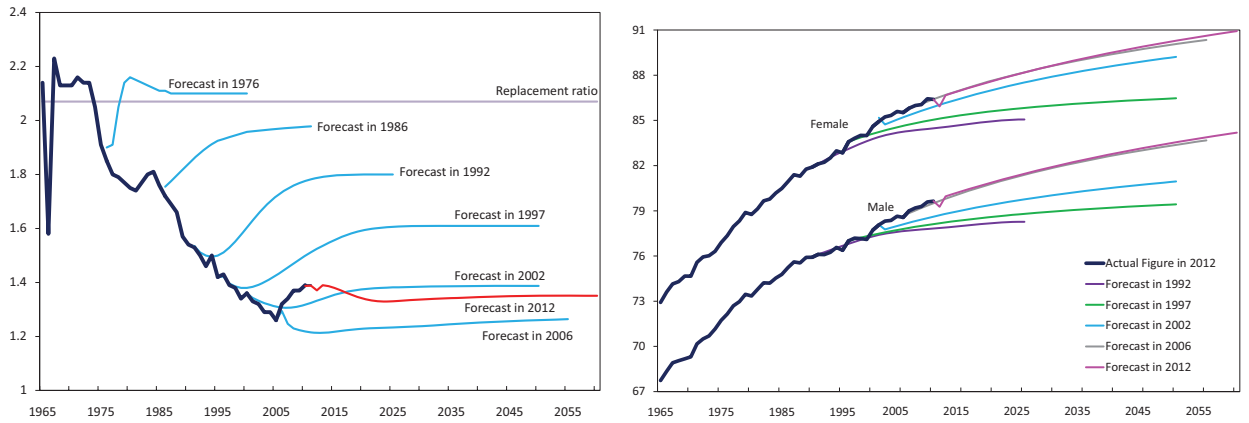
still see ample opportunities for these trends to interact with monetary policy in challenging ways.

Our main observation for policymakers is that demographics don't matter much for monetary policy, except when they do. In this section, we attempt to fill out this incredibly helpful insight.

Demographics require that we abandon representative-agent thinking and confront intergenerational distribution issues—inherently political issues that present challenging issues for independent central banks charged mainly with aggregate objectives. As noted above, distributional issues may have played a role in the great inflation. Distributional issues have clearly loomed large in the recent period as analysts have debated whether low interest rates and LSAPs have hurt an older generation of savers to promote a return to work of younger generations facing historically high rates of unemployment.

There is no doubt that monetary policy is much simpler and less politically sensitive in a balanced-growth world where these distributional issues do not exist, or at least are largely static and do not evolve over time. But this is not the world in which we live. And while neither we nor central banks are the obvious ones to opine on how society *should* deal with these issues, central banks can position themselves to play their appropriate role in this area by better understanding the issues at stake.

In that spirit, we explore some of the possible issues. There are two logically distinct aspects to demographic changes. The first might be called "pure demographics," which entails the direct impacts of aging populations, increases in longevity, changes in fertility rates, immigration, and



(a) Fertility

(b) Life Expectancy

Figure 11: Revisions to forecasts of Japanese fertility rates and life expectancy. Source: Ministry of Health, Labour and Welfare; National Institute of Population and Social Security Research, adapted from Nishimura (2012).

shifts in relative sizes of generations. A second issue, which in many cases is deeply intertwined with the pure demographics, is the fiscal stresses created when a large generation reaches retirement age and begins to collect old-age benefits that in large part have not been pre-funded.[39] We will return to fiscal stress, in section 7.3.2.

Even the glacial change in pure demographics may not be perfectly predictable. When Medicare was passed in 1965, American newborns expected to live about 70 years; now that number is 80. Sixty-five year olds at that time were expected to live another 14 years; today they can anticipate living until they are 85. Figure 11 illustrates surprise changes in perceptions of Japanese fertility rates and life expectancy by comparing government projections to actual outcomes. About every five years, when new forecasts come out, there have been substantial revisions to important demographic variables. Fertility rates have been consistently lower than expected, while Japanese live surprisingly longer lives. This amounts to a sequence of shocks raising old-age dependency ratios.

At the quarterly frequency on which central banks typically focus, these surprise changes are probably small enough to be negligible. But over longer horizons the effects can be large: relative to information available just a decade ago, Japanese men can expect to live three years longer. News about extended life expectancy feeds directly into consumption-saving decisions and portfolio composition. And an unusually large elderly cohort, as for the baby-boomers, amplifies the aggregate implications of the news.

Japan has been at the vanguard of research and policy discussions about the macroeconomic

[39]The two need not be linked. For example, Norway has pure demographic shifts occurring, but it also has a massive sovereign wealth fund and no fiscal stress.

implications of demographic shifts. Former Governor of the Bank of Japan Shirakawa (2012) presents an articulate case for how monetary policy interacts with an aging population. He lists a number of considerations to argue that on net it is possible that Japan's aging may create a "looming menace" that threatens to produce prolonged deflation.

Cross-country evidence on macroeconomic impacts of demographics consistently finds that aging populations, whether measured as increases in life expectancy, decreases in fertility rates, or increases in old-age dependency ratios, are associated with lower per-capita growth rates and lower real interest rates.[40] Results for inflation are more mixed [Juselius and Takáts (2015), Yoon et al. (2014), and Aksoy et al. (2015)]. This data summary, however, leaves open the question of what channels may be operative.

A growing body of theory papers that bring life-cycle consumers into monetary models helps with those interpretations. These economies are subject to changes in birth rates, retirement age, and life expectancy, so they can be used to mimic observed demographic changes.[41] That literature combines demographic dynamics with sluggish price adjustment to deliver simple life-cycle versions of the *nice* models. Although that line of work has not matured to the point of producing even medium-scale models that have been fit to data, it nonetheless throws up some provocative insights:

- Marginal propensities to consume can vary dramatically across age cohorts. As big (or small) generations move through their life cycles, aggregate consumption functions will drift.

- Consumption bundles also vary across stages of the life cycle, with older consumers spending more of their income on services (like health care) and less on durables (like housing). Slowly moving and persistent shifts in relative demands for goods and services inject trends into relative prices. An unusually large age cohort like the baby boom can create very large shifts in relative prices.

- As a population ages, labor force and labor supply decline to reduce the marginal product of capital and reduce investment opportunities.

- An aging population may reduce the economy's aggregate saving and willingness to absorb government debt, as point that Hoshi and Ito (2014) emphasize confounds demographics with sovereign risk.

- Macroeconomic shocks—including monetary policy actions—affect different age cohorts asymmetrically. Young households' decisions are more interest-sensitive than are old house-

[40] Yoon et al. (2014) and Aksoy et al. (2015), for example.

[41] This discussion draws on papers that build on Gertler (1999), including Fujiwara and Teranishi (2008), Katagiri (2012), Kara and von Thadden (2015), Carvalho and Ferrero (2014), and Katagiri et al. (2015).

holds'. In addition to producing redistributive effects, this asymmetry alters the transmission mechanism of monetary policy in time-varying ways.[42]

- Periodic revisions to official forecasts of fertility and longevity, like those in figure 11, can have powerful effects on public pension systems, whose actuarial evaluations use those projections. Projection updates force discrete shifts in expected paths of fiscal expenditures or taxes, which alter households' expected disposable income.

- Through various channels, an aging population may lead to a negative trend in long-term real interest rates and in the long-run neutral real interest rate. If monetary policymakers do not take account of this fact and thereby perceive too high a neutral rate, policy will be chronically tighter than intended until their perception changes, as Carvalho and Ferrero (2014) illustrate.

- It is an empirical regularity that older people have a higher propensity to vote, and so an aging population can be expected to alter political economy dynamics.[43]

As interesting as these theoretical predictions might be, they can leave a practitioner wondering about how much these can really matter for policy. We offer two rather speculative examples.

First, world demographics play a role in Bernanke's (2005) *savings glut* hypothesis, put forward as a partial explanation for the interest rate conundrum in the early 2000s. While the demographics are glacial, their effects may manifest in a less gradual manner. Glacial change in demographics in this case interacts in rich ways with relative growth, trade patterns and institutions, long-run world real interest rates, and the state of the business cycle to present policymakers with a difficult interpretational challenge.

The second example concerns labor force participation and is more immediately relevant. As the baby boom moves toward retirement, experts have long expected a trend decline in labor force participation in the United States and elsewhere. But the magnitude and timing of that decline are empirical matters. Standard reasoning suggests that secular and cyclical forces should interact as the particular choice of retirement time may be affected by near-term wage prospects. A worker who loses her job at a point near a target retirement date may prefer to retire than to engage in a costly job search. Initial job entry may similarly be affected by cyclical conditions.

In the face of the severe recession, labor force participation in the United States declined from 66.4 percent in January 2007 and stood at 62.6 percent in June 2015. There seems to be no question

[42] Imam (2013) finds evidence that demographic changes account for some of the decline in monetary policy effectiveness that Boivin et al. (2010) document.

[43] Katagiri et al. (2015) develop a life-cycle model whose political economy equilibrium implies that when monetary policy is at the zero lower bound the impacts of aging depend on its underlying source: unexpected declines in birth rates raise inflation, while surprise increases in longevity reduce inflation.

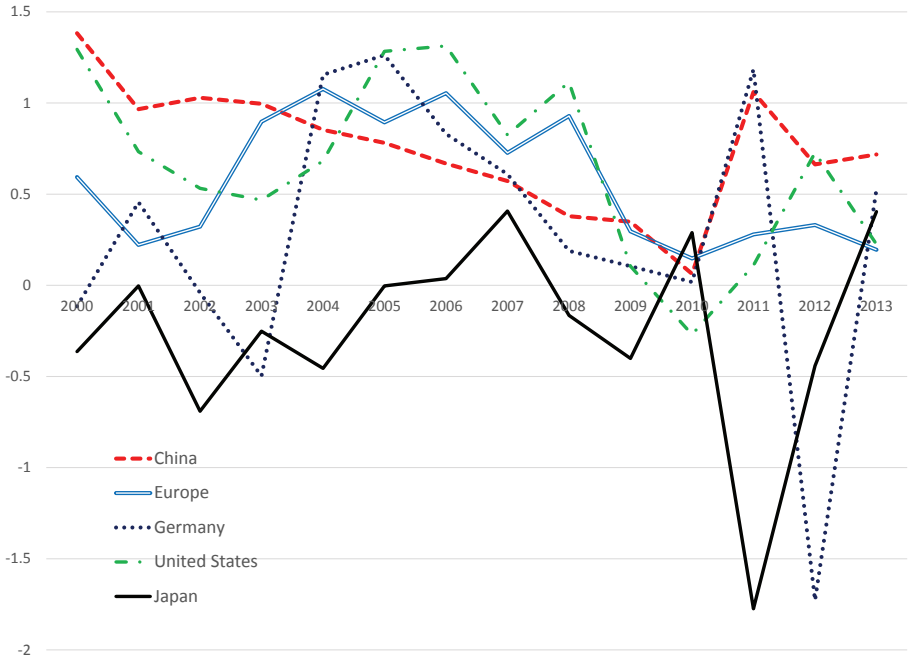


Figure 12: Annual growth rates of labor force. Source: United Nations.

that demographic movements alone caused much of this decline [Aaronson et al. (2014)], but there is considerable uncertainty regarding whether some of this drop might be reversed in a robustly growing economy and regarding the implications for monetary policy.[44] Erceg and Levin (2013) illustrate a path to incorporating such issues into otherwise standard business cycle models.

To emphasize the generic themes of this paper, the issue here is how secular demographic changes may interact with the normal business cycle to make a standard slack measure like the unemployment rate an insufficient—and possibly misleading—guide to policy.

In a balanced growth world with fixed great ratios and static age distributions, central banks are not confronted with these issues, so they are not drawn into these politically sensitive areas. We believe that it is inevitable that central banks will be drawn further into these issues in coming years. We commend central banks that have already taken the lead on researching these issues, and urge continuing those efforts.

7.3 FISCAL POLICY One stochastically trending variable that no one ignores is the ratio of sovereign debt to income. Actually, this statement is too strong, for many models of normal cyclical dynamics do not include or ascribe any importance to this ratio. By conventional views, monetary policy affects the real economy so long as prices and wages do not fully adjust to economic disturbances. Once adjustments are complete, monetary policy is neutral. Unlike monetary pol-

[44] It might be reversed at least for a time until the continued evolution of the secular component swamps any cyclical aspects.

icy, fiscal policy does not rely primarily on nominal rigidities to affect the economy: government spending and tax rates impinge on private decisions directly and when those policy actions affect asset accumulation, their impacts can be long-lasting. The International Monetary Fund (2015), for example, emphasizes the role that fiscal policy plays in promoting and sustaining long-term economic growth.

Many econometric models that central banks developed during the *nice* period follow the usual monetary new Keynesian approach of Smets and Wouters (2003, 2007) or Christiano et al. (2005) and simply omit government's fiscal position.[45] Assuming some version of Ricardian equivalence is required for this to be strictly true. If we were not being sticklers, we might imagine that this approach could be approximately appropriate in a world where the fiscal position is stable and, loosely speaking, doesn't matter much.

In a world where government debt-GDP ratios follow dramatic trends that can shift rapidly, this *nice view* assumption that the magnitude of is approximately irrelevant is not tenable. Ricardian equivalence sweeps under the carpet the potentially long-lasting dynamics that changes in distorting taxes and financing of government debt induce. Most policymakers, in our experience, reject Ricardian equivalence out of hand—with its powerful implication about the irrelevance of government debt; there are many reasons why the assumption might not hold even approximately.[46]

Once we dispense with Ricardian irrelevance, government debt becomes an important state variable whose slow evolution induces movements in all variables that depend on the state of government indebtedness. The frequencies at which fiscal policy actions affect macro variables depend on details of fiscal modelling, including role of government spending—as a substitute for or complement to private consumption or as infrastructure investment—types of distorting taxes, maturity structure of government debt, and fiscal rules.[47] Dynamic impacts of fiscal policy also depend in important ways on maintained assumptions about monetary policy behavior. In addition, advanced economies and, before long, some newly emerging economies, are headed for prolonged periods of increasing fiscal stress prompted by the demographic issues already discussed. Aging populations have been promised old-age benefits that to a large degree are being financed on a pay-as-you-go basis. For several decades economists have been warning of the "coming generational storm."[48]

[45] For example, the ECB's area-wide model [Christoffel et al. (2008)] or Sveriges Riksbank's RAMSES II [Adolfson et al. (2013)]. Exceptions include Freedman et al. (2010), Harrison et al. (2005) and Brayton et al. (2014), which model how (potentially distorting) fiscal instruments adjust to stabilize debt.

[46] Without providing an exhaustive list, practical reasons that Ricardian equivalence can break down include: presence of distorting taxation, private decision makers with different planning horizons than governments, incomplete financial markets, short-term government debt that serves as collateral and liquidity in financial transactions, and uncertainty about how policies will adjust in the future to stabilize debt.

[47] By *fiscal rules* we mean how the evolution of taxes and spending are formally modelled.

[48] That phrase comes from Kotlikoff and Burn's (2004) book, but the warnings well pre-date it; see Auerbach and Kotilikoff (1987, ch. 11), Auerbach et al. (1994, 1995), O'Neill (1996), Congressional Budget Office (2002).

In this section we review three generic features of fiscal policy that greatly complicate empirical interpretations. We start with ways in which routine fiscal disturbances are likely to be misapprehended by models of the *nice view*. Then we turn to two examples relevant to advanced economies today: the potentially subtle consequences of fiscal stress that arise from population aging and an analytical approach to fiscal limits and sovereign-risk spreads.

7.3.1 FISCAL DYNAMICS Figure 13 illustrates one estimate of how long fiscal dynamics can persist in a conventional model that includes fiscal details. The thought experiment debt-finances a temporary but persistent increase in government purchases of one percent of spending under two monetary-fiscal combinations: active monetary/passive fiscal policy or monetary dominance (dashed lines) and passive monetary/active fiscal policy or fiscal dominance (solid lines). The figure illustrates two generic features of fiscal effects: government debt dynamics are central to output and inflation outcomes—across both policy mixes, outcomes reflect the paths that government debt takes; those dynamics can be very slow-moving—the figure plots paths over 250 years.

Fiscal dynamics stem from two sources. Over shorter horizons the role that government spending serves combines with the real and nominal rigidities that DSGE models embed to exert strong influences. In the figure, model estimates make spending a complement to consumption and some rigidities are fairly high.[49] These features alone do not produce the longer-run dynamics. Those come from a second source: how the expansion in government debt is financed—the precise mix of tax revenues, spending reversals, and inflation that eventually retire debt back to its pre-expansion level. Like all deleveraging, historically U.S. federal debt has been paid off only gradually.[50] Like the "headwinds" associated with private deleveraging, public delveraging's impacts depend on both the speed of the deleveraging and the methods employed.

The fiscal dynamics that figure 13 depicts are absent from standard models developed to understand the NICE decade. In those models, government debt and lump-sum taxes take on lives of their own, with no implications for macro variables. Their effects then will be perceived as conundrums or be misattributed in some way. These issues are likely to loom largest when accurate interpretations are most important, such as during large fiscal expansions of the variety implemented in the aftermath of the financial crisis.

7.3.2 FISCAL STRESS Studies repeatedly conclude that fiscal policies in most advanced economies are on "unsustainable trajectories." Unsustainable policies bring to mind Stein's (1989, p. 1) law: "If something cannot go on forever, it will stop." Remarkably, policy reports about fiscal sustainability tend to turn the law on its head by asking, "If past policies, including ones that everyone

[49] Bouakez and Rebei (2007), Leeper et al. (2010b), Zubairy (2014), and Traum and Yang (2015) estimate models under various assumptions about the roles that government spending plays.

[50] Other studies that emphasize the role of fiscal financing include Chung and Leeper (2007), Leeper et al. (2010a), Uhlig (2010), Hall and Sargent (2011), and Drautzburg and Uhlig (2013).

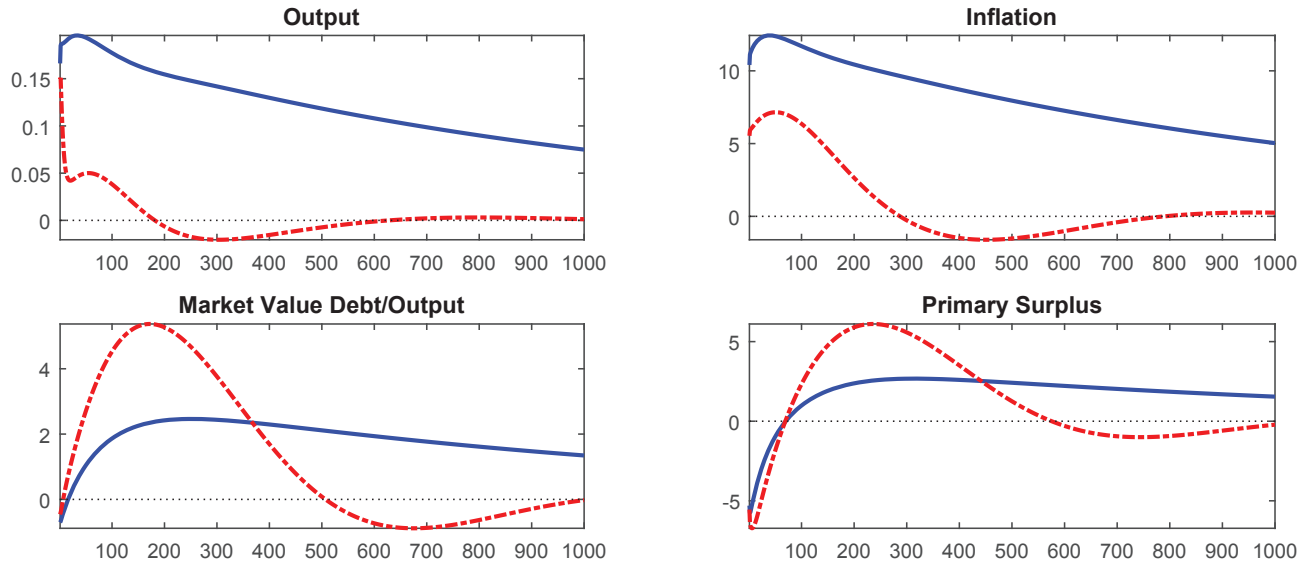


Figure 13: Paths of macro variables after a transitory 1 percent expansion in government spending under alternative monetary-fiscal mixes. Active monetary/passive fiscal (dashed lines); passive monetary/active fiscal (solid lines). Estimated from 1955q1–2014q2. In percentage deviations from steady state, except inflation, which is in basis points. Time units in quarters. Source: Leeper et al. (2015).

knows cannot last, were to continue indefinitely, what explosive path would government debt follow?"[51] Pointing out that something has to change serves a purpose in political discourse. But for a policymaker who is trying to interpret in-coming data, it is more useful to explore the range of possible changes and their economic consequences.

These sustainability reports treat fiscal policy with the same lack of seriousness that the NICE-decade monetary models do. In those models, government debt can grow forever as a share of GDP without implications for the real economy or inflation, as long as it doesn't grow too fast.[52]

This is not all about predicting fiscal crises. For example, we might be confident that most advanced economies will reform their fiscal policies well before signs of crisis emerge. But people are not completely myopic, and their beliefs about the nature and the timing of those reforms affect their economic decisions today. Those decisions must be leaving tracks in data that can inform monetary policy choices.

Recent experiences in Europe remind us of how messy one sort of resolution to fiscal stress—sovereign default—can be. But it's naïve to believe that fiscal stress is having negligible effects

[51] Examples abound, but Congressional Budget Office (2002), Cecchetti et al. (2010), and Ghosh et al. (2012) are representative. The Netherlands Bureau for Economic Policy Analysis (CPB) is an exception to these long-run fiscal analyses [Bos and Teulings (2012)].

[52] The growth rate must be less than the rate at which real debt service accumulates. A small piece of fiscal reality—a limit to the amount of tax revenue the government can extract—eliminates equilibria with exploding debt.

until it explodes in our faces. Policy change occurs when the status quo is no longer tenable—the economy hits its fiscal limit, the point at which—for economic or political reasons—tax revenue can no longer rise to finance the promised payments.

Unresolved fiscal stress means that no one knows how policy will change at the fiscal limit. And because the fiscal limit itself and the economy's path to that limit are driven by future economic and political shocks, no one knows when—or if—the limit will be breached. This uncertainty leads economic agents to bet on how things will play out. Will taxes rise to finance promised benefits? Will some promised benefits be reneged upon? Will inflation rise and bond prices fall to devalue the debt the government issues to finance benefits? Will some combination of the three occur?

Sensible people, with little else on which to base beliefs, will put some weight on each scenario and base their decisions on what they expect inflation, interest rates, tax rates and government transfers will be as a result. These decisions affect the equilibrium that we observe today, but because no crisis has occurred, the impacts may be subtle.

Davig et al. (2010, 2011) simulate what the equilibrium might look like in the decades before the economy hits its fiscal limit. Their notion of a fiscal limit is driven by the prevailing resistance in the United States to taxes: once the income tax rate reaches an upper bound, no further rate increases are politically viable.[53] In the period before taxes reach their limit, government transfers are fully honored and financed by a mix of higher taxes and higher government debt. Nothing dramatic happens. Higher taxes reduce both work effort and investment, so output, consumption, and real interest rates fall. Inflation rises glacially: 10-year-ahead average inflation gradually rises by 40 to 60 basis points over a 20-year simulation period.

The simulation hangs together with only a modest increase in expected and realized inflation because the *distribution* of inflation begins to look rather alarming to a central banker who seeks to keep inflation low and stable. Inflation develops a fat tail, with the upper 0.005 percentile containing inflation rates as high at 50 percent annually. The slow upward creep in inflation and the severe skewing of inflation's distribution occur despite a monetary policy that slavishly obeys the Taylor principle to fight inflation in the run-up to the fiscal limit.

These are not forecasts of economic outcomes from unresolved fiscal stress. They are merely possible scenarios based on bold assumptions about future policy rules and their probabilities. But the work illustrates one realistic way in which fiscal policy can subtly and very gradually affect the probability distribution of inflation and the economic environment that monetary policy confronts.

7.3.3 Fiscal Limits

A deeper concept of fiscal limits aims to model a country's ability and willingness to honor its sovereign debt obligations.[54] "Ability and willingness" are pretty

[53] In their study of Japanese government debt sustainability, Hoshi and Ito (2013) define the fiscal limit as the point at which government debt outstanding exceeds total private sector financial assets.

[54] Bi (2012) develops this idea of a fiscal limit and applies it to the European debt crisis.

broad, encompassing both economic and non-economic considerations. Ability depends on the discounted future stream of "maximum" primary surpluses, which determine how much debt can be supported. Any factors that influence maximum revenues and minimum expenditures feed into the stream of maximum surpluses. Examples include expected productivity growth, prospective policies—structural, tax or expenditure reforms—demographic trends, and political economy developments. Because these factors are intrinsically uncertain and forward-looking, the analysis produces a probability distribution of future maximum surpluses that hinges critically on country-specific features.

Bi (2012) uses a DSGE model to map the current state of the economy into the current fiscal limit distribution. For example, given a level of government debt today, a good productivity shock whose effects are expected to linger will raise the expected path of maximum surpluses to shift the fiscal limit out and increase the distance between current debt and the limit. The farther debt is from its limit, the less risky it is and the smaller are risk premia.

Fiscal limits force us to think beyond a country's current debt-GDP ratio to consider the many factors that impinge on the country's future ability and willingness to repay its debts. It's easy to cite Ireland, Greece or Portugal and list the reasons that their sovereign bonds were deemed to be risky during the 2010–2012 period. Spain presents a subtler challenge. From the start of monetary union Spanish government debt shrank to reach a nadir in 2008 of about 30 percent of GDP—10 percentage points below Germany's. Based on this single statistic, Spain seemed poised to enter the global financial crisis far from its fiscal limit. With the recession, in Spain—and everywhere else—government debt began to rise, but it remained below the German level through 2009 and stayed well below the euro area as a whole.

Why, if Spanish debt was in safe territory, did its 10-year bond yields begin to rise in 2011? Figure 14 suggests that more than bond-market vigilantism was in play. During the decade of good fiscal housekeeping, Spanish inflation was chronically above union-wide inflation, at times by more than a percentage point.[55] Thoughtful observers would note that in a monetary union, Spain's persistently higher-than-union-wide inflation rates could damage the country's competitiveness and future growth prospects. With weak future economic growth come lower tax revenues and higher social safety-net expenditures that reduce the expected flow of Spanish primary surpluses and shift the country's fiscal limit in toward prevailing and growing debt levels.

Whether from lack of competitiveness or some other source, Spain did experience a second dip in economic growth from 2011 through the middle of 2013. Unemployment continued the upward march that it began during the recession, rising well above 20 percent before peaking at 27 percent in February 2013. These developments raised concerns about Spain's ability to finance a

[55] Faust (2013) points out that both the IMF's *World Economic Outlook* and the *Consensus Forecasts* underpredicted Spanish inflation from 2000–2008 by an average of 80 basis points.

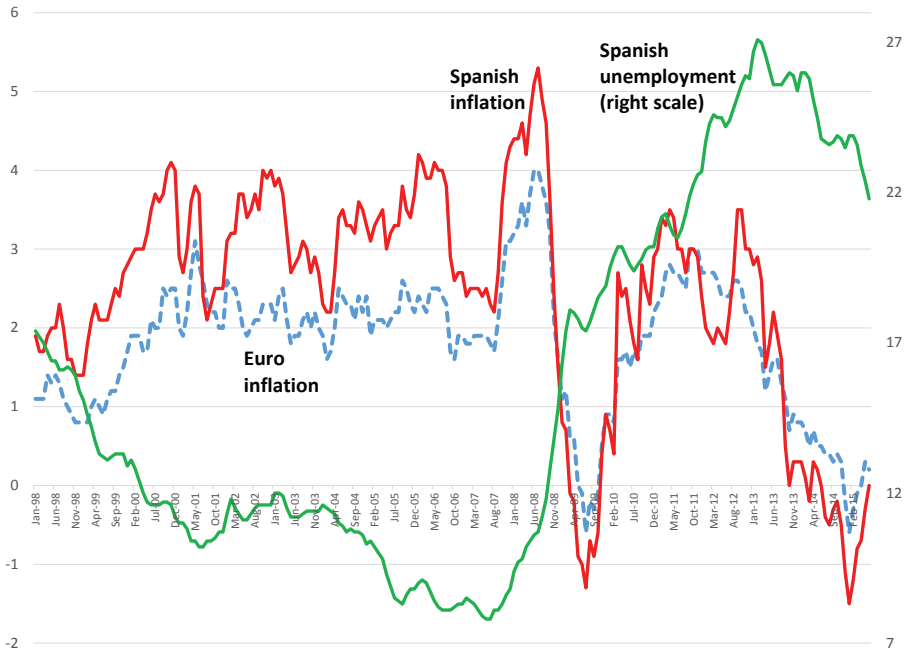


Figure 14: HICP inflation rates for Spain (solid line, left scale) and Euro(dashed line, left scale) and Spanish harmonized unemployment rate (solid line, right scale). Source: Eurostat.

government debt that rose from 69 to 92 percent of GDP between 2011 and 2013. Movement of debt toward Spain's fiscal limit coincided with an inward shift in the country's limit distribution, a combination that Bi's (2012) fiscal limit analysis predicts would raise risk premia.

Fiscal limits tell us that debt-GDP ratios are an incomplete—and potentially misleading—summary of a country's fiscal health. What matters is the distance between current debt and the fiscal limit distribution. The position and shape of that distribution, in turn, depend on the great many factors that determine the discounted value of future primary surpluses. As the Spanish and U.S. fiscal stress examples illustrate, interactions between cyclical outcomes (inflation and unemployment) and longer-run developments (fiscal financing and sustainability) run in both directions to compound the confounding dynamics.

This dynamic concept of a fiscal limit offers a fresh perspective on one aspect of the return to normal. Policymakers are well aware that if normal entails raising interest rates toward their historic averages, large outstanding government debt stocks will generate much higher debt service.[56] But higher real interest rates reduce the present value of primary surpluses. In the absence of higher revenues or lower outlays, the fiscal limit distribution will shift in, narrowing its distance from current outstanding debt. In countries that are already staring at their limits, government bond

[56]The Congressional Budget Office (2015) assumes three-month treasuries will rise from 0.1 to 3.4 percent from 2015 to 2025, while 10-year bond yields will increase from 2.6 to 4.6 percent. Despite a relatively flat path for government debt, interest rate hikes will increase net interest payments from 6.6 to 15.4 percent of federal outlays.

yields may rise for reasons unrelated to the expected path of short rates.

We wrap up the discussion of fiscal policy with an exquisite example of policy-relevant disparate confounding dynamics. Kocherlakota (2015) recently gave a speech that links three issues: (i) the secular decline in the neutral long-run real interest rate, as measured by 10 year-10 year forward yields on TIPS (Treasury Inflation Protected Securities); (ii) the consequences of this declining long rate for the likelihood that policy will hit the lower bound for the nominal policy interest rate, and (iii) the role of the level of public debt for the level of the neutral long rate. He points out that if government debt serves a role in completing financial markets—by providing collateral or liquidity—then there can be surprising benefits from issuing more debt when monetary policy is at the zero lower bound. An expansion in government debt raises the neutral real interest rate, which pulls up the nominal policy interest rate. Kocherlakota's example ties together demographic change—a likely source of the declining neutral real rate—with globalization of financial markets, monetary policy, and fiscal policy to address a pressing policy issue.

8 Concluding Remarks

This paper offers no simple or straightforward way to deal with the issues we present. Our only robust advice at this point is that we should stop looking for simple and straightforward solutions to the challenges that monetary policy poses.

What, then, will the new normal be? Regarding the big structural questions—secular stagnation and the like—we have nothing to offer.

From the standpoint of policy analysis, however, we think there is a clearer picture. We will not *return to* the policy as mythologized during the NICE decade—the myth that normal cyclical dynamics are relatively benign and some simple rule captures the essence of good policy. We cannot *return* to that world because it never existed. Our reading of history is that understanding disparate confounding dynamics has always been the key to good policymaking and failure to understand those dynamics has played a key role in major policy mistakes. Normal cyclical dynamics as capture in the *nice view*, in contrast, have played a distinctly minor role in both the successes and failures.

The new normal in policy analysis will, we hope, look more like what we have seen in policy analysis during the current recovery. This places great demands on policymakers, both in the formulation *and* communication of policy. As episodes such as the taper tantrum illustrate, this road will likely be bumpy. Central banks have made a good start and we believe that with the continued focus of academics, staff economists, and policymakers, this road can be smoothed.

REFERENCES

AARONSON, S., T. CAJNER, B. FALLICK, F. GALBIS-REIG, C. SMITH, AND W. WASCHER (2014): "Labor Force Participation: Recent Developments and Future Prospects," *Brookings Papers on Economic Activity*, Fall, 197–255.

ADOLFSON, M., S. LASÉEN, L. CHRISTIANO, M. TRABANDT, AND K. WALENTIN (2013): "Ramses II—Model Description," Sveriges Riksbank Occasional Paper No. 12, February.

AKSOY, Y., H. S. BASSO, T. GRASL, AND R. P. SMITH (2015): "Demographic Structure and Macroeconomic Trends," Manuscript, Birkbeck, University of London, January.

AUERBACH, A. J., J. GOKHALE, AND L. J. KOTLIKOFF (1994): "Generational Accounting: A Meaningful Way to Evaluate Fiscal Policy," *Journal of Economic Perspectives*, 8, 73–94.

——— (1995): "Restoring Generational Balance in U.S. Fiscal Policy: What Will It Take?" *Federal Reserve Bank of Cleveland*, 31, 3–12.

AUERBACH, A. J. AND L. J. KOTILIKOFF (1987): *Dynamic Fiscal Policy*, Cambridge, M.A.: Cambridge University Press.

BACKUS, D. K. AND J. H. WRIGHT (2007): "Cracking the Conundrum," *Brookings Papers on Economic Activity*, 38, 293–329.

BANK OF ENGLAND (2007): "The Bank of England's Submission Regarding the Economic Context," Treasury Committee Inquiry into the Monetary Policy Committee of the Bank of England: Ten Years On, February 19.

BARBERA, R. (2006): "Who is in Charge of U.S. Monetary Policy, Hu Indeed!" Strategic Investment Perspectives, ITG Economic Research, February.

——— (2009): *The Cost of Capitalism: Understanding Market Mayhem and Stabilizing our Economic Future*, New York: McGraw-Hill Education.

BEAN, C. R. (2004): "Global Demographic Change: Some Implications for Central Banks," in *Global Demographic Change: Economic Impacts and Policy Challenges*, 2004 Jackson Hole Symposium: Federal Reserve Bank of Kansas City Economic Conference Proceedings, 447–454.

BERNANKE, B. AND M. GERTLER (1999): "Monetary Policy and Asset Price Volatility," in *New Challenges for Monetary Policy*, 1999 Jackson Hole Symposium: Federal Reserve Bank of Kansas City Economic Conference Proceedings, 77–128.

BERNANKE, B. AND H. JAMES (1991): "The Gold Standard, Deflation, and Financial Crisis in the Great Depression: An International Comparison," in *Financial Markets and Financial Crises*, ed. by R. G. Hubbard, Chicago: University of Chicago Press, 33–68.

BERNANKE, B. S. (2003a): "'Constrained Discretion' and Monetary Policy," Remarks before the Money Marketeers of New York University, New York, February 3.

——— (2003b): "A Perspective on Inflation Targeting," Remarks at the Annual Washington Policy Conference of the National Association of Business Economists, Washington, D.C., March 25.

——— (2004): "The Logic of Monetary Policy," Remarks before the National Economists Club, Washington, D.C., December 2.

——— (2005): "The Global Saving Glut and the U.S. Current Account Deficit," Remarks at the Sandbridge Lecture, Virginia Association of Economists, Richmond, March.

——— (2007): "The Level and Distribution of Economic Well-Being," Speech Before the Greater Omaha Chamber of Commerce, Omaha, Nebraska, February.

——— (2012): "Deflation: Making Sure 'It' Doesn't Happen Here," Speech presented at the National Economists Club, Washington, D.C., November 21.

——— (2013): "Long-Term Interest Rates," Speech given at the Annual Monetary/Macroeconomics Conference: The Past and Future of Monetary Policy, San Francisco, March 1.

BI, H. (2012): "Sovereign Risk Premia, Fiscal Limits and Fiscal Policy," *European Economic Review*, 56, 389–410.

BIANCHI, F. AND C. ILUT (2014): "Monetary/Fiscal Policy Mix and Agents' Beliefs," Manuscript, Duke University, May.

BLINDER, A. S. (1997): "What Central Bankers Could Learn from Academics—and Vice Versa," *Journal of Economic Perspectives*, 11, 3–19.

BLINDER, A. S. AND R. REIS (2005): "Understanding the Greenspan Standard," in *The Greenspan Era: Lessons for the Future*, 2005 Jackson Hole Symposium: Federal Reserve Bank of Kansas City Economic Conference Proceedings, 11–96.

BLINDER, A. S. AND J. L. YELLEN (2001): *The Fabulous Decade: Macroeconomic Lessons from the 1990s*, The Century Foundation Press.

BLOOM, D. E. AND D. CANNING (2004): "Global Demographic Change: Dimensions and Economic Significance," in *Global Demographic Change: Economic Impacts and Policy Challenges*, 2004 Jackson Hole Symposium: Federal Reserve Bank of Kansas City Economic Conference Proceedings, 9–56.

BOIVIN, J., M. T. KILEY, AND F. S. MISHKIN (2010): "How Has the Monetary Transmission Mechanism Evolved Over Time?" in *Handbook of Monetary Economics*, ed. by B. M. Friedman and M. Woodford, Amsterdam: Elsevier Press, vol. 3, 369–422.

BORDO, M. AND A. FILARDO (2005): "Deflation and Monetary Policy in a Historical Perspective: Remembering the Past or Being Condemned to Repeat It," *Economic Policy*, October, 799–844.

BORDO, M. D. (1981): "The Classical Gold Standard: Some Lessons for Today," *Federal Reserve Bank of St. Louis Economic Review*, May, 2–17.

BOS, F. AND C. TEULINGS (2012): "The Dutch CPB: What Can be Learned from the World's Oldest Fiscal Watchdog?" VoxEU.org, May 1.

BOUAKEZ, H. AND N. REBEI (2007): "Why Does Private Consumption Rise After a Government Spending Shock?" *Canadian Journal of Economics*, 40, 954–979.

BRAYTON, F., T. LAUBACH, AND D. REIFSCHNEIDER (2014): "The FRB/US Model: A Tool for Macroeconomic Policy Analysis," FEDS Note, April.

BRYANT, R. C. (2004): "Cross-Border Macroeconomic Implications of Demographic Change," in *Global Demographic Change: Economic Impacts and Policy Challenges*, 2004 Jackson Hole Symposium: Federal Reserve Bank of Kansas City Economic Conference Proceedings, 83–144.

BULLARD, J. AND S. EUSEPI (2003): "Did the Great Inflation Occur Despite Policymaker Commitment to a Taylor Rule?" Federal Reserve Bank of St. Louis Working Paper No. 2003-20, October.

BULLARD, J., C. GARRIGA, AND C. J. WALLER (2012): "Demographics, Redistribution, and Optimal Inflation," *Federal Reserve Bank of St. Louis Review*, 94, 419–439.

CARNEY, M. (2014): "Inclusive Capitalism—Creating a Sense of the Systemic," Speech at the Conference on Inclusive Capitalism, London, May.

CARVALHO, C. AND A. FERRERO (2014): "What Explains Japan's Persistent Deflation?" Manuscript, University of Oxford, August.

CECCHETTI, S. G., M. S. MOHANTY, AND F. ZAMPOLLI (2010): "The Future of Public Debt: Prospects and Implications," *BIS Working Papers No. 300*, Monetary and Economic Department, March.

CHRISTIANO, L. J., M. EICHENBAUM, AND C. L. EVANS (2005): "Nominal Rigidities and the Dynamic Effects of a Shock to Monetary Policy," *Journal of Political Economy*, 113, 1–45.

CHRISTOFFEL, K., G. COENEN, AND A. WARNE (2008): "The New Area-Wide Model of the Euro Area: A Micro-Founded Open-Economy Model for Forecasting and Policy Analysis," ECB Working Paper No. 944, October.

CHUNG, H. AND E. M. LEEPER (2007): "What Has Financed Government Debt?" *NBER Working Paper, NBER Working Paper No. 13425*.

COGLEY, T. AND T. J. SARGENT (2015): "Measuring Price-Level Uncertainty and Instability in the U.S., 1850–2012," *Review of Economics and Statistics, forthcoming*.

CONGRESSIONAL BUDGET OFFICE (2002): *A 125-Year Picture of the Federal Government's Share of the Economy, 1950 to 2075*, Washington, D.C.: CBO.

——— (2015): *Updated Budget Projections: 2015 to 2025*, Washington, D.C., March: CBO.

DAVIG, T. AND E. M. LEEPER (2006): "Fluctuating Macro Policies and the Fiscal Theory," in *NBER Macroeconomics Annual 2006*, ed. by D. Acemoglu, K. Rogoff, and M. Woodford, Cambridge: MIT Press, vol. 21, 247–298.

DAVIG, T., E. M. LEEPER, AND T. B. WALKER (2010): "'Unfunded Liabilities' and Uncertain Fiscal Financing," *Journal of Monetary Economics*, 57, 600–619.

——— (2011): "Inflation and the Fiscal Limit," *European Economic Review*, 55, 31–47.

DEL NEGRO, M., M. P. GIANNONI, AND F. SCHORFHEIDE (2015): "Inflation in the Great Recession and New Keynesian Models," *American Economic Journal: Macroeconomics*, 7, 168–196.

DORNBUSCH, R. (1999): "Commentary: Monetary Policy and Asset Price Volatility," in *New Challenges for Monetary Policy*, 1999 Jackson Hole Symposium: Federal Reserve Bank of Kansas City Economic Conference Proceedings, 129–135.

DRAGHI, M. (2013): "The Role of Monetary Policy in Addressing the Crisis in the Euro Area," Speech given at the 'Room for Discussion' of the Study Association SEFA and the Faculty of Economics and Business, Amsterdam, April 15.

——— (2014): "Monetary Policy Communication in Turbulent Times," Speech given at the Conference De Nederlandsche Bank 200 Years: Central Banking in the Next Two Decades, Amsterdam, April 24.

DRAUTZBURG, T. AND H. UHLIG (2013): "Fiscal Stimulus and Distortionary Taxation," Federal Reserve Bank of Philadelphia Working Paper No. 13-46, November.

EICHENGREEN, B. (1992): *Golden Fetters: The Gold Standard and the Great Depression*, New York: Oxford University Press.

——— (2004): "Global Imbalances and the Lessons of Bretton Woods," NBER Working Paper No. 10497, May.

ERCEG, C. J. AND A. T. LEVIN (2013): "Labor Force Participation and Monetary Policy in the Wake of the Great Recession," IMF Working Paper No. 13/245, July.

EUSEPI, S., M. GIANNONI, AND B. PRESTON (2015): "The Limits of Monetary Policy with Long-Term Drift in Expectations," Manuscript, University of Melbourne, May 28.

EUSEPI, S. AND B. PRESTON (2013): "Fiscal Foundations of Inflation: Imperfect Knowledge," Manuscript, Monash University, October.

——— (2015): "The Science of Monetary Policy: An Imperfect Knowledge Perspective," Manuscript, Monash University, February.

FAUST, J. (1996): "Whom Can We Trust to Run the Fed? Theoretical Support for the Founders' Views," *Journal of Monetary Economics*, 37, 267–283.

——— (2013): "A Report on the Predictive Accuracy of the IMF's WEO Forecast," Manuscript, Johns Hopkins University, February 5.

——— (2015): "Did We Avoid 'It'? And Other Mid-Recovery Questions," Manuscript, Johns Hopkins University, June.

FAUST, J. AND J. H. WRIGHT (2013): "Forecasting Inflation," in *Handbook of Economic Forecasting*, ed. by G. Elliot and A. Timmermann, Amsterdam: Elsevier Press, vol. 2A, 2–56.

FEDERAL OPEN MARKET COMMITTEE (1999): "Transcripts of Meeting of the FOMC," Federal Reserve System, http://www.federalreserve.gov/monetarypolicy/fomchistorical1999.htm, December.

——— (2000): "Transcripts of Meeting of the FOMC," Federal Reserve System, http://www.federalreserve.gov/monetarypolicy/fomchistorical2000.htm, March.

——— (2003): "Transcripts of Meeting of the FOMC," Federal Reserve System, http://www.federalreserve.gov/monetarypolicy/fomchistorical2003.htm, June.

——— (2004a): "Policy Statement of the FOMC," Federal Reserve System, http://www.federalreserve.gov/monetarypolicy/fomchistorical2004.htm, May.

——— (2004b): "Transcripts of Meeting of the FOMC," Federal Reserve System, http://www.federalreserve.gov/monetarypolicy/fomchistorical2004.htm, December.

——— (2015): "Statement on Longer-Run Goals and Monetary Policy Strategy," Federal Reserve Board, Washington, D.C., January 27.

FEDERAL RESERVE BOARD (2000): "Greenbook, Part I," Federal Reserve System, http://www.federalreserve.gov/monetarypolicy/fomchistorical2000.htm, March.

——— (2002): "Greenbook, Part I," Federal Reserve System, http://www.federalreserve.gov/monetarypolicy/fomchistorical2002.htm, June.

——— (2003a): "Greenbook, Part I," Federal Reserve System, http://www.federalreserve.gov/monetarypolicy/fomchistorical2003.htm, January.

——— (2003b): "Greenbook, Part I," Federal Reserve System, http://www.federalreserve.gov/monetarypolicy/fomchistorical2003.htm, June.

FEESTRA, R. C., R. INKLAAR, AND M. P. TIMMER (2015): "The Next Generation of the Penn World Table," Forthcoming in *American Economic Review*.

FLEMING, S. (2015): "Transcript: Interview with William Dudley of the New York Fed," *Financial Times*, June 26.

FREEDMAN, C., M. KUMHOF, D. LAXTON, D. MUIR, AND S. MURSULA (2010): "Global Effects of Fiscal Stimulus During the Crisis," *Journal of Monetary Economics*, 57, 506–526.

FRIEDMAN, M. (1960): *A Program for Monetary Stability*, New York: Fordham University Press.

FUJIWARA, I. AND Y. TERANISHI (2008): "A Dynamic New Keynesian Life-Cycle Model: Societal Aging, Demographics, and Monetary Policy," *Journal of Economic Dynamics and Control*, 32, 2398–2427.

GERTLER, M. (1999): "Government Debt and Social Security in a Life-Cycle Economy," Amsterdam, vol. 50 of *Carnegie-Rochester Conference Series on Public Policy*, 61–110.

GHOSH, A., J. I. KIM, E. G. MENDOZA, J. D. OSTRY, AND M. S. QURESHI (2012): "Fiscal Fatigue, Fiscal Space and Debt Sustainability in Advanced Economies," *The Economic Journal*, 123, F4–F30.

GILCHRIST, S. AND E. ZAKRAJŠEK (2015): "Customer Markets and Financial Frictions: Implications for Inflation Dynamics," Prepared for *Inflation Dynamics and Monetary Policy*, 2015 Jackson Hole Symposium, August 11.

GOODHART, C. A. AND P. ERFURTH (2014): "Monetary Policy and Long-Term Trends," VoxEU.org, November 3.

GORDON, R. J. (1975): "Alternative Responses of Policy to External Supply Shocks," *Brookings Papers on Economic Activity*, 1975, 183–206.

GORDON, R. J. AND I. DEW-BECKER (2008): "Controversies About the Rise of American Inequality: A Survey," NBER Working Paper No. 13982, April.

GREENSPAN, A. (2002): "Economic Volatility," Remarks at a symposium sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, August 30.

——— (2004): "The Mortgage Market and Consumer Debt," Remarks at America's Community Bankers Annual Convention, Washington, D.C., October 19.

——— (2005): "Testimony before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate," Board of Governors of the Federal Reserve System, February 16.

HALDANE, A. G. (2015): "Growing, Fast and Slow," Speech at University of East Anglia, February.

HALL, G. J. AND T. J. SARGENT (2011): "Interest Rate Risk and Other Determinants of Post-WWII U.S. Government Debt/GDP Dynamics," *American Economic Journal: Macroeconomics*, 3, 1–27.

HARRISON, R., K. NIKOLOV, M. QUINN, G. RAMSAY, A. SCOTT, AND R. THOMAS (2005): *The Bank of England Quarterly Model*, London: Bank of England.

HAUSMAN, J. K. AND J. F. WIELAND (2014): "Abenomics: Preliminary Analysis and Outlook," *Brookings Papers on Economic Activity*, spring, 1–63.

HÖRDAHL, P. AND O. TRISTANI (2014): "Inflation Risk Premia in the Euro Area and the United States," *International Journal of Central Banking*, 10, 1–47.

HOSHI, T. AND T. ITO (2013): "Is the Sky the Limit? Can Japanese Government Bonds Continue to Defy Gravity?" *Asian Economic Policy Review*, 8, 218–247.

——— (2014): "Defying Gravity: Can Japanese Sovereign Debt Continue to Increase Without a Crisis?" *Economic Policy*, 27, 5–44.

IMAM, P. (2013): "Shock from Graying: Is the Demographic Shift Weakening Monetary Policy Effectiveness?" IMF Working Paper No. 13/191, September.

INTERNATIONAL MONETARY FUND (2015): "Fiscal Policy and Long-Term Growth," IMF Policy Paper, June.

ITO, T. (2006): "Japanese Monetary Policy: 1998–2005 and Beyond," in *Monetary Policy in Asia: Approaches and Implementation*, Bank for International Settlements, 105–132.

ITO, T. AND F. S. MISHKIN (2006): "Two Decades of Japanese Monetary Policy and the Deflation Problem," in *Monetary Policy Under Very Low Inflation in the Pacific Rim, NBER–EASE*, ed. by A. K. Rose and T. Ito, Chicago: University of Chicago Press, vol. 15, 131–193.

JACOBSON, M. AND F. OCCHINO (2012): "Labor's Declining Share of Income and Rising Inequality," *F*ederal Reserve Bank of Cleveland Economic Commentary, No. 2012–13, September 25.

JUSELIUS, M. AND E. TAKÁTS (2015): "Can Demography Affect Inflation and Monetary Policy?" BIS Working Paper No. 485, February.

KARA, E. AND L. VON THADDEN (2015): "nterest Rate Effects of Demographic Changes in a New-keynesian Life-Cycle Framework," *Macroeconomic Dynamics*, FirstView, 1–45.

KARABARBOUNIS, L. AND B. NEIMAN (2014): "The Global Decline of the Labor Share," *Quarterly Journal of Economics*, 129, 61–103.

KASA, K., T. B. WALKER, AND C. H. WHITEMAN (2014): "Heterogeneous Beliefs and Tests of Present Value Models," *Review of Economic Studies*, 81, 1137–1163.

KATAGIRI, M. (2012): "Economic Consequences of Population Aging in Japan: Effects through Changes in Demand Structure," IMES Discussion Paper No. 2012-E-3, Bank of Japan, March.

KATAGIRI, M., H. KONISHI, AND K. UEDA (2015): "Aging and Deflation from a Fiscal Perspective," Manuscript, Bank of Japan, June.

KINDLEBERGER, C. P. (1973): *The World in Depression*, London: Allen Lane The Penguin Press.

KING, M. (2003): Speech given to East Midlands Development Agency/Bank of England Dinner, Leicester, October, http://www.bankofengland.co.uk/archive/Documents/historicpubs/speeches/2003/speech204.pdf.

KLEIN, L. R. AND R. F. KOSOBUD (1961): "Some Econometrics of Growth: Great Ratios of Economics," *Quarterly Journal of Economics*, 75, 173–198.

KOCHERLAKOTA, N. (2015): "Fiscal Policy and the Long-Run Neutral Real Interest Rate," Speech given at Bundesbank Conference, Frankfurt, July 9.

KOHN, D. L. (2005): "Monetary Policy Perspectives on Risk Premiums in Financial Markets," Remarks at the Financial Market Risk Premiums Conference, Federal Reserve Board, Washington, D.C., July 21.

KOTLIKOFF, L. J. AND S. BURNS (2004): *The Coming Generational Storm: What You Need to Know About America's Economic Future*, Cambridge, MA: MIT Press.

LEE, R. (2014): "How Population Aging Affects the Macroeconomy," in *Re-Evaluating Labor Market Dynamics*, 2014 Jackson Hole Symposium: Federal Reserve Bank of Kansas City Economic Conference Proceedings, 261–283.

LEEPER, E. M., M. PLANTE, AND N. TRAUM (2010a): "Dynamics of Fiscal Financing in the United States," *Journal of Econometrics*, 156, 304–321.

LEEPER, E. M., N. TRAUM, AND T. B. WALKER (2015): "Clearing Up the Fiscal Multiplier Morass," NBER Working Paper No. 21433, July.

LEEPER, E. M., T. B. WALKER, AND S.-C. S. YANG (2010b): "Government Investment and Fiscal Stimulus," *Journal of Monetary Economics*, 57, 1000–1012.

LEVIN, A. T. AND J. B. TAYLOR (2010): "Falling Behind the Curve: A Positive Analysis of Stop-Start Monetary Policies and the Great inflation," NBER Working Paper No. 15630, January.

LEVIN, A. T. AND J. C. WILLIAMS (2003): "Robust Monetary Policy with Competing Reference Models," *Journal of Monetary Economics*, 50, 945–975.

MARTIN, R. F., T. MUNYAN, AND B. A. WILSON (2014): "Potential Output and Recessions: Are We Fooling Ourselves?" IFDP Notes, Federal Reserve Board, November 12, http://www.federalreserve.gov/econresdata/notes/ifdp-notes/2014/potential-output-and-recessions-are-we-fooling-ourselves-20141112.html.

MELTZER, A. H. (1999): "Commentary: Monetary Policy at Zero Inflation," in *New Challenges for Monetary Policy*, 1999 Jackson Hole Symposium: Federal Reserve Bank of Kansas City Economic Conference Proceedings, 261–276.

MERSCH, Y. (2014): "Monetary Policy and Income Inequality," Speech at the Corporate Credit Conference, Muzinich, Zurich, October.

MEYER, L. H. (2006): *A Term at the Fed: An Insider's View*, New York: HarperCollins.

NASON, J. M. (2006): "Instability in U.S. Inflation: 1967–2005," *Federal Reserve Bank of Atlanta Economic Review*, 91, 39–59.

NASON, J. M. AND G. W. SMITH (2015): "Measuring the Slowly Evolving Trend in US Inflation with Professional Forecasters," Manuscript, North Carolina State University, January.

NISHIMURA, K. G. (2012): "Ageing, Finance and Regulations," Keynote Address at the Joint Forum Meeting, Tokyo, November 14–15.

NORDHAUS, W. (2004): "Retrospective on the 1970s Productivity Slowdown," NBER Working Paper No. 10950, December.

O'NEILL, J. E. (1996): "The Long-Run Budgetary Impacts of an Aging Population," Testimony Before the Committee on the Budget U.S. House of Representatives, March 13.

PRIMICERI, G. (2006): "Why Inflation Rose and Fell: Policymakers' Beliefs and U.S. Postwar Stabilization Policy," *Quarterly Journal of Economics*, 121, 867–901.

RAJAN, R. G. (2005): "Has Financial Development Made the World Riskier?" in *The Greenspan Era: Lessons for the Future*, 2005 Jackson Hole Symposium: Federal Reserve Bank of Kansas City Economic Conference Proceedings, 313–369.

ROGOFF, K. (2004): "Globalization and Global Disinflation," in *Monetary Policy and Uncertainity: Adapting to a Changing Economy*, Jackson Hole Symposium: Federal Reserve Bank of Kansas City Economic Conference Proceedings, 77–112.

ROMER, C. D. AND D. H. ROMER (2002): "The Evolution of Economic Understanding and Postwar Stabilization Policy," in *Rethinking Stabilization Policy*, Jackson Hole Symposium: Federal Reserve Bank of Kansas City Economic Conference Proceedings, 11–78.

RONDINA, G. AND T. B. WALKER (2014a): "Dispersed Information and Confounding Dynamics," Manuscript, Indiana University, October.

——— (2014b): "Learning and Informational Stability," Manuscript, Indiana University, June.

RUDEBUSCH, G. D., B. P. SACK, AND E. T. SWANSON (2007): "Macroeconomic Implications of Changes in the Term Premium," *Federal Reserve Bank of St. Louis Review*, 89, 241–269.

SARGENT, T. J. (2002): "Commentary: The Evolution of Economic Understanding and Post-war Stabilization Policy," in *Rethinking Stabilization Policy*, Jackson Hole Symposium: Federal Reserve Bank of Kansas City Economic Conference Proceedings, 79–94.

——— (2010): "Interview with Thomas Sargent," Interviewed by Art Rolnick, https://www.minneapolisfed.org/publications/the-region/interview-with-thomas-sargent, September.

SHIRAKAWA, M. (2012): "Demographic Changes and Macroeconomic Performance—Japanese Experiences," Speech at 2012 BOJ-IMES Conference, Tokyo, May 30.

SIMS, C. A. (1980): "Macroeconomics and Reality," *Econometrica*, 48, 1–48.

SMETS, F. AND R. WOUTERS (2003): "An Estimated Dynamic Stochastic General Equilibrium Model of the Euro Area," *Journal of the European Economic Association*, 1, 1123–1175.

——— (2007): "Shocks and Frictions in US Business Cycles: A Bayesian DSGE Approach," *American Economic Review*, 97, 586–606.

STEIN, H. (1989): "Problems and Not-Problems of the U.S. Economy," *The AEI Economist*, June, 1–8.

SUMMERS, L. (1996): "Commentary: Why Are Central Banks Pursuing Long-Run Price Stability?" in *Achieving Price Stability*, 1996 Jackson Hole Symposium: Federal Reserve Bank of Kansas City Economic Conference Proceedings, 35–43.

SVENSSON, L. E. O. (2003): "What is Wrong with Taylor Rules? Using Judgment in Monetary Policy through Targeting Rules," *Journal of Economic Literature*, 41, 426–477.

SVERIGES RIKSBANK (2010): *Monetary Policy in Sweden*, Stockholm: Sveriges Riksbank, available at http://www.riksbank.com, June 3.

TAYLOR, J. B. (1993): "Discretion versus Policy Rules in Practice," *Carnegie-Rochester Conference Series on Public Policy*, 39, 195–214.

TAYLOR, J. B. AND J. C. WILLIAMS (2010): "Simple and Robust Rules for Monetary Policy?" in *Handbook of Monetary Economics*, ed. by B. M. Friedman and M. Woodford, Amsterdam: Elsevier Press, vol. 3, 829–859.

TRAUM, N. AND S.-C. S. YANG (2015): "When Does Government Debt Crowd Out Investment?" *Journal of Applied Econometrics*, 30, 24–45.

TURNER, P. (2013): "Benign Neglect of the Long-Term Interest Rate," BIS Working Paper No. 403, February.

UHLIG, H. (2010): "Some Fiscal Calculus," *American Economic Review*, 100, 30–34.

WIEGAND, J. (2008): "Bank Recycling of Petro Dollars to Emerging Market Economies During the Current Oil Price Boom," IMF Working Paper No. 08/180, July.

WOODFORD, M. (2004): "Inflation Targeting and Optimal Monetary Policy," *Federal Reserve Bank of St. Louis Review*, 86, 15–41.

——— (2012): "Methods of Policy Accommodation at the Interest-Rate Lower Bound," in *The Changing Policy Landscape*, 2012 Jackson Hole Symposium: Federal Reserve Bank of Kansas City Economic Conference Proceedings, 185–288.

WRIGHT, J. H. (2011): "Term Premia and Inflation Uncertainty: Empirical Evidence from an International Panel Dataset," *American Economic Review*, 101, 1514–1534.

YELLEN, J. (2003): "Overview," in *Monetary Policy and Uncertainty: Adapting to a Changing Economy*, 2003 Jackson Hole Symposium: Federal Reserve Bank of Kansas City Economic Conference Proceedings, 391–398.

YELLEN, J. L. (2014a): "Opening Remarks: Labor Market Dynamics and Monetary Policy," in *Re-Evaluating Labor Market Dynamics*, 2014 Jackson Hole Symposium: Federal Reserve Bank of Kansas City Economic Conference Proceedings, 1–15.

——— (2014b): "Perspectives on Inequality and Opportunity from the Survey of Consumer Finances," Remarks at the Conference on Economic Opportunity and Inequality, Boston, October.

——— (2015): "Normalizing Monetary Policy: Prospects and Perspectives," Speech given at the "The New Normal Monetary Policy," San Francisco, March 27.

YOON, J.-W., J. KIM, AND J. LEE (2014): "Impact of Demographic Changes on Inflation and the Macroeconomy," IMF Working Paper 14/210, November.

ZARNOWITZ, V. (1992): "Has Macro-Forecasting Failed?" *Cato Journal*, 12, 129–164.

ZUBAIRY, S. (2014): "On Fiscal Multipliers: Estimates from a Medium-Scale DSGE Model," *International Economic Review*, 55, 169–195.