Strengthening the Federal Reserve's Effectiveness, Transparency, and Accountability

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Committee on Financial Services
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Chairman Barr, Ranking Member Moore, and members of the Subcommittee on Monetary Policy and Trade, thank you for inviting me to testify at this hearing. I will start with some general remarks about the Federal Reserve's transparency and accountability, and then I will focus on the rationale for establishing simple benchmarks to help clarify the Federal Reserve's monetary policy strategy.

Operational Independence and Accountability

The Federal Reserve is America's central bank, and its monetary policy decisions affect every American—teenagers entering the job market for the first time, and retired people who are concerned about the interest earned on their savings accounts; consumers taking out auto loans to purchase new cars, and workers at the factories that manufacture those cars; households making payments on home mortgages, and construction workers whose firms are deciding how many new homes to build; small businesses whose profit margins may be tight, and families that are struggling to make ends meet.

Given the Fed's crucial role in affecting our economy, it's essential to ask: To whom is the Federal Reserve accountable? Or put more simply, who is the Fed's boss? Indeed, this question is fundamental for the issues being considered at this hearing. Unlike the Supreme Court, the Federal Reserve is *not* a separate branch of government. Rather, the Fed is an agency *of* the government. Moreover, while the Fed's chair and the other members of the Federal Reserve Board are nominated by the President and confirmed by the Senate, the Federal Reserve is not like the Treasury Department or other cabinet offices: Federal Reserve officials do *not* report to the President, nor does the Fed operate under his direction.

So, let me raise the question again: Who is the Fed's boss? And of course, the answer is: Congress. In fact, that answer comes directly from the U.S. constitution, which states that Congress has responsibility for regulating the value of money, and from the Federal Reserve Act, whereby Congress has delegated that responsibility to the Federal Reserve. Thus, the Fed reports directly to Congress, *not* to the President or anyone else.

Now, I've intentionally used the term "boss" because I think we can draw on some basic management principles to shed light on the issues being considered here today. In particular, how should a manager delegate authority to an employee in order to maximize that employee's effectiveness and accountability? Turning to Exhibit #1, here are three common-sense management principles that are followed by every well-run business or non-profit organization and that are highly relevant for the draft legislation being considered by your subcommittee:

(1) The boss stays well informed about the employee's strategy. In many cases, such consultations take place in the context of annual reviews, with regular status updates at a quarterly or semiannual frequency. These consultations are essential for maintaining accountability while avoiding micromanagement; after all, an employee can't be productive if the boss is constantly second-guessing that employee's decisions. And as I'll discuss in a moment, this is the basic rationale for requiring the Fed to explain its monetary policy strategy in terms of simple policy benchmarks.

Exhibit #1: Basic Management Principles

Principle	***Purpose***	***Relevance for Draft Legislation***
Oversight of Strategic Plans	Maintain Accountability, Avoid Micromanagement	Monetary Policy Benchmarks
Prompt Approval of Extraordinary Expenses	Maintain Accountability, Avoid Micromanagement	Emergency Lending
Designated Scope of Responsibilities	Maintain Focus by Reassigning Extraneous Tasks	Credit Policy

(2) Extraordinary budget items require prompt approval. In particular, the employee should have authority to incur routine expenses up to a specific cost threshold, whereas the boss has to approve extraordinary expenses beyond that threshold. Again, the basic premise is to maintain accountability while avoiding interference in normal day-to-day operations. And this is essentially the logic for preserving the Fed's operational independence but establishing procedures for obtaining prompt congressional approval for emergency lending facilities.

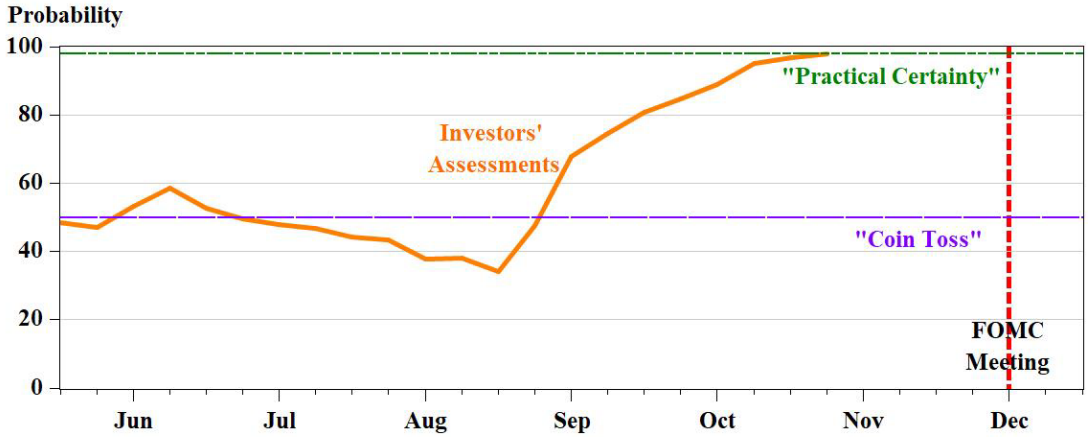
(3) Extraneous tasks should be reassigned elsewhere. Effective delegation requires a clear delineation of the responsibilities of each employee. Thus, if a specific assignment evolves into a task that doesn't fit within the employee's job description, then it's generally appropriate for the boss to reassign that task to someone else. And this is the basic rationale for the draft legislation on credit policy: The Federal Reserve has a legal mandate to set the course of monetary policy, to supervise and regulate financial institutions, and to serve as a lender of last resort—the "banker to the banks." In some extraordinary circumstances, carrying out that mandate may result in the Fed's acquisition of private assets. However, such assets shouldn't stay indefinitely on the Fed's balance sheet but should instead be swapped for U.S. Treasury securities, thereby preserving the Fed's operational independence and designated scope of responsibility.

Monetary Policy Benchmarks

The transparency of the Federal Reserve's monetary policy framework has improved substantially over the past few decades. Some of those improvements were legislated (e.g., semiannual monetary policy reports and hearings), some occurred following congressional hearings (e.g., release of FOMC meeting transcripts), and a number of other enhancements were initiated by the Fed itself (e.g., post-meeting statements, expedited minutes, and quarterly press conferences). And when the Fed adopted a specific numerical inflation target in 2012, it did so in close consultation with members of Congress. Thus, it's natural and appropriate to wonder whether there's still room for improving the clarity of the Fed's monetary policy strategy? After all, as Fed insiders often note, *"If it ain't broke, don't fix it."*

One way to address that question is to take a look at the Fed's official communications. For example, at the conclusion of its policy meeting last week, the Fed issued a 500-word statement. But nearly all of that statement was pure boilerplate, literally repeated word-for-word from the previous statement. There were a few brief references to the transitory effects of the hurricanes. But the only substantive changes were conveyed in two adjectives: the description of recent economic growth was upgraded from *"moderate"* to *"solid"*, and core inflation was characterized as *"soft."*

Exhibit #2: Is the Fed's Monetary Policy Strategy Clear to Investors?



A more concrete way of gauging the clarity of the Fed's policy strategy is to look at market participants' assessments of the likely path of the target federal funds rate, which is the Fed's primary monetary policy tool. Turning to Exhibit #2, you can see that as of last June, investors saw roughly 50-50 odds—just like a coin flip—that the Fed would hike interest rates at its December meeting.[1] Those odds bounced around a bit over the summer and then suddenly jumped upwards in late September and early October, *not* because of some startling new economic data but simply because Fed officials began clearly signaling their intention to hike rates in December. Indeed, investors now see the prospect of a rate hike as a practical certainty even though the December FOMC meeting is still six weeks away. Thus, even though Fed officials regularly reiterate that the path of monetary policy is data-dependent and not on a preset course, the Fed's policy strategy is not well understood by investors who sift through every tidbit of Fed communications, and that strategy is even more opaque to most members of the general public.

By contrast, simple benchmarks can provide a highly transparent means for the Federal Reserve to communicate the key elements of its policy strategy. Of course, the seminal benchmark was created by Professor John Taylor of Stanford University and hence is generally referred to as the "Taylor Rule." In fact, macroeconomists often refer to this sort of mathematical formula as a *"rule"* or *"interest rate reaction function."* However, as Professor Taylor has frequently noted, it would be inadvisable for policymakers to adhere mechanically to any simple mathematical formula; rather, such equations should be viewed as benchmarks or guidelines for the setting of monetary policy, while recognizing that professional expertise and good judgment will always be essential for sound policymaking in practice.

It should be noted that the use of simple policy benchmarks is not intrinsically "hawkish" or "dovish" in the sense of being tied to a specific view about how the Federal Reserve should fulfill its statutory mandate. For example, Taylor (1999) analyzed a simple variant of the Taylor Rule that had been used in earlier Federal Reserve staff analysis, and Yellen (2012) referred to that benchmark as the "balanced approach rule" in light of its effectiveness in fostering the Fed's dual objectives of maximum employment and price stability.

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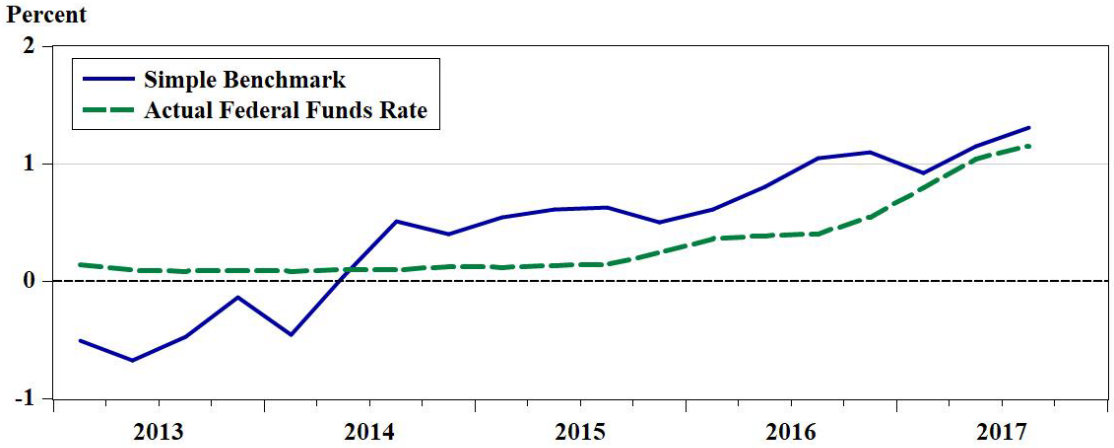
[1] This exhibit shows investors' assessments of the probability that the FOMC will raise the target federal funds rate at its December 2017 meeting. These probabilities are computed by the Chicago Mercantile Exchange (CME) and posted in real time on its website; see *http://www.cmegroup.com/trading/interest-rates/countdown-to-fomc.html*. The CME options data indicates that investors saw very low odds that the Fed would hike rates prior to December, and that expectation proved to be correct.

Exhibit #3: Is the Fed's Recent Policy Consistent with a Simple Benchmark?



Indeed, as shown in Exhibit 3, a variant of the "balanced approach rule" provides a remarkably close approximation to the Fed's actual policy path over the past few years. This simple benchmark can be expressed as follows:

$$i_t = 0.5i_{t-1} + 0.5[r_t^* + \pi_t + 0.5(\pi_t - 2) + 1.0ygap_t]$$

where i_t is the current federal funds rate, i_{t-1} is the average funds rate in the previous quarter, π_t is the 4-quarter average rate of core PCE inflation, $ygap_t$ is CBO's latest estimate of the current output gap, and r_t^* is the median projection of the longer-run average real federal funds rate as indicated by the Federal Reserve Bank of Philadelphia's survey of professional forecasters.

This benchmark incorporates two simple adjustments to the formula considered by Taylor (1999) and Yellen (2012). First, that formula assumed that the longer-run normal value of the real federal funds rate had a constant value of 2 percent, whereas this benchmark follows Levin (2014) and Blanchflower and Levin (2015) in adjusting that value over time based on the evolving views of professional forecasters. Second, this benchmark incorporates a moderate degree of interest rate smoothing, consistent with the earlier findings of Levin et al. (1999, 2003).

This analysis confirms that simple benchmarks can indeed be helpful in clarifying the Fed's monetary policy strategy, thereby contributing to its overall transparency and accountability to Congress as well as its effectiveness in serving the public.

Thank you for your consideration; I will be glad to answer any questions.

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March 24, 2015

Labor Market Slack and Monetary Policy[1]

By David G. Blanchflower and Andrew T. Levin

A fundamental cornerstone of modern macroeconomics is that the economy has a *balanced-growth path* that is characterized by stable inflation as well as steady growth of production and employment. In effect, if the economy becomes "overheated" and persistently exceeds its balanced-growth path, then the most notable symptom will be an acceleration of nominal wages and prices and hence inflation overshooting the central bank's target. Conversely, a persistent shortfall in economic activity and employment not only has substantial adverse effects on households' well-being but is also associated with downward pressure on wages and prices and hence with inflation falling persistently short of the central bank's target. Thus, ongoing assessments of the contours of the balanced-growth path–and of significant deviations from that path–are a crucial element of the design and communication of monetary policy, especially for a central bank with a legal mandate to foster maximum employment and price stability.[2]

In gauging movements in labor market slack over previous business cycles, macroeconomists have generally focused on the gap between the conventional unemployment rate (that is, the incidence of people who are out of work and actively searching for a job) and the "natural rate of unemployment" judged to be consistent with the balanced-growth path. In the wake of a severe recession and a sluggish recovery, however, the conventional unemployment gap can be a relatively poor or even misleading indicator of labor market slack. In particular, assessments of the shortfall of employment from the balanced-growth path should also in-

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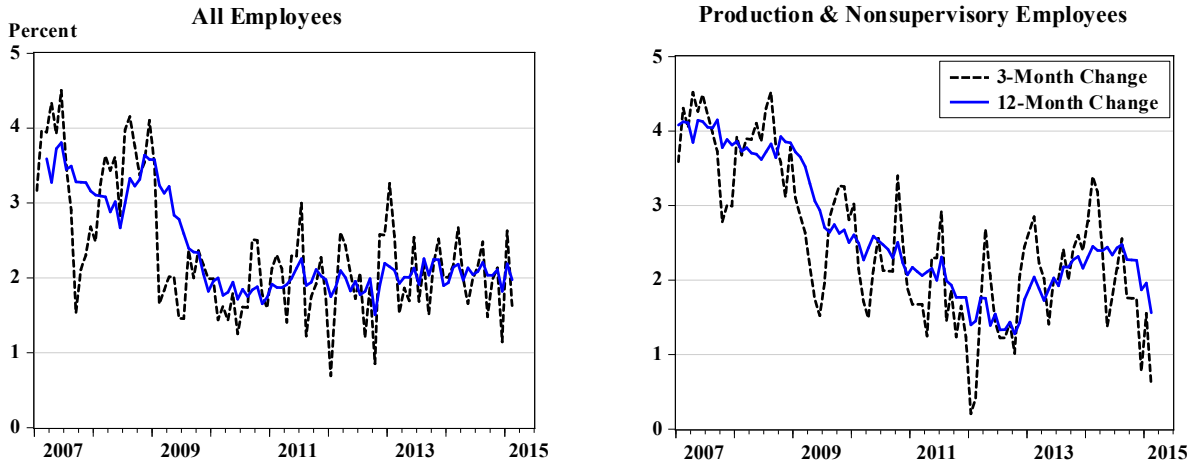
[2]The FOMC's Statement of Longer-Run Goals and Policy Strategy (adopted in January 2012 and reaffirmed annually since then) describes its mandated objectives of maximum employment and price stability as "generally complementary." See FOMC, "Statement on Longer-Run Goals and Monetary Policy Strategy, 2014, available at *http://www.federalreserve.gov/monetarypolicy.*

FIGURE 1

The Recent Evolution of U.S. Nominal Wage Growth



Note: The left panel depicts the growth rate of average hourly earnings for all U.S. private nonfarm employees, and the right panel depicts the corresponding growth rate for production and non-supervisory employees. Each panel depicts the annualized 3-month change (solid line) and the 12-month change (dashed line). Source: BLS and authors' calculations.

corporate the extent of *hidden unemployment* (that is, people who are not actively searching but who would rejoin the labor force if the job market were stronger) and the incidence of *underemployment* (that is, people working part-time who want a full-time job).

In this paper, we begin by examining the evolution of U.S. labor market slack over recent years and show that underemployment and hidden unemployment currently account for the bulk of the employment gap. Our benchmark assessment of the current magnitude of the shortfall in U.S. employment–including the incidence of underemployment and hidden unemployment–is equivalent to about 3.3 million full-time jobs. Moreover, the uncertainty surrounding that assessment is clearly skewed to the upside, so that the actual shortfall in employment might well be twice as large.

Recent Congressional Budget Office (CBO) analysis indicates that the potential labor force is currently expanding by about 50,000 to 60,000 individuals per month due to demographic factors. Thus, if nonfarm payrolls continue to rise steadily by around 260,000 jobs per month (which has been the average pace over the past few quarters), then the employment gap might be eliminated toward the end of next year. In contrast, if the economic recovery decelerates and payroll growth slows to around 100,000 jobs per month (roughly similar to its pace during 2010 and most of 2011), then the employment gap would barely diminish at all over coming years.

Next, using state-level data, we find strong statistical evidence that conventional unemployment, underemployment, and hidden unemployment each exert significant downward

pressure on nominal wages.[3] Such results should not be surprising, because employers may fill a job vacancy by hiring (a) someone who had been out of work and actively searching for a job; (b) someone who had been working part-time, either at the same firm or elsewhere; or (c) someone who had just rejoined the labor force and hence wasn't being counted as unemployed.

Recent data on U.S. nominal wage growth is fully consistent with our assessment that labor market slack remains substantial. As shown in the left panel of Figure 1, the average hourly earnings of all private nonfarm employees decelerated markedly in the wake of the Great Recession, and since 2010 nominal wage growth has remained mired at around 2 percent.[4] Indeed, the latest 12-month change (from February 2014 through February 2015) was 1.975 percent. The right panel of the figure shows the evolution of nominal wages for production and nonsupervisory workers, a measure that is less sensitive to movements in the upper tail of the wage distribution and hence more informative about broader wage trends. Recent readings on this measure point to a significant *decline* in nominal wage growth over the past few quarters: The 12-month change through February 2015 was just 1.6 percent, down nearly a full percentage point from the pace of wage growth last summer, and the latest annualized three-month change was only 0.8 percent.[5]

Finally, we consider the monetary policy implications of labor market slack using a variant of the simple rule that has been extensively studied by Taylor and characterized as the "balanced approach rule" by Yellen.[6] This analysis indicates that the initiation of monetary policy tightening would be premature at the present time. Indeed, such a policy move would be a serious mistake in light of substantial downside risks to the current economic outlook.[7] Rather, liftoff from the zero lower bound should be deferred until labor market slack has diminished substantially further and inflation has moved up significantly closer to the FOMC's 2 percent inflation goal.

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[3]In a speech on January 15, 2015, Dennis Lockhart (the president of the Federal Reserve Bank of Atlanta) stated that economists at his institution have also "advanced the thesis that the elevated number of people working part-time involuntarily is restraining wage growth."

[4]The same pattern is evident for other measures of labor compensation such as the employment cost index. Indeed, J. Robertson and E. Terry ("What's (Not) Up with Wage Growth? *Macroblog*, Federal Reserve Bank of Atlanta, February 17, 2015) analyzed a range of indicators of nominal wage growth and concluded that "none of the characteristic-specific median growth rates we looked at are close to returning to prerecession levels. Lower-than-normal wage growth appears to be a very widespread feature of the labor market since the end of the recession."

[5]Average hourly earnings of production and nonsupervisory workers increased from $20.77 in November 2014 to $20.80 in February 2015–a measly raise of just 3 cents. Lack of wage growth is also found in other BLS wage series. Median usual weekly earnings for full-time wage and salary workers grew by 1.9 percent over the course of last year and by 1.7 percent in the fourth quarter. For all civilian workers, the Employment Cost Index (ECI) grew by 2.2 percent in both the third and fourth quarters of 2014.

[6]This rule was initially analyzed by J. Taylor, "A Historical Analysis of Monetary Policy Rules, in J. Taylor, ed., *Monetary Policy Rules* (University of Chicago Press, 1999). Its characterization as a "balanced approach rule was given by J. Yellen, "Perspectives on Monetary Policy, remarks given at the Boston Economic Club, June 6, 2012 *(http://www.federalreserve.gov/newsevents/speech/yellen20120606a.htm)*.

[7]According to the US Census Bureau, retail sales declined in three consecutive months: -0.9 percent in December 2014, -0.8 percent in January 2015, and -0.6 percent in February 2015.

Gauging Labor Market Slack

The Employment Gap

Our measure of the employment gap is the sum of three specific components.[8] First, the *unemployment gap* is the deviation of the conventional unemployment rate–labeled "U3" by the Bureau of Labor Statistics (BLS)–from professional forecasters' consensus projections of its longer-run normal rate (as reported in semiannual Blue Chip surveys). Second, the *participation gap* is the deviation (in percentage points) of the actual size of the labor force from CBO assessments of the potential labor force; this shortfall corresponds to the notion of "hidden unemployment" described above. Third, the *underemployment gap* takes the BLS measure of people working part-time for economic reasons (expressed as a fraction of the potential labor force) as a deviation from its 1994-2007 average and then converts this deviation into full-time equivalent (FTE) jobs.[9]

As shown in Figure 2, the U.S. employment gap has narrowed markedly over the past few years, along with each of its three components. Nonetheless, it is readily apparent that the conventional unemployment rate has *not* served as an accurate synopsis of the evolution of labor market slack. For example, the declining unemployment rate over the course of 2010 and most of 2011 was not induced by a pickup in job growth but instead reflected the extent to which many Americans gave up searching for work and departed from the labor force. In effect, the reduction in the unemployment gap was almost fully offset by an increase in the participation gap, and hence the overall employment gap showed very little improvement during that period.

Even more importantly, it is evident that the U.S. economic recovery remains far from complete in spite of apparently reassuring recent signals from the conventional unemployment rate. Indeed, while the unemployment gap has become quite small, the incidence of underemployment remains elevated and the size of the labor force remains well below CBO's assessment of its potential. In particular, the employment gap currently stands at around 1.9 percent, suggesting that the "true" unemployment rate (including underemployment and hidden unemployment) should be viewed as around $7\frac{1}{2}$ percent. Gauged in human terms, the current magnitude of the employment shortfall is equivalent to about 3.3 million full-time jobs.

Of course, the characteristics of the economy's balanced-growth path cannot be directly observed, and hence any particular assessment of the deviations from that path is necessarily subject to considerable uncertainty. In the context of a typical business cycle, such uncertainty might reasonably be judged as symmetric around the benchmark estimate. At the present juncture, however, it seems plausible that professional forecasters and analysts at policy institutions may have become overly pessimistic in gauging the extent to which the Great Recession caused permanent damage to the U.S. labor market. Consequently,

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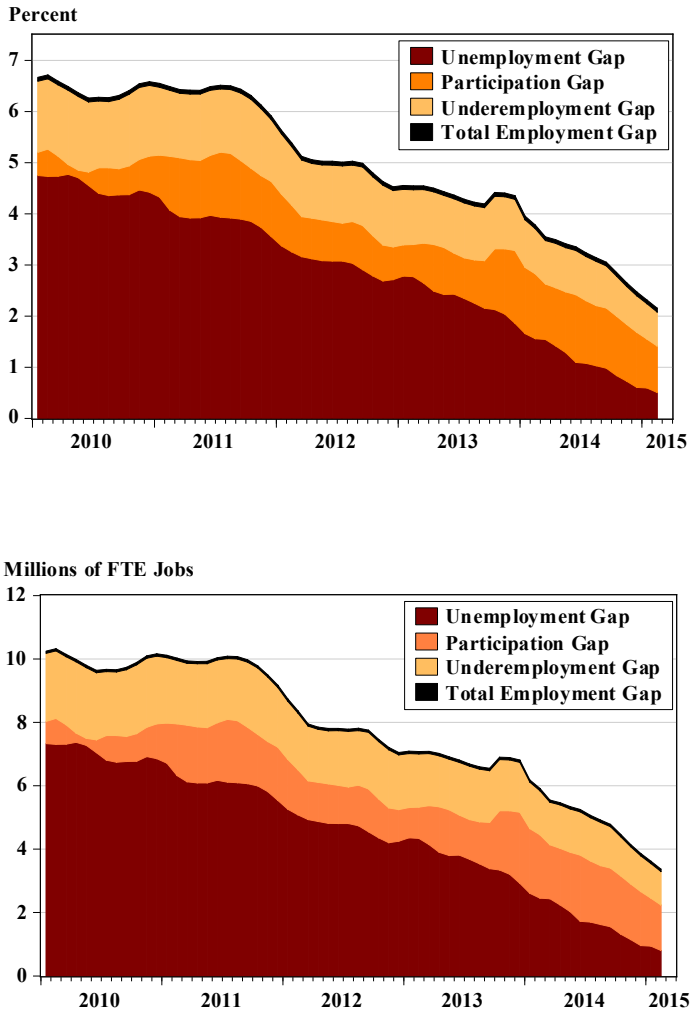
[8]This measure of the employment gap was introduced by A. Levin, "The Design and Communication of Systematic Monetary Policy Strategies, Journal of Economic Dynamics and Control (2014).

[9]The FTE conversion factor is computed using BLS data on the average weekly hours of individuals working part-time for economic reasons compared to the average weekly hours of individuals who are working full-time.

FIGURE 2

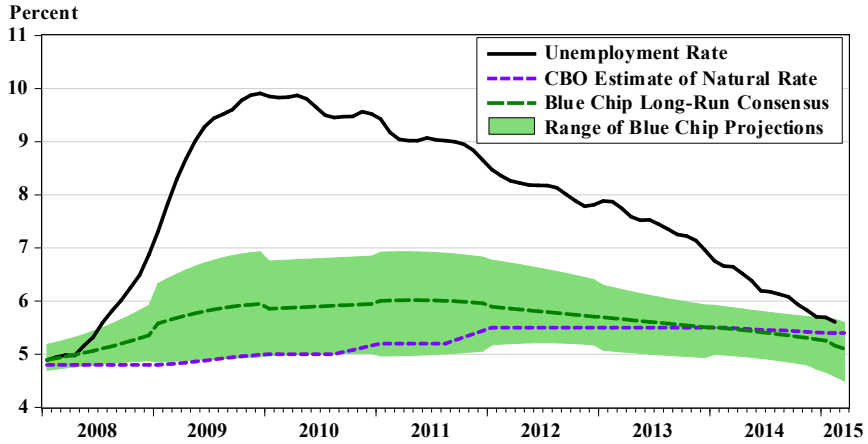
Benchmark Assessment of the Employment Gap



Note: This figure depicts the recent evolution of the U.S. employment gap in proportion to the potential labor force (top panel) and in millions of FTE jobs (bottom panel). In each panel, the dark-shaded area denotes the unemployment gap, the medium-shaded area denotes the participation gap, the light-shaded area denotes the underemployment gap, and the solid line denotes the total employment gap; all of these series are shown as three-month moving averages. Source: BLS, CBO, and authors' calculations.

FIGURE 3

Evolving Assessments of the Unemployment Gap



Note: The solid line denotes the three-month moving average of the U.S. unemployment rate (U3) from January 2008 to February 2015. The short-dashed line denotes the evolution of CBO's assessments of the long-run natural rate. The long-dashed line denotes the Blue Chip consensus (that is, the mean projection) for the unemployment rate 5 to 10 years ahead, while the upper and lower limits of the shaded area represent the average projections in the top and bottom quartiles, respectively. Source: Source: BLS, *Blue Chip Economic Indicators*, and authors' calculations.

the confidence bands around our current assessment of the employment gap may in fact be skewed to the upside; i.e., this assessment may well be an *underestimate* of the true magnitude of labor market slack. To examine that possibility, we now consider each of the individual components of the employment gap in turn.

The Unemployment Gap

CBO regularly produces assessments of the natural unemployment rate that would prevail if the economy were on its balanced-growth path.[10] More specifically, CBO defines the natural rate as the level of unemployment "arising from all sources except fluctuations in aggregate demand." In the wake of the Great Recession, CBO refined its analysis to gauge the extent to which the natural rate has been affected by transitory vs. persistent structural factors. Thus, over the past few years CBO has produced estimates of the *long-term natural rate*, which solely reflects the influences of longer-lasting structural factors.[11]

[10]These assessments are published in CBO's annual *Budget and Economic Outlook* document each January or February as well as in its midyear updates each August.

[11]Since 2011 CBO has also produced estimates of the *short-term natural rate*, which incorporates the effects of transitory structural factors. In 2014, CBO relabeled the "long-term natural rate" as the "underlying long-term rate of unemployment" and began referring to the "short-term natural rate" as simply "the natural rate." In the immediate aftermath of the Great Recession, the distinction between these two measures was quite substantial (with a peak difference of around 0.8 percentage points). As of 2015, however, the two

Surveys of professional forecasters generally do not collect information about their estimates of the natural rate of unemployment. However, forecasters routinely make longer-run projections regarding the path to which the economy is expected to converge over time, and such projections essentially reflect their assessments of characteristics of the balanced-growth path, including the growth rate of potential output and the natural rate of unemployment. In particular, Blue Chip longer-run surveys (which are conducted semi-annually in March and October) report on the consensus and range of forecasters' projections of the average unemployment rate 5 to 10 years ahead.[12]

As shown in Figure 3, the Blue Chip's longer-run consensus outlook in early 2008 was 4.8 percent–virtually identical to CBO's assessment of the natural unemployment rate. In effect, analysts generally agreed that the unemployment gap at that juncture was effectively nil. Shortly thereafter, the actual unemployment rate skyrocketed upwards, reaching 10 percent by late 2009. CBO then raised its assessment of the natural rate by just a notch, whereas professional forecasters evidently became much more pessimistic about the prospects for long-lasting damage to the labor market: The Blue Chip longer-run consensus outlook moved up to around 6 percent, and the top quartile of projections in that survey reached nearly 7 percent. By 2012, CBO had come to share much of that pessimism and hence marked up its estimate of the long-term natural rate to levels similar to those of the Blue Chip consensus.

Over the past few years, as the unemployment rate has declined steadily and nominal wage inflation has been subdued, professional forecasters have been gradually marking down their longer-run unemployment projections. In the Blue Chip longer-run survey published in March 2015, the consensus outlook for unemployment was 5.1 percent, while the bottom quartile has declined to $4\frac{1}{2}$ percent and the top quartile of projections now stands at $5\frac{1}{2}$ percent. Interestingly, that consensus outlook is identical to the midpoint of the central tendency of FOMC participants' longer-run unemployment rate projections that were released in conjunction with the March 2015 FOMC meeting. CBO's latest assessment of the long-term natural rate (published in late January) was a notch higher at 5.4 percent.

It seems reasonable to infer that the uncertainty surrounding these assessments is skewed to the downside. Indeed, if unemployment declines further over coming quarters while wage inflation remains subdued, analysts will presumably make even further downward revisions to their assessments of the longer-run normal rate of unemployment. Thus, while our benchmark estimate of the unemployment gap is quite small, its true magnitude might well be substantially larger–perhaps by as much as three-fourths of a percentage point.

The Participation Gap

In conjunction with its estimates of potential output and the natural unemployment rate, CBO produces regular assessments of the historical and projected size of the *potential labor force*, that is, the balanced-growth path for the labor force that would prevail in the absence of

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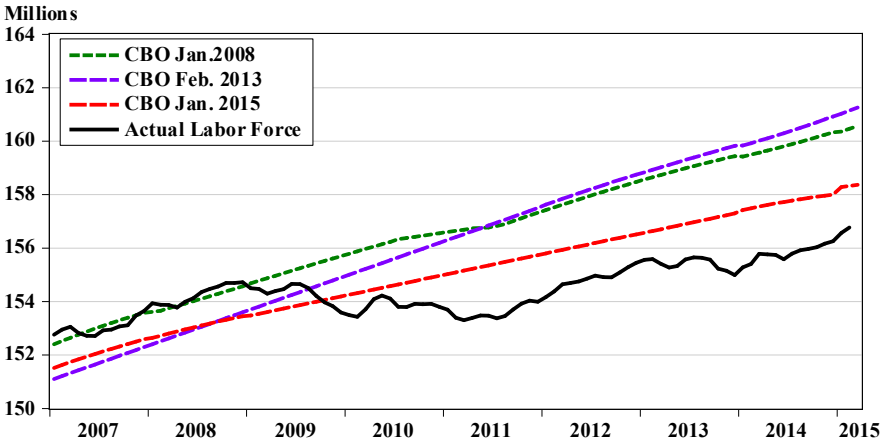
measures are now identical; i.e., CBO has concluded that transitory structural factors are no longer having any significant influence on the natural rate of unemployment.

[12]Blue Chip longer-run survey results are reported in the March and October editions of *Blue Chip Economic Indicators*, a publication owned by Aspen Publishers. Copyright (c) Aspen Publishers, Inc. All rights reserved.

FIGURE 4

Evolving CBO Assessments of the Potential Labor Force



Note: The solid line denotes the three-month moving average of the U.S. labor force from January 2007 to February 2015, and the dashed lines denote the CBO's assessments of the potential labor force as of January 2008 (short-dashed), February 2013 (medium-dashed), and January 2015 (long-dashed). Each CBO series has been adjusted to incorporate subsequent revisions to BLS population controls. Source: BLS, CBO, and authors' calculations.

aggregate demand shocks. In effect, given detailed projections for the size and demographic composition of the population (mainly drawing on the work of the Census Bureau), CBO's assessments of the potential labor force convey its analysis of how demographic and structural factors are likely to influence the evolution of labor force participation over time.

Figure 4 depicts the evolution of CBO's assessments of the potential labor force. As of January 2008, CBO estimated that the actual labor force (specifically, about 154 million people) was very close to its potential level; i.e., the participation gap was judged to be negligible. Moreover, at that juncture CBO projected that the potential labor force would expand at an annual pace of about three-quarters of a percent through 2012 and would then decelerate somewhat to an annual pace of about half a percent in subsequent years.[13]

In the wake of the Great Recession, the U.S. labor force actually decreased in size through mid-2011 and then resumed a moderate upward trajectory over the past few years. Nonetheless, from 2009 through 2013, CBO made only modest revisions to its assessments of the potential labor force. Most notably, CBO analysis indicated that the labor force had *exceeded* its potential size by about a full percentage point during the lead-up to the financial crisis. However, CBO made roughly offsetting adjustments to the projected growth rate of the potential labor force, and hence the implications for the magnitude of the participation

[13] As discussed in C. Erceg and A. Levin ("Labor Force Participation and Monetary Policy in the Wake of the Great Recession, *Journal of Money, Credit and Banking*, 2014), CBO's labor force projections in early 2008 were broadly consistent with the projections that were published by BLS in November 2007.

gap as of 2013 were essentially the same as implied by its January 2008 assessment.

In contrast, CBO has recently made substantial downward revisions to its assessments of the entire post-2008 trajectory for the potential labor force. In particular, CBO now judges that demographic and structural factors account for a larger share of the post-2008 decline in labor force participation than indicated by its previous analysis. Moreover, CBO has concluded that much of the cyclical decline in labor force participation has become irreversible; i.e., CBO now anticipates that only two-thirds of the individuals who departed from the workforce in the wake of the Great Recession will rejoin the labor force as the economy continues to strengthen.

Evidently, such judgments have crucial implications for gauging the current magnitude of the shortfall in U.S. employment. According to CBO's latest assessment of the potential labor force, the participation gap currently stands at around 0.8 percent (which is the value that we used in constructing our benchmark estimate of the employment gap as shown in Figure 2). By contrast, CBO's outlook as of February 2013 implies a substantially larger participation gap of around 2.6 percent and hence that the employment gap is *nearly twice as large* as our benchmark estimate.

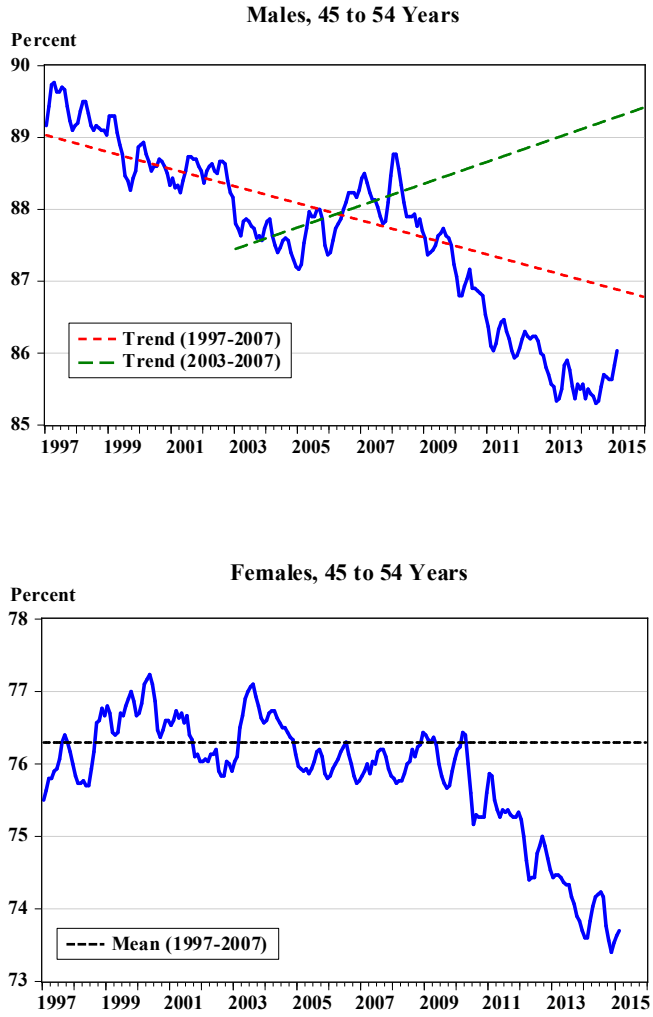
Breaking down the data by gender is also relevant for assessing the extent to which the post-2007 decline in U.S. labor force participation might be largely structural or irreversible. As shown in the left panel of Figure 5, the participation rate of males age 45 to 54 years was drifting downward during the late 1990s, but that trend was arrested and perhaps even reversed during the mid-2000s. Thus, there is evidently a substantial degree of uncertainty about the current magnitude of the participation gap for this demographic group. If one fits a linear trend over the decade ending in 2007, then the actual participation rate is now within a percentage point of that trend line–roughly similar to CBO's current assessment of the aggregate participation gap. By contrast, if one fits a linear trend over the five-year period ending in 2007, then the participation gap is around 3 percentage points, roughly consistent with the implications of CBO's assessments several years ago.

As shown in the right panel of Figure 5, the participation rate of females age 45 to 54 years was essentially flat from 2000 through 2007, and hence there is simply no basis whatsoever for attributing its post-2007 decline to structural factors. Rather, it seems evident that this decline resulted from the persistent weakness of the job market in the wake of the Great Recession. Moreover, the magnitude of that decline–about $2\frac{1}{2}$ percentage points–is virtually identical to the drop in labor force participation of all prime-age adults (that is, aged 25 to 54 years), who comprise the bulk of the U.S. labor force. In effect, this pattern bolsters the view that the Great Recession and its aftermath were largely responsible for the post-2007 decline in the U.S. participation rate, consistent with the conclusions of a number of recent empirical studies.[14]

[14]See D. Aaronson, J. Davis, and L. Hu, "Explaining the Decline in the U.S. Labor Force Participation Rate, Chicago Fed Letter #296, Federal Reserve Bank of Chicago, 2012; J. Sherk, "Not Looking for Work: Why Labor Force Participation Has Fallen During the Recession, Backgrounder 2722, Heritage Foundation Center for Data Analysis, 2012; W. Van Zondweghe, "Interpreting the Recent Decline in Labor Force Participation, *Economic Review*, Federal Reserve Bank of Kansas City, 5-34, 2012; J. Hotchkiss and F. Rios-Avila, "Identifying Factors Behind the Decline in the Labor Force Participation Rate, *Business*

FIGURE 5

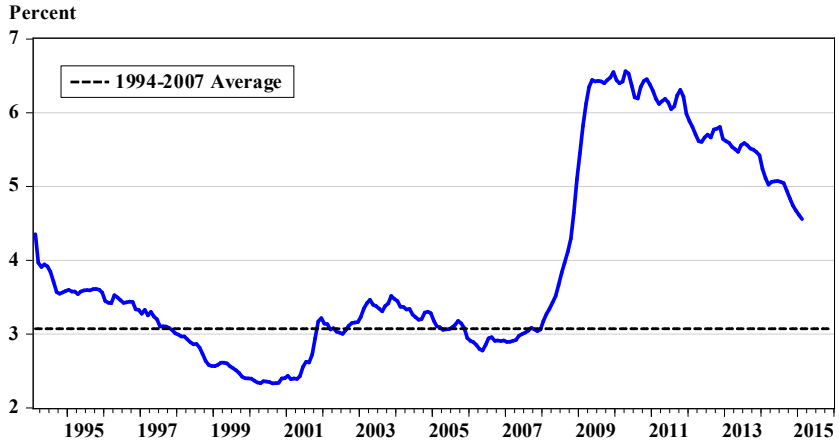
Disaggregated Evidence on Participation Trends



Note: The left panel depicts the three-month moving average of the labor force participation rate of males aged 45 to 54 years (solid line), along with linear trends fitted to observations from 1997 to 2007 (short-dashed line) and 2003 to 2007 (long-dashed line). The right panel depicts the three-month moving average of the labor force participation rate of females aged 45 to 54 years (solid line), along with its mean value from 1997 to 2007 (dashed line). Source: BLS and authors' calculations.

FIGURE 6

The Underemployment Gap



Note: This figure depicts the three-month moving average of the number of people employed part-time for economic reasons as a fraction of total employment (solid line) and the mean value of that ratio over the period from 1994:1 to 2007:12. Source: BLS and authors' calculations.

Finally, it should be noted that the participation rate of males age 45 to 54 years has recently moved up by nearly a full percentage point, rising from 85.3 percent last spring to 86.2 percent in the latest BLS employment report. That development may reasonably provide some reassurance that the labor market damage from the Great Recession is *not* irreversible and that many other prime-age adults (both male and female) as well as younger adults will decide to rejoin the labor force if the job market continues to strengthen going forward.

The Underemployment Gap

Gauging the underemployment gap seems relatively straightforward by comparison with the challenges of assessing the unemployment gap and the participation gap. As shown in Figure 6, the underemployment rate– that is, the incidence of people working part-time for economic reasons (PTER) as a fraction of total employment–did not exhibit any trend over the period from 1994 through 2007. It seems implausible that the sudden rise in underemployment during the Great Recession was caused by demographic or structural factors. And individuals who are underemployed are clearly not "unemployable" (as some have suggested about the long-term unemployed or those who have dropped out of the workforce), since they are already working but simply can't find a full-time job. Indeed, BLS data indicate that the average person classified as PTER is working about 23 hours per week.

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and Economic Research 3:257-275, 2013; and C. Erceg and A. Levin, "Labor Force Participation and Monetary Policy in the Wake of the Great Recession. For a contrary view, see Aaronson et al., "Labor Force Participation: Recent Developments and Future Prospects, *Brookings Papers on Economic Activity*, 2014.

Moreover, it seems unlikely that structural factors are the primary reason why the incidence of underemployment has only declined gradually over the past few years. After all, if the economy were on its balanced-growth path and some employers preferred to shift their workforce toward a greater number of part-time positions, then those employers would need to offer a relatively higher wage to induce workers to take part-time jobs voluntarily–a phenomenon that is certainly not evident in the current job market.

In light of these considerations, it is striking that the underemployment rate has only moved about halfway back from its 2009 peak towards its pre-recession level. That pattern might well suggest that the overall magnitude of labor market slack may have diminished by a similar proportion. In particular, as shown in Figure 2, the employment gap reached a peak of about 6 percent in early 2010. Consequently, it may be reasonable to infer that the employment gap currently stands at around 3 percent–that is, about a percentage point higher than our benchmark assessment. In effect, the evolution of the underemployment gap reinforces the view that the uncertainty surrounding our benchmark assessment of the employment gap is skewed to the upside.

The Wage Curve

We now move on to examine the extent to which measures of labor market slack over and above the unemployment rate impact wages. We do so following the approach taken by Blanchflower and Oswald, using data from the Merged Outgoing Rotation Group (MORG) files extracted from the Current Population Survey (CPS).[15] The CPS is collected monthly and is used to calculate the unemployment rate and other labor market aggregates published monthly in the BLS in the Employment Situation jobs release.[16] Data are available from 1990-2012, so with 50 states and the District of Columbia, there are 1,173 observations in total.[17]

Table 1 presents results using the log of hourly earnings as the dependent variable, whereas Table 2 uses weekly earnings. The results are essentially the same, so our discussion will focus on the results shown in Table 1.

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[15] D. Blanchflower and A. Oswald, *The Wage Curve* (Cambridge, MA: MIT Press, 1994).

[16] Respondents in the CPS are surveyed for four consecutive months (waves 1-4), and then after a four-month break, are surveyed for another four months (waves 5-8). The wage questions are only asked in waves 4 and 8, which are referred to as the "outgoing rotations." Each of the annual MORG files has approximately 170,000 wage observations. Data are aggregated to the level of state and year cell including both hourly and weekly earnings as well as variables on age, gender, race and schooling. This is exact aggregation and solves the Moulton problem. So a gender variable in the micro data file becomes a variable identifying the proportion of workers in a state in a particular year, and so on for the other variables. Mapped onto the file are data from the BLS on the participation rate as well as the proportion of the employed that is part-time for economic reasons as well as the number of the unemployed who have been unemployed for less than 26 weeks; 26-52 weeks and more than 52 weeks.

[17] Each regression includes the 19 personal control variables described in the previous footnote, as well as a lagged dependent variable that helps mitigate biases of uncertain sign and magnitude that could result from aggregation or missing variables. The start date of 1990 is determined by the availability of the labor market status variables, whereas the wage data is available for prior years; hence the inclusion of a lagged dependent variable does not constrain the length of our sample.

TABLE 1

U.S. State-Level Panel on Hourly Wages, 1990-2012

1) Long-Term Unemployment

$Wage_{t-1}$	0.7106	0.6835	0.7101	0.6822	0.7060	0.6834
	(360.00)	*(340.65)*	*(350.92)*	*(340.56)*	*(350.53)*	*(340.60)*
Unemployment $Rate_t$	-0.0279		-0.0266		-0.0240	
	(60.98)		*(50.51)*		*(50.32)*	
Unemployment $Rate_{t-1}$		-0.0365		-0.0404		-0.0364
		(90.47)		*(80.50)*		*(80.04)*
% Unemployed >26 $weeks_t$			-0.0001	0.0002		
			(0.45)	*(10.39)*		
% Unemployed >52 $weeks_t$					-0.0004	-0.0000
					(10.88)	*(0.05)*
Adjusted R^2	0.9945	0.9947	0.9945	0.9947	0.9945	0.9947

2) Underemployment

$Wage_{t-1}$	0.6825	0.6610	0.6534	0.6607	0.6534	0.6225
	(330.55)	*(320.67)*	*(320.04)*	*(320.42)*	*(320.40)*	*(290.85)*
Unemployment $Rate_t$	-0.0256			-0.0064		
	(60.46)			*(10.25)*		
Unemployment $Rate_{t-1}$		-0.0339	-0.0351		-0.0210	-0.0178
		(80.73)	*(90.18)*		*(40.27)*	*(30.64)*
Non-Participation $Rate_t$	-0.0956	-0.0830		-0.0906	-0.0823	
	(40.94)	*(40.33)*		*(40.75)*	*(40.33)*	
Non-Participation $Rate_{t-1}$			-0.0954			-0.0925
			(50.06)			*(40.97)*
Underemployment $Rate_t$				-0.0213	-0.0149	
				(50.87)	*(40.22)*	
Underemployment $Rate_{t-1}$						-0.0199
						(50.59)
Adjusted R^2	0.9948	0.9947	0.9948	0.9947	0.9948	0.9949

Note: All equations include 50 state dummies, 22 year dummies; 15 schooling variables plus age, gender and two race variables. All variables are in natural logarithms. Each regression uses 1,173 observations. Each coefficient's t-statistic is shown below in parentheses. Source: BLS and CPS MORG files.

TABLE 2

U.S. State-Level Panel on Weekly Wages, 1990-2012

1) Long-Term Unemployment						
$Wage_{t-1}$	0.6499	0.6561	0.6840	0.6560	0.6790	0.6840
	(340.36)	*(310.75)*	*(340.21)*	*(310.73)*	*(330.68)*	*(340.21)*
Unemployment $Rate_t$	-0.0441		-0.0443		-0.0405	
	(90.17)		*(70.70)*		*(70.55)*	
Unemployment $Rate_{t-1}$		-0.0449		-0.0460		-0.0364
		(90.31)		*(70.87)*		*(70.71)*
% Unemployed >26 $Weeks_t$			-0.0000	0.0001		
			(0.08)	*(0.34)*		
% Unemployed >52 $Weeks_t$					-0.0004	-0.0000
					(10.53)	*(0.08)*
Adjusted R^2	0.9924	0.9924	0.9924	0.9924	0.9924	0.9924
2) Underemployment						
$Wage_{t-1}$	0.6499	0.6268	0.6125	0.6128	0.6032	0.5821
	(330.74)	*(290.47)*	*(280.75)*	*(290.46)*	*(280.75)*	*(260.26)*
Unemployment $Rate_t$	-0.0424			-0.0151		
	(80.90)			*(20.54)*		
Unemployment $Rate_{t-1}$		-0.0423	-0.0443		-0.0162	-0.0264
		(80.81)	*(90.35)*		*(20.77)*	*(50.04)*
Non-Participation $Rate_t$	-0.1238	-0.1155		-0.1207	-0.1172	
	(50.37)	*(40.99)*		*(50.36)*	*(50.19)*	
Non-Participation $Rate_{t-1}$			-0.1499			-0.1457
			(60.62)			*(60.54)*
Underemployment $Rate_t$				-0.0314	-0.0313	
				(70.29)	*(70.48)*	
Underemployment $Rate_{t-1}$						-0.0259
						(60.61)
Adjusted R^2	0.9926	0.9926	0.9927	0.9929	0.9929	0.9929

Note: All equations include 50 state dummies, 22 year dummies; 15 schooling variables plus age, gender and two race variables. All variables are in natural logarithms. Each regression uses 1,173 observations. Each coefficient's t-statistic is shown below in parentheses. Source: BLS and CPS MORG files.

As shown in column 1 of the panel labeled "Long-term unemployment", the lagged dependent variable has a coefficient of 0.7106, consistent with interpreting this regression specification as a wage curve rather than as a Phillips curve.[18] The estimated coefficient of -0.0279 on the logarithm of the unemployment rate is negative and statistically significant, with a t-statistic of around 7. A simple computation indicates that the long-run unemployment elasticity of pay is -0.10, implying that a doubling of the unemployment rate is associated with a 10 percent decline in real wages.[19] As shown in column 2, these findings are not sensitive to the precise timing of the unemployment measure (using the rate in period $t-1$ instead of period t). Moreover, the results reported here are essentially the same as what Blanchflower and Oswald found across many countries and datasets and are also consistent with the conclusions reached by Nikjamp and Poot in a meta-analysis of wage curve estimates.[20]

The remaining columns of this panel confirm the findings of Blanchflower and Posen.[21] In particular, these regressions incorporate various measures of long-term unemployment that are never statistically significant. Evidently, the pace of wage growth is linked to the overall level of unemployment and does *not* depend on its composition, i.e., the relative incidence of long-term vs. short-term unemployment.

The second panel of the table called "Underemployment" provides some new results. As shown in the first two columns, the nonparticipation rate (that is, 100 minus the participation rate) has a negative and statistically significant effect on wage growth, consistent with the findings of Blanchflower and Posen.[22] Next, we incorporate the underemployment rate, which is defined as the number of workers who say they are working part-time for economic reasons as a percentage of total employment (as shown in Figure 6). This coefficient estimate is also negative and significant, and its inclusion does not influence the statistical significance of the other key variables.[23]

Evidently, wage growth is pushed down by the unemployment rate, the nonparticipation rate, and the underemployment rate. Thus, while the unemployment rate may have been an adequate indicator of slack prior to the onset of the Great Recession, all of these forms

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[18]D. Card, "The Wage Curve: A Review, *Journal of Economic Literature* 33:785-99.

[19]Specifically, this elasticity is computed as -0.0279/(1 - 0.7106) = -0.0964.

[20]Blanchflower and Oswald, *The Wage Curve*; D. Blanchflower and A. Oswald, "The wage curve reloaded, NBER Working Paper #11338, 2005; P. Nijkamp and J. Poot, "The Last Word on the Wage Curve? *Journal of Economic Surveys* 19: 421-50, 2005. Blanchflower and Oswald (*The Wage Curve*, p. 357) stated: "Future work will have to begin to test for statistically significant differences among numbers that lie in a rough band from -0.05 to -0.20. It would probably be unwise to treat the minus-point-one rule as more than one of thumb".

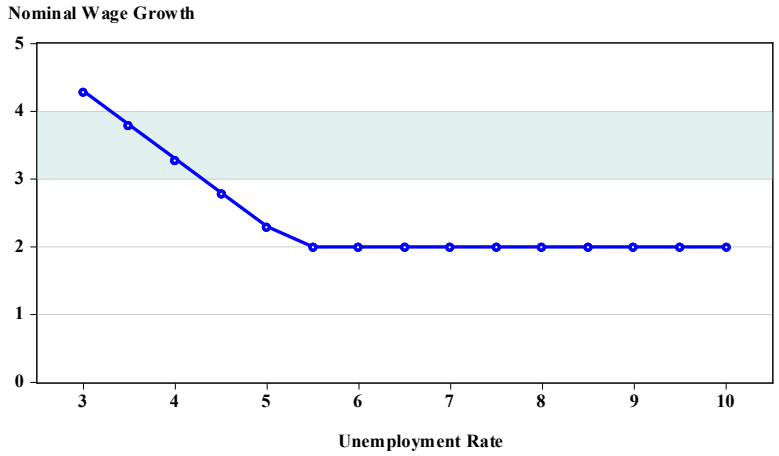
[21]D. Blanchflower and A. Posen, "Wages and Labor Market Slack: Making the Dual Mandate Operational, Peterson Institute for International Economics Policy Brief 14-10, 2014.

[22]Blanchflower and Posen, "Wages and Labor Market Slack; A. Paciorek ("Where Are the Construction Workers? FEDS Notes, Board of Governors of the Federal Reserve System, February 26, 2015) found that many individuals who are out of the labor force appear to be relatively good candidates for construction employment, at least on the basis of their demographic characteristics. In particular, he suggests there may be "a large pool of people who would find construction work attractive but did not enter the industry during the bust years."

[23]The results are essentially the same in Table 2 using weekly earnings.

FIGURE 7

A Stylized Representation of the Wage Curve



Note: The shaded area depicts the range for nominal wage growth that Federal Reserve Chair Yellen has described as "normal." Source: authors' calculations.

of labor market slack appear to be crucial in interpreting the sluggishness of nominal wage growth over the past few years, as shown in Figure 1.[24]

Figure 7 presents our interpretation of the relationship between nominal wage growth and the "true unemployment rate (including underemployment and nonparticipation). In particular, we suspect that the wage curve is relatively flat at elevated levels of labor market slack, i.e., a decline in slack does not generate any significant wage pressures as long as the level of slack remains large. As noted above, our benchmark analysis indicates that the true unemployment rate is currently around $7\frac{1}{2}$ percent–a notable decline from its peak of more than 10 percent but still well above its longer-run normal level of around 5 percent. Thus, the shape of the wage curve can explain why nominal wage growth has remained stagnant at around 2 percent over the past few years even as the employment gap has diminished substantially. Moreover, our interpretation suggests that nominal wages will not begin to accelerate until labor market slack diminishes substantially further and and the true unem-

[24]See D. Bell and D. Blanchflower ("How to Measure Underemployment? Peterson Institute for International Economics Working Paper 13/2, August 2013; "Underemployment in the UK Revisited, *National Institute Economic Review*, 224:F8-F22, 2013; "Labour Market Slack in the UK, *National Institute Economic Review*, 229:F4-F11, 2014) for more on underemployment in the United Kingdom based on preferences over hours. Workers are asked in the Labour Force Survey, which is the equivalent of the CPS in the United States, if they want more or less hours. These responses can be aggregated to the economy level. From 2000 to 2008 there was no underemployment as the number of hours of those who wanted more hours approximately equaled the number of hours of those who want fewer hours. Since 2008 the numbers who want more hours dominate to such a degree that underemployment currently is approximately 1.8 percent on top of the unemployment rate itself. It also turns out that one-third of the extra hours currently come from full-time workers, suggesting the measure we use in the US is an underestimate of the true amount of underemployment by around 50 percent.

ployment rate approaches its longer-run normal level of around 5 percent.

Monetary Policy Implications

No macroeconomic model provides a completely satisfactory description of any economy in the real world. Indeed, the limitations of existing macroeconomic models have been underscored by the incidence of relatively large and persistent forecast errors in many advanced economies over the past few years.[25] Thus, rather than relying on the monetary policy implications of any single macro model, it seems sensible to consider simple reference rules that provide reasonably robust performance across a range of plausible models. Such rules can serve as valuable benchmarks in the decision-making process and in explaining those decisions to the public.[26]

Following the seminal analysis of Taylor, a simple rule-of-thumb for adjusting the level of the federal funds rate can be expressed as a weighted sum of four components: the equilibrium real interest rate, the actual inflation rate, the inflation gap (that is, the deviation of inflation from the central banks inflation objective), and the level of resource slack.[27] We discuss each of these components in turn.

The equilibrium real interest rate (r^*) is defined as the short-term real interest rate at which the economy evolves along its balanced-growth path and inflation remains stable at the central banks objective. As with other properties of the balanced-growth path, the value of r^* cannot be directly measured but must be inferred from observed economic and financial data. In our analysis, the value of r^* is given by the consensus outlook in the Philadelphia Feds Survey of Professional Forecasters (SPF) regarding the 5-to-10-year ahead projection for the average value of the 3-month Treasury bill rate less the PCE inflation rate. Thus, using the results of the latest SPF (published in February 2015), we set $r^* = 1.25$ percent.[28]

Inflation and the inflation gap. The FOMC has established an inflation objective of 2 percent, expressed in terms of the price index for personal consumption expenditures (PCE). In measuring actual inflation, we mitigate the influence of transitory price shocks by focusing on the 12-month percent change in the core PCE price index (that is, excluding food and energy prices). In the latest reading, this measure of inflation was 1.31 percent, and hence

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[25] See C. Romer and D. Romer, "Program Report: The NBER Monetary Economics Program, National Bureau of Economic Research Report 1,17, 2014.

[26] See J. Taylor, "Discretion Versus Policy Rules in Practice, *Carnegie-Rochester Conference Series on Public Policy* 39:195214, 1993; J. Taylor and J. Williams, "Simple and Robust Rules for Monetary Policy, *Handbook of Monetary Economics*, 2010; A. Levin and J. Taylor, "Falling Behind the Curve: A Positive Analysis of Stop-Start Monetary Policies and the Great Inflation, in *The Great Inflation*, Bordo, M., Orphanides, A., eds., Chicago, IL: University of Chicago Press, 2013; and A. Levin, "The Design and Communication of Systematic Monetary Policy Strategies.

[27] Specifically, such a rule can be expressed as follows: $i_t = r^* + \pi_t + \alpha(\pi_t - \pi^*) + \beta gap_t$, where i_t denotes the target federal funds rate, r^* denotes the equilibrium real interest rate, π_t denotes a smoothed measure of inflation, π^* denotes the inflation objective, gap_t is a measure of resource slack, and the coefficients α and β indicate how much the interest rate should be adjusted in response to the inflation gap $(\pi_t - \pi^*)$ and to resource slack, respectively. See J. Taylor, "Discretion Versus Policy Rules in Practice.

[28] This value of the equilibrium real interest rate is about 25 basis points lower than the median of FOMC participants longer-run real interest rate projections in the latest SEP (published in mid-March).

TABLE 3

Prescriptions of the "Balanced Approach" Rule under Alternative Assessments of the Employment Gap

Assessment	Employment Gap	True Unemp. Rate	Funds Rate Prescription
Benchmark Estimate	1.9	7.4	0.29
Lower Natural Rate *(4.8 percent)*	2.2	7.7	-0.01
Higher Potential Labor Force *(CBO 2013)*	3.6	9.1	-1.44
Higher Potential Labor Force and Lower Natural Rate	3.9	9.4	-1.74

Source: BLS, *Blue Chip Economic Indicators*, CBO, SPF, and authors' calculations.

the inflation gap was 0.69 percent.

Resource slack. In light of our foregoing analysis, we measure resource slack in terms of the total employment gap. In addition to our benchmark estimate, we consider the implications of several alternative assessments of labor market slack.

For the sake of brevity, our analysis focuses on one specific rule-of-thumb that was analyzed extensively by Taylor.[29] This rule prescribes the level of the federal funds rate as the weighted sum of the equilibrium real interest rate, the current inflation rate, the inflation gap, and the level of resource slack, with weights of 1.0, 1.0, 1.5, and 1.0, respectively. This particular specification has been shown to provide a reasonably balanced approach to fostering the stability of inflation and economic activity, and hence Yellen characterized it as the "balanced approach rule.[30]

As shown in Table 3, this policy rule prescribes a target federal funds rate of about $\frac{1}{4}$ percent using our benchmark estimate of the employment gap. However, the implied funds rate is notably lower for other reasonable assessments. Indeed, using CBO's February 2013 projection for the potential labor force (as depicted in Figure 4) along with a natural rate of 4.8 percent (consistent with analysts pre-crisis projections), the employment gap is nearly twice as high at around 4 percent, and the funds rate prescription is nearly 2 percentage

[29] J. Taylor ("A Historical Analysis of Monetary Policy Rules, in J. Taylor, ed., *Monetary Policy Rules*, University of Chicago Press, 1999) reported on a comprehensive analysis of the performance of simple policy rules across a wide range of macroeconomic models.

[30] Yellen, "Perspectives on Monetary Policy.

points below zero.

This analysis indicates that initiating the process of monetary policy tightening would be premature at the present time. Indeed, such a policy move would be a serious mistake in light of substantial downside risks to the current economic outlook. Rather, liftoff from the zero lower bound should be deferred until labor market slack has diminished further and inflation has moved up closer to the FOMCs 2 percent inflation goal.

Making the Federal Reserve Fully Public: Why and How

Jordan Haedtler, Andrew Levin, and Valerie Wilson*

August 2016

Abstract: The Federal Reserve's governance structure is outdated and inadequate for ensuring that the Fed serves the public interest. In this paper, we examine the case for making the Fed fully public ("why"), and then we consider specific proposals for doing so ("how"). Our analysis indicates that pragmatic and nonpartisan reforms can strengthen the Federal Reserve's governance while enhancing its operational independence to pursue its statutory mandate without political interference. In particular, the Fed should be a fully public institution whose decision-makers are selected by open and transparent processes; indeed, we find that making the Fed fully public also yields significant benefits for American taxpayers. Moreover, the Fed should be held to the same standards of transparency and accountability as every other public agency, including comprehensive annual reviews by the Government Accountability Office (GAO) and applicability of the Freedom of Information Act (FOIA) to all aspects of the Fed's procedures and operations.

* Haedtler is the campaign manager of the Fed Up Coalition, Levin is a professor of economics at Dartmouth College, and Wilson is director of the Economic Policy Institute's Program on Race, Ethnicity, and the Economy. We appreciate very helpful comments, suggestions, and background research from Maggie Corser, Ady Barkan, Dean Baker, Josh Bivens, Jared Bernstein, and Bill Spriggs.

I. Introduction

When the Federal Reserve System was founded in 1913, its fundamental purpose was to serve as the "*bank to the bankers"*—that is, a secure depository for bank reserves and a source of funds during liquidity shortages. Thus, like nearly every other central bank of that era, the twelve regional Federal Reserve Banks were established as essentially private institutions, owned and managed by commercial banks under the broad oversight of the Federal Reserve Board (which is an independent federal agency).

Over the past century, however, the Federal Reserve has evolved into *America's central bank*, and its monetary policy decisions now affect the everyday lives of practically every American family. For example, when the Fed acts to adjust the level of short-term interest rates, that adjustment is reflected in a wide array of interest rates and asset prices, including auto loan rates, home mortgage rates, savings deposit rates, business financing costs, and so forth. And those financial effects reverberate on the broader economy, affecting consumer spending, business hiring and investment, and the determination of wages and prices.

Unfortunately, the Federal Reserve's governance structure is outdated and inadequate for ensuring that the Fed serves the public interest. The presidents of the Federal Reserve Banks sit on the Federal Open Market Committee (FOMC), which determines the course of monetary policy, but the Federal Reserve Banks are private institutions owned by commercial banks. Indeed, commercial banks select two-thirds of the directors of each Federal Reserve Bank, including half of the directors responsible for appointing its president. Moreover, while the demographics of America have grown increasingly diverse over time, the leadership of the Federal Reserve Banks (that is, the presidents and the directors) has remained overwhelmingly white, male, and insular—dominated almost exclusively by long-time Fed insiders and individuals with a financial background.

Moreover, the Fed's private ownership is now out of step with practically every other major central bank around the world. For example, the Bank of Canada and the Bank of England became public in 1938 and 1946, respectively, while the European Central Bank has been a public institution since its inception in the 1990s. Nearly all of the 19 national central banks in the eurozone are fully public; the lone exceptions are Belgium, Greece, and Italy. And the Bank of Japan and the Swiss National Bank each have miniscule amounts of outstanding shares, the majority of which are held by other public institutions.[1]

In this paper, we examine the case for making the Fed fully public ("why"), and then we consider specific proposals for doing so ("how"). Our analysis indicates that pragmatic and nonpartisan reforms can strengthen the Federal Reserve's governance while enhancing its operational independence to pursue its statutory mandate without political interference. In particular, the Fed should be a fully public institution whose decision-makers are selected by open and transparent processes; indeed, we find that making the Fed fully public also generates significant benefits for American taxpayers. Moreover, the Fed should be held to the same standards of transparency and accountability as every other public agency, including comprehensive annual reviews by the Government Accountability Office (GAO) and applicability of the Freedom of Information Act (FOIA) to all aspects of its procedures and operations.

[1] The paid-in capital of the Bank of Japan (BOJ) is fixed at a miniscule amount of 100 million yen (roughly $1 million) that accrues a tiny stream of dividends (about $50,000 per year). Moreover, the Japanese government owns 55 percent of the BOJ's paid-in capital, and its other shareholders do not have any role in the BOJ's oversight or management. The paid-in capital of the Swiss National Bank is fixed at 25 million CHF (about $25 million), of which roughly two-thirds is held by public institutions.

II. The Rationale for Fed Reform

A. Deficient Selection Procedures

As noted above, the FOMC sets the nation's monetary policy. Under the Federal Reserve Act, the FOMC has a nuanced structure in which the seven members of the Fed's Board of Governors and the president of the Federal Reserve Bank of New York are all permanent voting members, while four of the other eleven presidents serve as voting members on a rotating basis. That design was intended to ensure that the Federal Reserve Bank presidents—as heads of private institutions—would only constitute a minority of the voting members of the FOMC. In recent years, however, the Fed's Board of Governors has regularly experienced multiple vacancies, reflecting a more extensive timeframe for vetting potential nominees as well as a more protracted duration of the Senate confirmation process. Thus, the members of the Board of Governors have constituted a voting majority at only half of the FOMC meetings from 2001 to 2008 and less than one-third of the FOMC meetings since then.[2] In effect, increased political gridlock has expanded the influence of the Federal Reserve Bank presidents in setting the nation's monetary policy.[3]

Despite the crucial role of Reserve Bank presidents in determining the nation's monetary policy, the process for selecting them takes place entirely behind closed doors. Recent Reserve Bank presidential appointments have revealed a process that is opaque, inbred, and largely *pro forma*. The Federal Reserve Act establishes the procedure for selecting Reserve Bank presidents. The Federal Reserve Board describes the process as follows: "To conduct the search, the Reserve Bank's board of directors forms a search committee composed of Class B and C directors. That committee hires a search firm to help identify a broad, diverse, highly qualified candidate pool. The committee considers a large nationwide pool of candidates, both within and outside the Federal Reserve System, who meet the position's qualifications."[4]

Beyond these legal guidelines, very little information is publicly available regarding how Reserve Bank presidents are chosen. The public is kept in the dark about the candidates being considered, the timeline for their selection, and the criteria used to assess candidates' qualifications. When the Reserve Bank presidents in Philadelphia, Dallas, and Minneapolis announced their retirements in 2014, the stage was set for a preview of the re-appointment process set to take place in 2016. One by one, the presidential vacancies at all three Reserve Banks were filled by individuals who had previously been affiliated with the same large bank, and the Board of Governors unanimously approved each of those appointments.[5] At the Dallas and Philadelphia Reserve Banks, the individuals chosen had been involved in their own selection.[6]

These, however, are not the only examples of Reserve Bank presidents having an inside track to selection. A 2015 analysis conducted by the Bipartisan Policy Center found that 17 of the 25 Reserve Bank

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[2] Indeed, there have been three FOMC meetings at which there were only four members of the Board of Governors, and hence they comprised a minority of the voting members of the FOMC.

[3] *http://www.brookings.edu/~/media/research/files/papers/2015/03/02-fed-banks-21st-century/pcb_workingpaper10_june24_final.pdf*.

[4] *https://www.federalreserve.gov/faqs/how-is-a-federal-reserve-bank-president-selected.htm*.

[5] *https://www.thenation.com/article/why-do-former-goldman-sachs-bankers-keep-landing-top-slots-at-the-federal-reserve/*

[6] *http://www.bloomberg.com/news/articles/2015-06-03/not-far-to-look-fed-s-newest-president-searched-found-himself*; *http://bizbeatblog.dallasnews.com/2015/08/dallas-fed-names-harvard-business-professor-as-new-president.html/*

presidents since 1990 "have been immediate past employees or board members of a regional bank." [7] In response to recent concerns members of Congress raised about the re-appointment process for Federal Reserve Bank presidents being an "inside game," leaders at the Fed noted that the Board of Governors conducts "ongoing monitoring" and an annual review of Reserve Bank presidents' performance, and that when the time came to re-appoint or replace presidents, the Board of Governors would "act on the recommendations" of the boards of directors.[8] In 2016, all Reserve Bank presidents were re-appointed to new terms.[9]

The re-appointment process is *pro forma* and insular. Indeed, Federal Reserve Bank presidents do not conceive of their own appointments as having five-year terms; rather, they mostly expect to serve until they retire or are aged out. One example of the process' perfunctory nature is the routine re-appointment of presidents who can't possibly serve the bulk of their term due to mandatory retirements.

To ensure that a wider breadth of candidates—not just those with backgrounds at the Fed and within the financial sector—are considered, the Fed must bring this process out from the shadows.

B. Lack of Diversity

In 1977, Congress amended the Federal Reserve Act to include reforms requiring that Federal Reserve leaders "represent the public, without discrimination on the basis of race, creed, color, sex, or national origin, and with due but not exclusive consideration to the interests of agriculture, commerce, industry, services, labor and consumers."

Despite these efforts to formally align the institution with current antidiscrimination laws and to expand diversity on Federal Reserve Bank boards of directors, the Federal Reserve remains wholly unrepresentative of the public, in terms of racial, gender, and professional diversity:

- No African American or Latino has ever served as president of any Federal Reserve Bank.
- At present, ten of the twelve Federal Reserve Bank presidents are white men; two are women, and only one is non-white.
- The directors of the Federal Reserve Banks are predominantly white men; specifically, 83 percent are white and nearly three-fourths are men.
- About five years ago, the GAO reported that consumer groups and labor organizations were significantly underrepresented on Federal Reserve Banks' boards of directors.[10] Since then, however, the share of directors from banking and commerce has increased even further.
- Less than 5 percent of all Federal Reserve Bank directors represent organizations governed by community members and employees.

[7] *http://bipartisanpolicy.org/blog/reform-the-fed-get-rid-of-groupthink/*
[8] *https://www.c-span.org/video/?c4580569/sen-jack-reed*
[9] *https://www.federalreserve.gov/newsevents/press/other/20160219a.htm*
[10] *http://www.gao.gov/products/GAO-12-18*

C. Consequences for Decision-Making

Diversity is more than just a symbolic gesture of fairness and inclusion. Empirical analysis clearly shows that diversity, especially within public organizations, enhances the pursuit of policies and practices that meet a broader range of public needs and expectations and even improves organizational performance.[11] This operates through direct as well as indirect channels. When included in decision-making roles, members of underrepresented groups tend to act to ensure that the interests of those who share their group identities are not overlooked. Additionally, their presence in these roles also influences non-minority decision-makers by exposing them to information that may be beyond the scope of their personal experience.

The advice of Federal Reserve Bank directors and the background of Federal Reserve Bank presidents are undoubtedly key factors that contribute to the FOMC's deliberations. The attitudes, perspectives, and life experiences that Federal Reserve Bank presidents and board directors take to the FOMC have an enormous bearing on the Federal Reserve's decisions, which in turn have major implications for public well-being. The outsized voice of the commercial banks in selecting regional Federal Reserve directors significantly affects the capacity of the Federal Reserve Banks to fulfill their responsibility for assessing and characterizing economic conditions in their respective regions. And the resulting lack of diversity of the Federal Reserve Bank presidents—in terms of race, ethnicity, gender, educational background and professional experience—has substantive consequences for comprehensively and accurately assessing the strength of the economy in advance of making monetary policy decisions.

Of course, the Fed is not charged with alleviating the full range of structural factors that lie at the root of racial inequality, and its monetary policy tools would be poorly suited to address those factors. However, monetary policy actions can significantly affect the pace of an economic recovery and hence have effects on employment and wages by shifting the balance of power between workers and employers. These effects tend to be disproportionately large for specific demographic groups because tighter labor markets also make it more costly for employers to discriminate. Thus, it is appropriate for the Fed to consider those effects in setting the course of monetary policy, but the transcripts of FOMC meetings provide little evidence that Fed officials have actually done so.

In particular, African American workers suffer disproportionately from labor market downturns and benefit markedly from economic recoveries. The unemployment rate for blacks typically moves twice as much as the national unemployment rate.[12] And the unemployment rates of black teenagers and young adults—especially those without a college degree—are even more sensitive to shifts in the stance of monetary policy.[13] Nonetheless, even as national unemployment hovered at crisis levels in 2010, the FOMC meeting transcripts reveal that Fed officials never made a single reference to the abysmal labor market conditions of African Americans.[14]

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[11] J.J. Hindera, Representative bureaucracy: Further evidence of active representation in the EEOC district offices, *Journal of Public Administration Research and Theory* 3(4):415-429, 1993. S.E. Page, *The difference: How the power of diversity creates better groups, firms, schools and societies*, Princeton University Press, 2007. S.C. Selden, *The promise of representative democracy: Diversity and responsiveness in a government agency*, M.E. Sharpe, 1997.

[12] *http://www.epi.org/publication/the-impact-of-full-employment-on-african-american-employment-and-wages/*

[13] *http://www.npc.umich.edu/publications/working_papers/paper10/03-10rev2.pdf*

[14] *https://sites.google.com/site/kocherlakota009/home/policy/thoughts-on-policy/1-18-16*. In 2010 the unemployment rate for African Americans exceeded 15 percent—more than 5 percentage points higher than the national unemployment rate.

To see the positive side of these dynamics, it is helpful to revisit the experience of the late 1990s. By 2000, the average annual unemployment rate had fallen to 4 percent—its lowest level in generations, and the deviation between unemployment rates for blacks vs. whites was only 4.1 percent—notably smaller than in the 1980s or the 2000s. In addition to these substantial employment gains, the real wages of black workers grew by 2 percent per year during the late 1990s—a tad faster than the wage growth of 1.7 percent per year for whites *[Figure D from Full Employment tables & figures.xlw]*. These employment and wage gains translated into improved living standards for African American households. The share of African American households in the middle 60 percent of the income distribution rose 3 percentage points between 1995 and 2000, whereas that share declined during the recoveries of the 1980s and the 2000s.

It is important to note that these desirable outcomes stemmed from a full employment economy *without* any acceleration in the rate of inflation, suggesting that policymakers should be willing to experiment aggressively with low rates of unemployment for the sake of improving conditions in some of America's hardest-hit communities without undue concern about keeping inflation rates in check. Such considerations may be more likely to occur among a group of policymakers who are familiar with the wide range of economic outcomes in an increasingly diverse and unequal society.

The Fed's lack of sectoral diversity is also a problem. When major corporate figures from a variety of industries are included on the Reserve Banks' boards, the Fed considers its requirement to represent an array of economic interests fulfilled. But multi-millionaire CEOs have an inherently different understanding and perspective than small business owners, debtors, students, middle- and low-income workers, and those seeking credit.[15] In practice, that lack of diversity has frequently skewed concerns within the Fed toward inflation and downplayed the importance of achieving full employment. Indeed, Baker and Bernstein (2013) analyzed the deviation of unemployment from its full-employment level and found that the cumulative gap from 1980 to 2012 was about 31 percentage points.

Finally, the Fed's current governance structure contributes to a "group-think" approach that may explain why policymakers failed to recognize key warning signals prior to the onset of the financial crisis. Indeed, Greider (2014) notes that "...reliance on a narrow frame of reference produces institutional blind spots and gross errors…The telling evidence lies in what the Fed does not talk about. If you scan the public record over the last generation, you might conclude that the policy-makers were unaware of the grave disorders that were steadily accumulating. Or that they believed the economic pressures assaulting citizens were not relevant to monetary policy. Whatever the explanation, the Fed missed the big story—the steady economic deterioration stalking the middle class—just as it did not see the reckless behavior in banking that would lead to collapse."

[15] *http://www.bizjournals.com/twincities/news/2015/08/19/general-mills-ceo-ken-powell-pay-layoffs.html*

III. Strengthening the Fed's Governance

Legislative action will be required to make the Federal Reserve into a fully public institution. Of course, amending the Federal Reserve Act is a delicate matter, and it is crucial to ensure that such legislation strengthens the Fed's governance and enhances its operational independence to carry out its statutory mandate. In this section, we provide a detailed analysis of the governance reforms proposed by Levin (2016), and then we compare this approach to the proposals of Conti-Brown (2015) and Fisher (2016).

A. Ownership

Current Law. Each regional Federal Reserve Bank is a private institution that is legally owned by commercial banks—referred to as *member banks*—whose headquarters are located within its district.[16] Indeed, the Federal Reserve itself refers to the member banks as "stockholders" who purchase shares of equity and thereby supply the Fed with paid-in capital.[17] Those shares cannot be transferred or sold; i.e., each Federal Reserve Bank is in essence a privately-held corporation.

The equity issued by each Federal Reserve Bank—and hence the amount of its paid-in capital—is determined by the equity of its member banks. Specifically, each member bank is required to provide paid-in capital to the Fed that is equal to three percent of its own equity (that is, its capital plus surplus).[18] If a member bank's equity increases, then it must purchase a corresponding amount of additional shares from its Federal Reserve Bank. Conversely, if a member bank is liquidated or its equity shrinks, then the Federal Reserve Bank cancels the corresponding amount of shares and refunds that amount back to the member bank.

As with many privately-held corporations, each Federal Reserve Bank pays dividends to its shareholders. Under current law, the dividend rate for the larger member banks (assets exceed $10 billion) is given by the yield on 10-year U.S. Treasury notes, while the smaller member banks (assets less than $10 billion) receive a fixed dividend rate of 6 percent.[19] As of year-end 2015, the Fed's paid-in capital totaled $29.5 billion, of which $27.4 billion was provided by the larger member banks, and $2.1 billion was provided by the smaller member banks.[20]

Proposed Reform. All of the regional Federal Reserve Banks should become public corporations that are fully owned by the American people. This transformation would be remarkably straightforward, because the Fed can simply follow the procedures that it already uses for making adjustments to the shares of individual member banks. *Each Federal Reserve Bank will cancel all of the shares of its member banks* and refund their paid-in capital along with the prorated amounts of any accrued dividends; those refunds will be issued by crediting each bank's account at the Federal Reserve Bank.

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[16] All nationally-chartered banks are required to be members of the Federal Reserve System. Such membership is voluntary for state-chartered banks, but in practice only a few small banks decline that option.

[17] *https://www.federalreserve.gov/newsevents/press/bcreg/bcreg20160218a1.pdf*

[18] Under current law, the Board of Governors has authority to call on each member bank to provide additional paid-in capital up to a maximum of 6 percent of its own equity; however, that provision has never been used in practice.

[19] These dividend rates became effective on January 1, 2016; prior to that date, all member banks accrued dividends at the fixed rate of 6 percent.

[20] The total amount of paid-in capital is shown in the "Federal Reserve Banks Combined Financial Statements" of the Federal Reserve's annual report (*http://www.federalreserve.gov/publications/annual-report/2015-contents.htm*). The subtotals corresponding to large member banks and smaller member banks, respectively, were obtained from the FDIC database of "Statistics on Depository Institutions" *(https://www5.fdic.gov/sdi/)*.

This approach to making the Federal Reserve fully public does not involve any change at all in the current value of U.S. government debt. Moreover, this measure will not have any effect on the size of the Fed's balance sheet but will simply *modify the composition of the Fed's liabilities*. In effect, the Fed will be paying off one form of liability—namely, member banks' paid-in capital—by expanding another type of liability, namely, member banks' reserves held at Federal Reserve Banks.

Indeed, this measure will *augment the Fed's net income*, because the stream of dividend payments is much more costly than paying for the equivalent amount of bank reserves held at the Fed. For example, the dividend rate that the Fed pays to the larger member banks (i.e., the 10-year Treasury yield) is now close to 1.5 percent—roughly a percentage point higher than the rate of interest that the Fed currently pays on bank reserves. Of course, the precise magnitude of this spread varies somewhat over time, but the consensus of professional forecasters is that the spread will remain roughly unchanged over the coming decade.[21] As for the smaller member banks, the interest rate on reserves is currently far below the fixed dividend rate of 6 percent, but that spread is expected to narrow over time as the level of short-term interest rates moves gradually upwards.

Thus, making the Federal Reserve fully public will generate *significant benefits for American taxpayers*, because the Fed generally transfers all of its net income to the U.S. Treasury.[22] For example, at the current level of interest rates, the annualized amount of the Fed's dividend payments is about $540 million.[23] By transforming its paid-in capital into bank reserves, the Fed would instead pay about $150 million in interest. In effect, this transformation would increase the Fed's annual net income by nearly $400 million per year. Even with the level of interest rates rising gradually over time, the benefit to taxpayers will continue to exceed $300 million per year.

Indeed, if we cumulate the annual amounts over the coming decade, *the savings to taxpayers from making the Fed fully public is likely to be well over $3 billion*. As we have already emphasized, the fundamental rationale for making the Fed public is to enhance its governance, accountability, and transparency. Nonetheless, the magnitude of these fiscal benefits is substantial and thereby makes the case for enacting this reform even more compelling.[24]

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[21] The Federal Reserve Bank of Philadelphia regularly collects professional forecasters' projections of the longer-run average level of interest rates *(https://www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters)*. In the most recent projections (published last February), the median projection was 2.5 percent for the 3-month Treasury bill rate and 3.4 percent for the 10-year Treasury yield; i.e., the spread between those rates is expected to average 0.9 percent over the next decade—just a notch lower than the current spread.

[22] Under current law, the Federal Reserve maintains a surplus capital account that is capped at $10 billion, and any net income exceeding that amount must be remitted to the U.S. Treasury. The Fed's net income has remained positive throughout its history, but if its net income ever turned negative the Fed would draw down its surplus capital and suspend the transfer of funds to the U.S. Treasury.

[23] As noted above, the Fed is currently paying a dividend rate of about 1.5 percent on the $27.2 billion of paid-in capital provided by the larger member banks and a fixed dividend rate of 6 percent on the $2.3 billion in paid-in capital provided by the smaller member banks; consequently, those annual dividends are about $410 million and $140 million, respectively. By transforming all of its paid-in capital into bank reserves, a fully public Fed would instead pay its current interest rate of 0.5 percent on those bank reserves.

[24] Making the Fed fully public may also be viewed positively by commercial banks, because the Fed would refund all of their paid-in capital, which the banks could then invest in the broader economy. Indeed, that is precisely the rationale for H.R. 5027, a bill recently proposed by Rep. Neugebauer that would return most (but not quite all) of the Fed's paid-in capital to the banks.

B. Appointment of Federal Reserve Bank Officials

A key element of making the Fed fully public is that the appointment of Federal Reserve Bank officials—that is, directors and presidents—should occur through an open and transparent process that provides extensive opportunities for public input.

Directors. Each Federal Reserve Bank should continue to be overseen by a board of nine directors who serve staggered three-year terms. Under current law, the member banks select six of those directors—namely, three employees of member banks, and three individuals not employed by any member bank—while the remaining three directors are appointed by the Fed's Board of Governors. In contrast, once the Fed becomes fully public, it would no longer be appropriate for the commercial banks to have any special role in selecting any of the directors. Instead, all of the directors should be selected through a process overseen by the Board of Governors and involving elected officials of each Fed district.

A fundamental reason for the Fed's regional structure is to ensure that the nation's geographical diversity is reflected in the Fed's monetary policy decisions. Thus, every candidate for director should be nominated by at least one senior elected official—either a governor or member of Congress—from the geographical area covered by that particular Federal Reserve Bank. The Board of Governors would appoint a search committee to narrow down the list of candidates as needed, and then the Board of Governors would make the final decision through a recorded vote.

The appointment process should ensure that directors are broadly representative of the public in terms of racial/ethnic and gender diversity, educational background, and professional experience. The majority of directors on each board should be affiliated with small businesses and non-profit organizations, including community and consumer groups, labor unions, and academic institutions. To avoid conflicts of interest and protect the integrity of the Federal Reserve's role in regulating the banking industry, individuals affiliated with financial institutions overseen by the Fed should be prohibited from serving as directors.

To ensure a sufficiently high degree of transparency, the appointment process would include the following elements: (i) publication of the selection criteria and timeline; (ii) public forums at which members of the public can meet with the search committee; (iii) publication of the names of all candidates under consideration; and (iv) opportunities for members of the public to submit questions to the candidates, either electronically or at a public forum.

Presidents. The board of directors of each Federal Reserve Bank should maintain responsibility for appointing and overseeing its president. Under current law, that appointment is made by only six of the directors, namely, the three non-bankers chosen by the member banks and the three individuals appointed by the Board of Governors. In contrast, once the Fed becomes fully public, all nine directors would be responsible for making that decision.

To ensure a high degree of transparency, the process of appointing Federal Reserve Bank presidents should be reformed so that each board of directors takes nominations from the public, publishes a list of all eligible nominees, and engages in a selection process involving genuine public participation through public forums and other forms of input and feedback.

C. Terms of Office

Terms of office play a crucial role in ensuring that a central bank has an appropriate degree of operational independence and accountability. If the term of office is fairly short and subject to renewal, then policymakers may be susceptible to political interference that could impair the central bank's ability to carry out its statutory mandate. Conversely, it would not be appropriate for central bankers to have permanent lifetime appointments, because the central bank is an agency with delegated authority, *not* an autonomous branch of government like the judiciary.

In their comprehensive study of central bank independence and transparency, Eichengreen and Dincer (2014) have noted that the international best practice is for monetary policymakers to be appointed to a *single nonrenewable term that exceeds the length of the political cycle*.[25] Indeed, that standard is already followed by several other major central banks. For example, the president of the European Central Bank and the governor of the Bank of England each serve a single nonrenewable term of 8 years, while the governor of the Bank of Canada has a 7-year term.[26]

By contrast, the current terms of office of Federal Reserve policymakers are not consistent with that standard. The Federal Reserve's Chair is appointed to a renewable term of 4 years, and hence the question of whether a current Fed chair will be reappointed has occasionally arisen as an issue in U.S. presidential campaigns.[27] The members of the Fed's Board of Governors are appointed to staggered 14-year terms, but in practice their tenure has averaged only about 4 years.[28] Finally, as previously noted, the Federal Reserve Bank presidents have renewable 5-year terms, but in practice their reappointments have been *pro forma* and hence they typically hold office for two decades or more.

Thus, making the Fed fully public provides a crucial opportunity to strengthen the Fed's operational independence and accountability. Every Fed policymaker—including the Chair, the Vice Chairs, the other members of the Board of Governors, and the presidents of the Federal Reserve Banks—should have a single non-renewable term of 7 years, and those terms should be evenly staggered over time. Of course, some appointees may not end up serving a full 7-year term due to circumstances that could not be anticipated at the time of their appointment to office. Nonetheless, the vetting process should aim to ensure that every appointee intends to serve the full length of their term.[29] That constraint might be binding for some potential nominees who would otherwise be highly qualified. But fostering the Fed's

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[25] See criteria 1a, 1d, 5a, and 5e in Table 18 of N. Dincer and B. Eichengreen, "Central Bank Transparency and Independence: Updates and New Measures", *International Journal of Central Banking*, March 2014, pp.189-253 (*http://www.ijcb.org*).

[26] Since 1987 each governor of the Bank of Canada has served a single term of office; that practice has been a matter of convention rather than a statutory requirement.

[27] For example, Chairman Arthur Burns was appointed by President Nixon in 1970 and reappointed by President Ford four years later, but the Fed's policies were questioned in the 1976 presidential campaign, and in 1977 Chairman Burns tried unsuccessfully to persuade the Carter administration to support his reappointment to a third term. *[insert reference here]* Indeed, the issue of the Fed Chair's reappointment has arisen in the current campaign; see *http://www.wsj.com/articles/donald-trump-says-he-would-replace-janet-yellen-supports-low-interest-rates-1462465158*.

[28] Under current law, a member of the Board of Governors may initially be appointed to fill out the remainder of someone else's 14-year term and then reappointed to a full 14-year term; moreover, as noted above, the appointment of the Fed Chair is subject to renewal every four years, subject to the constraint that the Chair must be a member of the Board of Governors. Consequently, a Fed Chair's tenure may also be very long, as in the cases of William Martin (1950-1970) and Alan Greenspan (1987-2006).

[29] For example, academic institutions typically allow tenured faculty to take a leave of absence for up to two years; thus, a number of such individuals have been appointed to the Board of Governors and then resigned within 18 to 24 months in order to return to their academic positions.

operational independence is crucial to its effectiveness, and hence it is essential to ensure that the tenure of Fed policymakers extends beyond the length of the political cycle.

D. Comparison with Alternative Approaches

Proposals to make the Fed fully public have been debated since the 1930s. Generally speaking, such proposals have involved one of two approaches: (1) the Federal Reserve Banks would be converted into branch offices of the Fed's Board of Governors, and their presidents would become employees of the Board of Governors; or (2) the Federal Reserve Banks would become part of the federal government, and their presidents would become federal officials appointed by the President and confirmed by the Senate. For example, Conti-Brown (2015) has advocated the first approach, while Fisher (2016) has proposed a comprehensive reform package that would incorporate the second approach.[30] Under either approach, the board of directors of each Federal Reserve Bank would no longer have any role in its governance and could be transformed into an advisory council or simply disbanded.

Alternative #1*:* Making the Federal Reserve Bank presidents into employees of the Board of Governors would risk undermining the decentralized structure of the Fed and consolidating too much power in Washington, DC. As employees hired and fired by the Board of Governors, the chiefs of the Federal Reserve Banks could no longer be independent voices representing diverse perspectives and distinctive geographic regions. Indeed, the entire Fed might become even more susceptible to the "group think" problem noted above.

Thus, rather than curtailing or abolishing the Federal Reserve Banks, it would be preferable to strengthen their effectiveness by making them fully public institutions. Involving the senior elected officials of each region in nominating the directors of its Federal Reserve Bank would help ensure that those directors are broadly representative of their entire region—not just its financial and corporate interests. Moreover, opening up the process of appointing the Federal Reserve Bank presidents would dramatically expand the public's ability to engage in that process at a grassroots level, rather than shifting all of those decisions to officials at the Fed's DC headquarters.

Examining the experiences of other central banks around the world, the advantages of public central banks that encourage regional collaboration become clear. In countries where the population is mainly concentrated in a fairly small geographical area (such as Canada, Japan, Sweden, and the United Kingdom), the central bank's policymakers are appointed by the national government while its regional branch offices carry out purely administrative functions. By contrast, the Eurozone encompasses much greater regional diversity, and hence the European Central Bank (ECB) was intentionally designed to have a governance structure similar to that of the Federal Reserve. Thus, monetary policy for the Eurozone is determined by the ECB Governing Council, comprised of its executive board (whose members are appointed by a joint decision of the heads of all Eurozone countries) and the presidents of the 19 national central banks (who are appointed by their respective national governments). Indeed, that regional governance structure has proven crucial in enabling the ECB to face a number of daunting policy challenges over recent years.

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[30] See *http://yalejreg.com/nc/do-the-banks-own-the-federal-reserve-let-s-finally-make-the-answer-a-resounding-no-by-peter-conti-br/* and *http://shadowfed.org/wp-content/uploads/2016/04/FisherSOMC-April2016.pdf* .

Alternative #2. The presidents of the Federal Reserve Bank could become federal officials appointed by the President and confirmed by the Senate, thereby preserving their independent role in relation to the Fed's Board of Governors. However, shifting the appointment process to the federal level could lead to a greater number of Federal Reserve Bank presidents with political connections in Washington rather than deep and longstanding ties to their own Federal Reserve district. Indeed, the Board of Governors itself is already supposed to be comprised of individuals from diverse regions, but that legal requirement has rarely been considered in practice.[31]

Moreover, expanding the number of Fed officials to be nominated by the President and confirmed by the Senate could be a recipe for a much greater incidence of vacancies among the Federal Reserve Bank presidents, similar to the problem faced by the Fed's Board of Governors in recent years. One way to avoid that particular pitfall would be to slash the number of Federal Reserve Banks, perhaps following a process similar to the approach used in determining military base closures at the end of the Cold War. Alternatively, as in the comprehensive reform package proposed by Fisher (2016), the Fed's Board of Governors could be scaled down to a single Chair while the number of Federal Reserve Banks would shrink from 12 to 8, so that the Fed would have a single decision-making body comprised of nine voting members—all of whom would be federal officials. Such an approach has substantial implications for how the Fed carries out its responsibilities for financial supervision and regulation, and hence a detailed analysis of that proposal would necessarily go well beyond the scope of our paper.

IV. Strengthening the Fed's Transparency and Accountability

Transparency and accountability are fundamental characteristics of every well-governed public agency.[32] Moreover, the international experience clearly demonstrated that enhancing a central bank's transparency and accountability raises the public's confidence in the integrity of the monetary policy process and thereby strengthens public support for its operational independence in carrying out its legal mandate. In this section, we consider three key elements that would significantly improve the Fed's transparency and accountability, aligning its practices with those of other U.S. public agencies and with many other central banks around the globe.

A. Public Access to Information

Over the past half-century, the Freedom of Information Act (FOIA) has required that every federal agency must make its records "promptly available to any person," subject to a few specific exemptions that are intended to protect national security, individual privacy, proprietary business information, and pre-decisional agency deliberations. As a federal agency, the Fed's Board of Governors is subject to FOIA.

By contrast, *the twelve Federal Reserve Banks are private institutions that are not covered by FOIA*. In fact, the Board of Governors has successfully argued in federal court that it is obliged to protect

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[31] The law states: "In selecting the members of the Board, not more than one of whom shall be selected from any one Federal Reserve district, the President shall have due regard to a fair representation of the financial, agricultural, industrial, and commercial interests, and geographical divisions of the country." *(http://www.federalreserve.gov/aboutthefed/section%2010.htm)*

[32] For further discussion, see *http://regulationbodyofknowledge.org/regulatory-process/institutional-design/* and *http://www.worldbank.org/en/topic/governance/overview*.

the secrecy of all Federal Reserve Bank records and guard against their disclosure.[33] The legal premise is that the Board of Governors is the federal agency that oversees the Federal Reserve Banks, and hence its responsibilities are the same as any federal agency that must protect the confidential information of a private institution. The federal court strongly endorsed that argument in its final ruling:

> *"...as the Board points out, the fact that it can require examination of the Federal Reserve Banks is no different than any other financial institution subject to mandatory supervision by a federal regulator. If a financial institution cannot expect confidentiality, it may be less cooperative and forthright in its disclosures, even if an examination is mandatory. There is no reason to believe the Federal Reserve Banks would not react the same way."*
>
> *U.S. District Court for the District of Columbia, Case 13-cv-603-tsc*
> *(Laurence M. Ball vs. Board of Governors of the Federal Reserve System)*

It is deeply troubling that a federal court has accepted the premise that the public release of their records could lead the Federal Reserve Banks to become "less cooperative and forthright" in their interactions with the Board of Governors. Unfortunately, that prospect is a direct consequence of the fact that the Federal Reserve Banks are currently structured as private institutions owned by commercial banks.

That lack of transparency is inappropriate and unacceptable, because the Federal Reserve's fundamental purpose must be to serve the interests of the public. By converting the Federal Reserve Banks into public institutions, the entire Federal Reserve System will be covered by FOIA. Consequently, all of its records will become subject to prompt disclosure (apart from the standard exemptions), regardless of whether those records originated at a Federal Reserve Bank or at the Board of Governors.

B. External Reviews

Regular external reviews are a key element of good management for any institution, public or private. Indeed, such reviews have become standard practice at many central banks as well as global organizations like the International Monetary Fund.[34] For example, the Bank of England has a Court of Directors that has authority to examine all aspects of its activities, and those reviews are conducted by an Independent Evaluation Office that reports directly to the Court of Directors.[35] As noted above, such reviews strengthen the public's confidence in the effectiveness of the central bank and thereby enhance its operational independence from political interference.

U.S. federal agencies are generally subject to two forms of external review. First, each agency has an independent Office of the Inspector General that examines all aspects of the agency's procedures and operations, with the aim of identifying and investigating fraud, waste, and mismanagement. Second, each agency is subject to evaluations by the Government Accountability Office, an independent nonpartisan agency whose fundamental purpose is to help improve the performance and accountability of the federal government.[36]

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[33] *http://www.courthousenews.com/2015/04/02/jpmorgan-aig-bailout-records-remain-secret.htm*
[34] *http://blogs.wsj.com/economics/2015/02/20/how-some-central-banks-are-reviewed-around-the-world/*.
[35] *http://www.bankofengland.co.uk/about/pages/people/court.aspx*
[36] *http://www.gao.gov/about/index.html*

Office of the Inspector General (OIG). The Fed's Board of Governors has an OIG that reviews its procedures and operations, whereas the Federal Reserve Banks are private institutions that do not have any OIG. Moreover, the Board's OIG cannot conduct any investigation at a Federal Reserve Bank unless it obtains explicit prior permission from the president of that Federal Reserve Bank. Similarly, the Board's OIG cannot investigate any FOMC incident involving a specific Federal Reserve Bank without the specific prior consent of that Federal Reserve Bank's president.

Such constraints on the authority of the Board's OIG authority are inconsistent with the overarching goal of ensuring that the Federal Reserve functions as effectively as possible in serving the American people. By making the Fed fully public, the Board's OIG can assume responsibility for conducting independent reviews of all aspects of the entire Federal Reserve System—not just the Board of Governors. Moreover, as with all other major federal agencies, the Fed's Inspector General should be appointed by the President and confirmed by the Senate.[37]

Government Accountability Office (GAO). As noted above, the GAO is an independent nonpartisan agency that has a proven track record in improving the efficiency and effectiveness of federal government programs.[38] In fact, over the past five years, the GAO has saved the taxpayers over $330 billion—a return of about $174 for every dollar spent running the GAO itself.

Nevertheless, the GAO has only limited authority to examine the Fed's procedures and operations.[39] For example, the GAO is currently prohibited from reviewing any Fed operations involving foreign central banks.[40] That prohibition seems particularly unfortunate in light of a recent instance in which the Federal Reserve Bank of New York inadvertently transmitted $81 million to hackers who had broken into the computer system of the central bank of Bangladesh. A subsequent Reuters investigation found that the New York Fed was "slow to react to warning signs" and "lacked a system for spotting potential fraud in real time, even though such systems were already in use elsewhere."[41] Indeed, Congresswoman Caroline Maloney stated that the incident posed "a threat to the confidence people could have in the central banking system."

More generally, the GAO is currently prohibited from investigating any aspect of the Fed's monetary policy process, including the financial transactions conducted by the New York Fed on behalf of the FOMC. One purported rationale for that constraint is that the Fed's financial accounts are already subjected to annual audits by private-sector firms. However, those financial audits are solely focused on detecting specific evidence of fraudulent activity—a far narrower scope than the GAO's mission of identifying inefficiencies, operational risks, and potential improvements in policies or procedures that could be beneficial to the general public or save money for American taxpayers. Moreover, the private firms tasked with conducting Fed audits are by no means impeccable and certainly do not have a public track record like that of the GAO. For example, the accounting firm that conducted the most recent audit

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[37] The GAO has studied this issue and concluded as follows: "We believe that the differences in the appointment and removal processes between presidentially appointed IGs and those appointed by their agency heads result in a clear difference in the level of independence of the IGs." *(http://www.gao.gov/new.items/d09524t.pdf)*

[38] *http://www.gao.gov/products/GAO-16-272T*

[39] GAO reports on specific Fed activities are posted at http://www.federalreserve.gov/newsevents/reform_audit_gao.htm.

[40] Under current law, GAO investigations of the Board of Governors and the Federal Reserve Banks "may not include transactions for or with a foreign central bank, government of a foreign country, or nonprivate international financing organization." (31 USC 714.b.1)

[41] *http://www.reuters.com/investigates/special-report/cyber-heist-federal/*

of the Fed's books has been sued by Fannie Mae for alleged gross negligence, while the firm that previously audited the Fed has been ruled to have been negligent in a separate case.[42]

Despite some common misperceptions, comprehensive GAO reviews of the Fed need not be a partisan issue. Indeed, over the past couple of decades proposals to "audit the Fed" have been advocated by members of Congress from both sides of the aisle.[43] However, a significant pitfall of those proposals has been the prospect that such audits could become a means of political interference. Thus, in initiating full GAO reviews of the Fed, several specific provisions will be crucial: (1) Such reviews should be conducted on an annual basis, not be triggered by any congressional committee or member of Congress. (2) The GAO should freely determine the topics and focal points of each review. (3) The GAO should be prohibited from commenting on any specific monetary policy decision. With those provisions in place, comprehensive GAO reviews will significantly strengthen the Fed's effectiveness and its public accountability without impairing its operational independence to carry out its statutory mandate.

C. Monetary Policy Reports

In accordance with the Humphrey-Hawkins Act of 1978, the Federal Reserve provides semiannual monetary policy reports to Congress. That statute originally contained specific reporting requirements, but in 2000 those requirements were streamlined into a single broad requirement to provide *"a discussion of the conduct of monetary policy and economic developments and prospects for the future, taking into account past and prospective developments in employment, unemployment, production, investment, real income, productivity, exchange rates, international trade and payments, and prices."* Indeed, many analysts have characterized the Fed's semiannual monetary policy reports as largely vacuous.

Thus, in line with the practice of many other central banks, the Fed should begin producing quarterly monetary policy reports that explain the rationale for its monetary policy decisions and characterize the diversity of views among Fed officials.[44] In particular, each report should:

- Present quantitative assessments of the deviation of employment from its maximum level and the deviation of inflation from its mandate-consistent rate, and characterize the degree of uncertainty surrounding those assessments.
- Provide a baseline projection for the economy, including information about the factors that are particularly relevant for specific sectors, regions, and demographic groups.
- Identify material risks to the current economic outlook and explain the Fed's plans for mitigating or responding to those risks.
- Discuss any economic models and benchmark rules that are used in setting the course of monetary policy.

[42] *http://www.washingtonpost.com/wp-dyn/content/article/2006/12/12/AR2006121201386.html; http://www.theglobeandmail.com/report-on-business/industry-news/the-law-page/court-upholds-ruling-on-deloittes-negligence-over-livent/article28078784/*

[43] GAO audits were a key plank of the Fed reform bill proposed in 1993 by Democratic Rep. Henry Gonzalez.

[44] For example, quarterly monetary policy reports are produced by the Bank of Canada, the Bank of England, the Bank of Norway, and the Swiss National Bank.

V. Conclusion

In this paper, we have presented the case for a set of pragmatic and nonpartisan reforms that would strengthen the Federal Reserve's governance and enhance its operational independence to carry out its statutory mandate of fostering maximum employment and price stability. Moreover, these reforms would ensure that the Fed is a publicly accountable institution that takes a wide array of economic perspectives into account, thereby enriching the Fed's decision-making process while affirming the norm that those decisions should not be subject to political interference.

At the heart of the proposed reforms is a call to make the Fed a fully public institution whose decision-makers are public officials selected through open and transparent processes. This begins with transferring ownership of the twelve regional Federal Reserve Banks away from commercial banks to the American people. By following procedures already in place for adjusting the shares of individual member banks, the process for carrying out this transition would be incredibly straightforward, and have no effect on the current value of U.S. government debt or the size of the Fed's balance sheet.

Another key element in making the Fed fully public involves changing the process by which Federal Reserve Bank directors and presidents are appointed. In sharp contrast to the current process that is opaque, inbred and largely *pro forma*, we propose a process requiring a higher degree of transparency in selection criteria, timeline, selection of candidates for president and board nominees, and extensive opportunities for public input. To avoid potential conflicts of interest, we further recommend that individuals affiliated with financial institutions overseen by the Fed should be prohibited from serving as directors. Additionally, establishing a single non-renewable 7-year term of office for every Fed policymaker–including the Chair, the Vice Chairs, the other members of the Board of Governors, and the presidents of the Federal Reserve Banks–would strengthen the Fed's operational independence and accountability.

There are clear and measurable benefits to these proposed reforms. Making the Fed fully public would generate a fiscal benefit for American taxpayers of at least $300 million per year. These additional savings would come from larger transfers of net income from the Fed to the U.S. Treasury as a result of the Fed no longer having to pay dividends to commercial banks. In addition to this fiscal benefit, the reforms we've outlined also provide greater capacity for the Fed to more fully represent and serve the best interests of the American people when making monetary policy decisions. As America's central bank, the Fed's monetary policy decisions affect the everyday lives of practically every American family, and have even greater consequences for specific demographic groups. Bringing the appointment process out of the shadows and expanding opportunities for public input in the appointment of Fed officials responsible for making monetary policy greatly increases the potential for assembling a more diverse and inclusive body of decision makers. More diversity, in terms of race, ethnicity, gender, educational background and professional experience, would enhance the Fed's ability to comprehensively and accurately assess the strength of the economy in advance of making monetary policy decisions.

Proposals to make the Fed fully public have been debated since the 1930s. Failure to make that transition has resulted in a Federal Reserve governance structure that is outdated and inadequate for ensuring that the Fed serves the public interest. Moreover, the Fed's private ownership by commercial banks is now out of step with practically every other major central bank around the world. Incremental amendments to the Federal Reserve Act at various points in time have routinely failed to overcome the hindrances of private

ownership, or to transform the leadership of the Federal Reserve Banks beyond the status quo, which is overwhelmingly white, male and insular – dominated almost exclusively by long-time Fed insiders and individuals with a financial background.

Overcoming these deficiencies and bringing about lasting change within the Federal Reserve requires Congressional action to make the Fed a fully public institution. Pragmatic reforms that appeal to the nonpartisan principles of good governance, transparency and accountability are the best way to ensure that the necessary Congressional action is taken. While the reforms outlined in this paper are by no means the only options on the table, they undoubtedly meet those standards.

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The design and communication of systematic monetary policy strategies ☆

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ABSTRACT

The efficacy of central bank communications is inextricably linked to the characteristics of the monetary policy framework. Therefore, this paper presents a set of fundamental principles regarding the joint design of monetary policy strategy and communications. The practical implications of these principles are illustrated by considering a number of significant policy challenges faced by central banks in the advanced economies.

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1. Introduction

Over the past two decades, central banks around the world have made tremendous strides in clarifying their monetary policy communications. Indeed, while many other aspects of monetary policymaking remain controversial, economists have reached a broad consensus regarding the strong rationale for clarity about the central bank's policy framework, that is, its longer-run goals and strategy, its assessments of the economic outlook, and its judgments about the appropriate path of policy.[1] In large part, the breadth of this consensus is a reflection of two distinct benefits:

- Clarity about the monetary policy framework bolsters the effectiveness of the *monetary transmission mechanism* by enhancing the private sector's understanding of how the stance of policy is likely to evolve in response to changes in economic and financial conditions.

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[1] See Blinder et al. (2009) and Yellen (2013).

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- Transparency about monetary policy is essential for maintaining the central bank's *operational independence* in a context of public accountability, thereby enabling its policy decisions to remain insulated from short-term political pressures.

Economic and financial developments in recent years have broadly confirmed the importance of clear central bank communications and in many instances have also underscored the scope for significant further improvements.

In contemplating these issues, it is essential to recognize that the efficacy of central bank communications is inextricably linked to the characteristics of the monetary policy framework. Therefore, this paper presents a set of fundamental principles regarding the *joint design of monetary policy strategy and communications*. These principles are framed in terms that are likely to be relevant for a wide array of central banks, including those of emerging markets and low-income countries. For the sake of brevity, however, the practical implications of these principles are generally illustrated using current policy challenges facing central banks in advanced economies. It should also be emphasized that such examples are solely for illustrative purposes and *not* intended to provide any definitive policy recommendations.

In particular, simple monetary policy rules can serve as valuable benchmarks for central banks in the decision-making process and in explaining those policy decisions to the public.[2] Of course, it would be inadvisable for policymakers to mechanically follow the prescriptions of a rule whose specification has been permanently fixed. However, in circumstances where policymakers judge that the stance of policy should deviate temporarily from the path prescribed by the policy rule, the rationale for doing so should be clearly explained to the public. Moreover, the central bank should maintain a systematic procedure for considering potential adjustments to the specification of its policy rule, recognizing that minor technical adjustments might occasionally be warranted whereas the fundamental characteristics would not be modified unless there were compelling reasons for doing so.

The remainder of the paper is organized as follows: Section 2 lays out several broad principles regarding monetary policy strategy and communications. Section 3 considers the framing of the central bank's inflation objective. Section 4 discusses the central bank's assessments of resource slack. Section 5 analyzes the use of simple policy rules as benchmarks. Section 6 considers the merits and limitations of specific communication tools. Section 7 concludes.

2. Some general principles

Central bank communications contribute to economic prosperity by facilitating well-informed decisions of households and businesses and by reducing economic and financial uncertainties. Clear communications also enhance the effectiveness of the monetary transmission mechanism by helping financial market participants and the general public understands how the stance of policy is likely to evolve in response to changes in economic and financial conditions. In recent decades, economists have also arrived at a broad consensus regarding the importance of insulating monetary policy decisions from short-term political pressures. However, the central bank's operational independence is only sustainable if the government provides a clear legal mandate regarding its policy objectives and instruments and then holds the central bank accountable over time for fulfilling that mandate. Consequently, enhancing the transparency of the central bank's policy framework and communicating clearly about the rationale for its specific policy decisions facilitate accountability to the general public and thereby reinforce the central bank's operational independence.[3]

> ⇒ *Provide regular communications regarding the central bank's assessments of the balance of risks to the economic outlook and contingency plans for mitigating and addressing such risks.*

Forecasters at many central banks and in the private sector have tended to focus on providing precise assessments of the modal outlook rather than on gauging the evolution of the balance of risks. Scenario analysis is a valuable tool for examining key risks and formulating contingency plans aimed at mitigating such risks. In effect, it may be beneficial for central banks to conduct and publish stress tests for monetary policy, analogous to the stress testing that is becoming standard practice for private financial institutions.

> ⇒ *Communicate clearly about the central bank's plans for adjusting the specific instruments that will be used in implementing its policy strategy over time.*

The central bank may be able to deploy a number of distinct monetary policy instruments, depending on its legal mandate and on the characteristics of the domestic financial system. For example, such tools may include direct lending to financial institutions, payment of interest on reserves, and transactions in publicly traded securities or foreign exchange. Thus, clarity about the central bank's monetary policy framework necessarily involves transparency about its choice of instruments, including its assessments of their efficacy, costs, and risks. There are also substantial benefits of clarifying the central bank's judgments regarding the appropriate path of policy as well as the conditions that could warrant significant adjustments to that path.[4]

[2] See Taylor and Williams (2010) for further analysis and discussion.

[3] Indeed, in his remarks at last December's official commemoration of the Federal Reserve's centennial, then-Chairman Bernanke (2013) stated: "Ultimately, however, the most important reason for transparency and clear communication is to help ensure the accountability of our independent institution to the American people and their elected representatives." See also Bernanke (2007) and Kohn (2014).

[4] See Gurkaynak et al. (2005), Swanson and Williams (2014), Stein (2014), and Yellen (2011, 2014).

⇒ *Foster and encourage a diversity of viewpoints in the process of formulating the central bank's policy decisions and communications.*

Historically, the institutional culture of central banks has tended to be quite conservative, with a strong inclination towards presenting a unified front in all public communications. However, effective risk management and contingency planning require "outside-the-box" thinking and creative problem-solving. These considerations underscore the institutional benefits of ensuring that both policymakers and staff represent a diverse set of backgrounds and perspectives.

3. The inflation objective

⇒ *Establish a numerical inflation objective that will serve as a fundamental benchmark for monetary policy strategy and communications.*

In the absence of an explicit inflation objective, the central bank may be particularly susceptible to short-term political pressures that lead to gradual upward drift in inflation expectations.[5] Conversely, empirical analysis has demonstrated that a transparent and credible inflation objective has significant effects in keeping inflation expectations firmly anchored, which in turn contributes to the stability of actual inflation.[6] Moreover, specifying a numerical inflation objective provides the central bank with greater flexibility to promote macroeconomic and financial stability.[7]

The process of initiating or revising the inflation objective depends on the central bank's institutional setting. In particular, the specification of this objective may be legislated in the central bank's charter or determined by periodic consultations with government authorities. Alternatively, the central bank itself may determine the inflation objective that is judged to be most consistent with its legal mandate. For example, in 2003 the Governing Council of the European Central Bank (ECB) established a quantitative definition of price stability–its mandate under the Maastricht Treaty–as keeping consumer price inflation "below but close to 2 percent over the medium term." More recently, the Federal Open Market Committee (FOMC) and the Bank of Japan (BOJ) have each established an inflation goal of 2 percent.

3.1. Specification

⇒ *The inflation objective should be defined in terms of a broad measure of consumer prices; that definition should only be adjusted for technical reasons.*

In the advanced economies, the inflation goal has generally been defined in terms of a broad measure of consumer prices, such as the consumer price index (CPI) or the price index for personal consumption expenditures (PCE). Such measures of inflation may also fluctuate in response to fiscal policy adjustments, such as a revision in government-administered prices or indirect tax rates. However, the central bank can readily make note of those factors in its monetary policy communications; indeed, the Bank of Japan (BOJ) has regularly done so in explaining the implications of recent and prospective value-added tax (VAT) rate hikes.

It should be noted that significant communication challenges may arise if the inflation goal is defined in terms of a price index that responds directly to movements in the level of short-term interest rates. For example, a monetary policy tightening aimed at restraining inflation pressures may nonetheless induce an near-term *upward* shift in such an inflation measure. In light of such concerns, the Bank of England's inflation target was initially defined in terms of the retail price index excluding mortgage payments (RPIX) rather than the overall retail price index (RPI). A few years later, the Bank of England's inflation target was redefined in terms of the CPI, but that redefinition was clearly explained as a technical adjustment and hence did not undermine the credibility of the monetary policy framework.[8]

⇒ *The numerical value for the inflation objective should be re-examined periodically but should only be modified for compelling economic reasons.*

To serve as an effective nominal anchor, the inflation objective must be transparent and credible; that is, the private sector must have a reasonable degree of confidence that this objective will be sustained over time and that the central bank will take actions as warranted to fulfill that objective. Indeed, in analyzing the early experiences of several inflation-targeting central banks, Bernanke et al. (1999) found that the private sectors inflation expectations tended to move only gradually in the wake of the initial announcement of the inflation objective. Moreover, such patterns do not necessarily reflect sluggish information flows or irrationality; rather, the evidence indicates that even professional forecasters tend to

[5] See Levin and Taylor (2013).

[6] See Levin et al. (2004), Gurkaynak et al. (2010), and Beechey et al. (2011).

[7] The Federal Open Market Committee's statement on longer-run goals and policy strategy (FOMC, 2014) indicates: "Communicating this inflation goal clearly to the public helps keep longer-term inflation expectations firmly anchored, thereby fostering price stability and moderate long-term interest rates and enhancing the Committee's ability to promote maximum employment in the face of significant economic disturbances."

[8] See King (2004) and Gurkaynak et al. (2010).

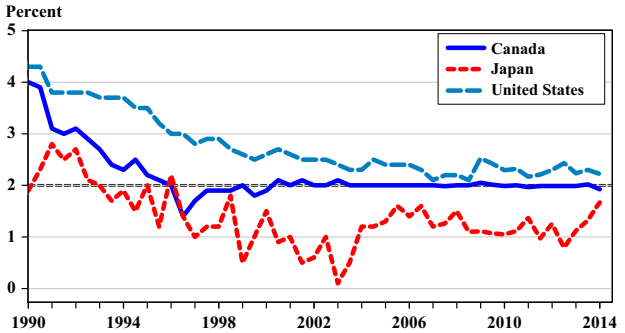

Fig. 1. The Evolution of Longer-Run Inflation Expectations in Three Advanced Economies. Source: Consensus Forecast longer-run surveys of CPI inflation projections 6 to 10 years ahead, published semiannually in April and October. Copyright (c) Consensus Economics Inc.

take a wait-and-see approach in assessing the extent to which a significant institutional change is likely to be durable over time.[9]

The numerical value of the inflation objective is appropriately determined in light of assessments of the relative costs of inflation, the extent of downward nominal wage rigidity, and the costs and risks associated with the zero lower bound on nominal interest rates. Such assessments might well evolve over time as a result of new data and empirical analysis, and hence the specific value of the inflation objective should *not* be viewed as having been set permanently in stone. On the other hand, frequent tinkering with the specification of this objective incurs the risk of undermining its clarity as well as its credibility.[10] Consequently, the specification of the inflation objective should be revisited on a periodic but relatively infrequent basis–perhaps once every five or 10 years–in the context of a comprehensive review of the central bank's policy framework. Moreover, such reviews must be systematic and transparent to ensure that any modification of the inflation goal would only occur as a consequence of compelling economic reasons rather than short-term political pressures.

To illustrate the foregoing principles, it is helpful to consider the evolution of longer-run inflation expectations in three advanced economies, as depicted in Fig. 1.

Canada: In early 1991, the Canadian government and the Bank of Canada agreed on a policy framework with a medium-term inflation target of 2 percent for the total consumer price index (CPI). Initially, that target does not appear to have been fully credible: as of spring 1992, professional forecasters still anticipated that CPI inflation would settle at around 3 percent over the longer run. Over time, however, inflation expectations moved into line with the target, facilitated by the Bank of Canada's actions and communications and underpinned by the breadth of public support for its policy framework. Indeed, survey evidence and financial market data indicate that inflation expectations in Canada have remained firmly anchored since the late 1990s.[11] Moreover, the monetary policy framework has been reviewed regularly at five-year intervals, but each of those reviews has concluded that the existing policy framework continued to be workable and appropriate; cf. Carney (2011).

United States: Longer-term U.S. inflation expectations drifted steadily downward during the 1990s–a period in which the Federal Reserve did not have an explicit inflation objective but pursued a course of policy that has been characterized as "opportunistic disinflation.[12] That course of policy effectively ended in mid-2003, when the Federal Open Market Committee (FOMC) indicated that a substantial further decline in inflation would be unwelcome. Consequently, professional forecasters longer-term outlook for U.S. consumer inflation levelled off at around 2 percent, although empirical analysis subsequently indicated that inflation expectations were still not as firmly anchored as in a number of other economies that had established an explicit numerical inflation objective. In January 2012, the FOMC established a longer-term inflation goal of 2 percent, as measured by the price index for total personal consumption expenditures (PCE), and has reaffirmed that inflation goal at each of its annual organization meetings since then.[13]

Japan: During the 1990s, the Bank of Japan (BOJ) indicated that it was aiming at modestly positive levels for published measures of inflation, thereby keeping the true underlying rate of inflation close to zero. The Consensus Economics longer-run

[9] See Evans and Wachtel (1993) and Erceg and Levin (2003).

[10] DePooter et al. (2014) analyzed data for three emerging-market economies and found that inflation expectations were somewhat less firmly anchored in Brazil (where the inflation target is specified on a year-to-year basis) compared with Chile and Mexico (each of which has a fixed target for inflation).

[11] The Consensus Economics survey results indicate that professional forecasters longer-run outlook for Canadian inflation has stayed very close to the 2 percent target throughout the past 15 years. Moreover, Gurkaynak et al. (2006) analyzed Canadian daily data on forward inflation compensation that is, the difference between forward rates on nominal and inflation-linked bonds and found that far-forward inflation compensation did not respond significantly to either Canadian or U.S. macroeconomic news.

[12] See Meyer (1996) and Orphanides and Wilcox (2002).

[13] It should be noted that Fig. 1 shows the evolution of the longer-run outlook for U.S. CPI inflation–the measure used in Consensus Forecast surveys. The Federal Reserve Bank of Philadelphias quarterly Survey of Professional Forecasters (SPF) elicits projections for both the CPI and the PCE price index. In the May 2014 survey, the SPF's median projection for the 10-year average U.S. PCE inflation rate was exactly 2 percent, while the corresponding projection for U.S. CPI inflation was a notch higher at 2 1/4 percent, virtually identical to the outlook in the April 2014 Consensus survey.

outlook for Japanese CPI inflation declined gradually during the 1990s, it remained at around 1 percent through the subsequent decade even as headline inflation was generally running below zero.[14] In March 2013, the BOJ announced a strong commitment to taking the requisite quantitative and qualitative policy measures in order to achieve its 2 percent inflation goal. The BOJ's actions and communications evidently succeeded in bolstering the credibility of its inflation goal: as of April 2014, the longer-run Consensus outlook for Japanese CPI inflation stood at 1.7 percent, up from 1.1 percent a year earlier and higher than any previous reading since the mid-1990s.

3.2. Time frame

> ⇒ *The central bank must clearly convey its assessments of the time frame over which inflation is projected to converge to its objective and the policy actions that are likely to be warranted in fostering that convergence process.*

Generally speaking, the framing of any goal may be practically meaningless without some sort of concrete plan for achieving that goal within a reasonable time frame. Thus, to ensure that its inflation objective serves as an effective nominal anchor, the central bank must clearly communicate its strategy for bringing inflation back to the objective, including the anticipated time frame for the convergence process as well as the policy actions that are likely to be warranted.

The appropriate time frame for closing the inflation gap–that is, the deviation of actual inflation from its objective–evidently depends on conjunctural conditions. For example, if a transitory commodity price shock induces a spike in consumer price inflation, policymakers may reasonably anticipate that inflation is likely to revert to its objective fairly quickly even in the absence of any policy actions. Conversely, an ongoing acceleration in commodity prices may exert persistent upward pressure on inflation, and a significant monetary policy tightening might indeed be warranted to offset such pressures and bring the inflation rate back to its objective. Indeed, in the absence of clear communications about the central bank's policy strategy, longer-run inflation expectations could become dislodged and exacerbate the upward pressure on actual inflation.

Inflation gaps can also arise from shifts in aggregate demand that may result from changes in fiscal policy, external demand, or credit market frictions. During “normal” times, the central bank can take prompt action to offset such shifts, thereby stabilizing resource utilization and keeping the inflation rate close to its objective. In contrast, when faced with a large and protracted decline in aggregate demand, monetary policy can become constrained by the zero lower bound on nominal interest rates, and hence the shortfall in aggregate demand may exert persistent downward pressure on the inflation rate.[15] Under such circumstances, the rationale for clear monetary policy communications becomes even more compelling:

To illustrate some practical implications of this principle, we briefly consider recent developments and prospects for inflation in the United States and the euro area.

United States: U.S. inflation plummeted during the Great Recession and remained subdued during the early stages of the economic recovery. Indeed, Federal Reserve officials flagged the risk of further disinflation or deflation as a key rationale for launching a second round of large-scale asset purchases (commonly known as QE2) in late 2010.[16] In the first half of 2011, headline inflation moved sharply upwards in the wake of surging global prices of energy and other commodities, and measures of core inflation also headed upward, reflecting pass-through of higher input prices as well as the effects of supply-chain disruptions in the aftermath of a tragic earthquake and tsunami in Japan. At that juncture, the FOMC clearly indicated its judgment that those developments were largely transitory and hence that consumer inflation would “subside to levels at or below those consistent with the Committee's dual mandate as the effects of past energy and other commodity price increases dissipate.” (FOMC, 2011)

As shown in Fig. 2, that expectation proved to be well-founded. The four-quarter average rate of PCE inflation peaked at around 2 3/4 percent in 2011:Q3 and then headed steadily downward toward a level of about 1 percent. As of early spring 2014, FOMC participants and professional forecasters generally expected that PCE inflation would head gradually upward toward the FOMC's 2 percent inflation goal. Indeed, at that juncture the FOMC made note of the risk that inflation could remain flat or decline further over coming quarters.[17]

Euro Area: As noted above, the ECB's policy strategy since 2003 has been explicitly intended to maintain euro area CPI inflation “below but close to 2 percent over the medium run.” The ECB President subsequently defined this time frame very specifically: “The medium term for a central bank is a period of 18 months to two years.” (Trichet, 2008). Actual inflation has exhibited substantial fluctuations in recent years, dropping close to zero in the wake of the global financial crisis and then

[14] In 2006 the nominal anchor was framed more specifically in terms of year-to-year changes in the CPI, and policy board members' assessments of the appropriate value for the inflation goal had a midpoint of 1 percent. In early 2012, the BOJ specified a numerical inflation goal of 1 percent for the time being” and a year later the BOJ revised its inflation goal upward to 2 percent.

[15] Matheson et al. (2013) analyzed inflation developments in the advanced economies in the wake of the global financial crisis.

[16] See Bernanke (2010) and Yellen (2011).

[17] During the first half of 2014, each FOMC meeting statement indicated that “The Committee recognizes that inflation persistently below its 2 percent objective could pose risks to economic performance, and it is monitoring inflation developments carefully for evidence that inflation will move back toward its objective over the medium term.”

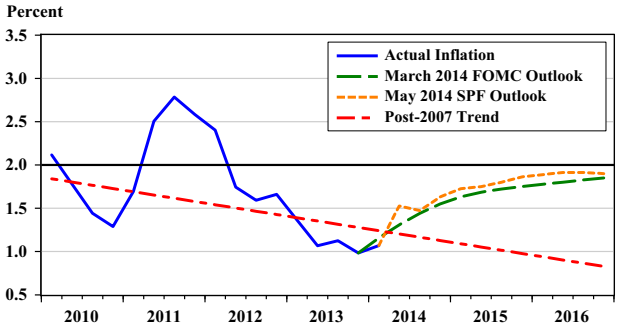

Fig. 2. The U.S. inflation outlook. *Note*: In this figure, actual U.S. inflation (solid line) is measured by the four-quarter average change in the PCE price index. The FOMC's inflation outlook (long-dashed line) is represented by taking the midpoint of the central tendency of the PCE inflation projections of individual Committee participants, as published in the March 2014 Summary of Economic Projections (SEP). The private sector's inflation outlook (short-dashed line) is represented by the projections for PCE inflation published in the May 2014 edition of the Federal Reserve Bank of Philadelphia's Survey of Professional Forecasters (SPF). The post-2007 trend (dot-dashed line) is estimated by ordinary least squares regression using quarterly data for the period 2007:Q1 to 2014:Q1.

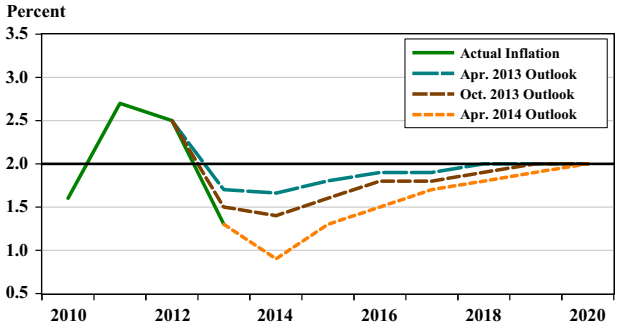

Fig. 3. The inflation outlook for the Euro area. *Source*: Consensus forecast longer-run surveys of CPI inflation projections 6–10 years ahead, published semiannually in April and October. Copyright (c) Consensus Economics Inc.

rising above 2 1/2 percent following the global surge in commodity prices. In the face of those developments, however, the ECB succeeded in keeping longer-run inflation expectations anchored at around 2 percent.[18]

As shown in Fig. 3, the inflation outlook for the euro area deteriorated markedly over the course of 2013 and early 2014.[19] According to the Consensus Economics longer-run survey published in April 2014, forecasters expected that euro area inflation would rise only gradually over coming years before eventually converging to the ECB's inflation objective towards the end of the decade–a far longer convergence horizon than would be implied by a "medium run" time frame. Moreover, there were notable downside risks to that outlook: In the ECB's May 2014 survey of professional forecasters, respondents assigned a 30 percent probability to outcomes in which the inflation rate in 2015 would remain below one percent. In light of those risks, ECB officials indicated that they were prepared to take further policy actions to foster a more satisfactory inflation outlook and to ensure that inflation expectations would remain firmly anchored.

3.3. *Financial stability considerations*

> ⇒ *The central bank should ensure that financial stability considerations do not undermine the public's confidence in its nominal anchor.*

The global financial crisis spurred the recognition that price stability and macroeconomic stability are inextricably linked to the stability of the financial system. Moreover, while macroprudential supervision and regulation should serve as the first line of defense in averting financial crises, there is a growing consensus that monetary policy adjustments may also be warranted under some circumstances. While a full discussion of the implications for the design of monetary policy strategy and communications would go well beyond the scope of this paper, one key aspect bears emphasis at this juncture.[20]

[18] See Beechey et al. (2011) and Galati et al. (2011).

[19] The contours of the inflation outlook in the ECB's quarterly survey of professional forecasters (available at http://www.ecb.europa.eu/stats/prices/indic/forecast) are very similar to the Consensus survey results shown in Fig. 3.

[20] For further analysis and discussion, see Svensson (2013) and Alichi et al. (2014).

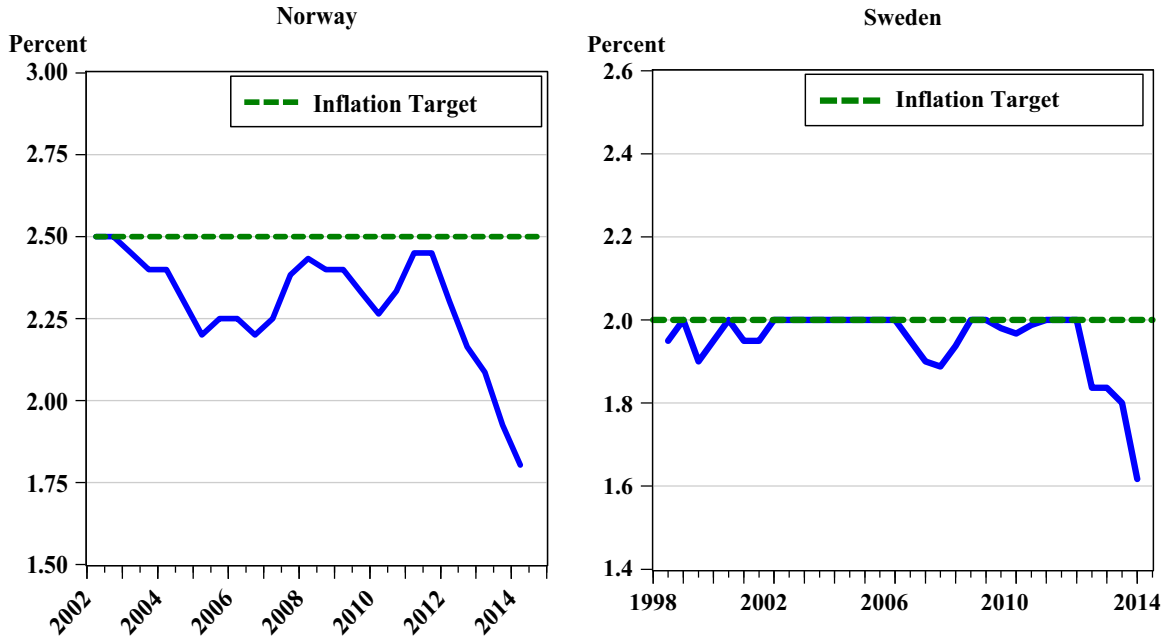

Fig. 4. The evolution of longer-run inflation expectations in two Scandinavian economies. *Note*: Each panel depicts the central bank's inflation target (dashed line) and the evolution of longer-run inflation expectations (solid line), as measured by a moving average of the latest two semiannual Consensus forecast surveys of CPI inflation projections 6–10 years ahead. Copyright (c) Consensus Economics Inc.

In particular, it seems to be essential to ensure that financial stability concerns do not undermine the public's confidence in the central bank's nominal anchor. Indeed, keeping longer-term inflation expectations firmly anchored is almost surely a crucial element in fostering the safety and soundness of the financial system. Conversely, a policy strategy that allows inflation expectations to drift over time seems likely to be counterproductive for financial stability as well as price stability.

Fig. 4 points to the potential relevance of this issue for two Scandinavian economies. The Sveriges Riksbank's inflation target of 2 percent was established in 1993, and by the late 1990s longer-run inflation expectations were well-anchored at that target. Norges Bank's inflation target of 2.5 percent was established in 2001, and over the subsequent decade it succeeded in keeping longer-run inflation expectations close to that target. More recently, however, both of these central banks maintained a relatively tight stance of monetary policy aimed at mitigating emerging financial imbalances, even as inflation dropped persistently below target in each economy. Consequently, longer-run inflation expectations–at least as measured by Consensus Economics surveys–began drifting downward noticeably.

The incidence of disagreement among forecasters tends to be highly correlated with the degree of uncertainty about the economic outlook; cf. D'Amico and Orphanides (2008). Consequently, measures of cross-sectional dispersion can also serve as useful indicators of the extent to which longer-run inflation expectations are firmly anchored.[21] For example, the TNS Sifo Prospera survey (which is conducted on behalf of the Sveriges Riksbank) indicates that the degree of dispersion regarding the Swedish inflation outlook widened notably over the past several years. In particular, the cross-sectional standard deviation of 5-year-ahead inflation projections increased from 0.30 percent in January 2011 to 0.52 percent in July 2014. Over the same period, the mean forecast in the TNS Sifo Prospera survey declined about 0.3 percentage points to a level of about 1.8 percent.[22] Moreover, since the extent of dispersion is directly linked to the degree of sampling uncertainty associated with any specific survey, these results do not appear to be significantly different from those obtained from the Consensus Economics longer-run surveys.

4. Assessments of resource slack

> ⇒ *The central bank should regularly communicate its assessments of resource slack and the degree of uncertainty surrounding those assessments.*

One of the cornerstones of modern macroeconomics is that every economy has a balanced-growth path that is consistent with keeping inflation stable at its desired rate. With that conceptual framework in mind, there are two compelling reasons for assessing the magnitude of *resource slack*–that is, the level of economic activity relative to the balanced-growth path–and incorporating such assessments into the central bank's monetary policy strategy and communications. First, shortfalls in

[21] See Gurkaynak et al. (2010) and Beechey et al. (2011).
[22] The survey methodology and the detailed results are available at *http://www.prospera.se/reports/inflation-expectations*.

aggregate income and employment have direct human costs, because households experience a lower level of economic wellbeing. Second, rates of resource utilization influence the setting of wages and prices, and hence persistent resource slack tends to exert downward pressure on inflation; conversely, persistently elevated rates of utilization tends to induce upward pressure on inflation. Consequently, the monetary policy goals of macroeconomic stability and price stability are generally–though not always–complementary.

Of course, the contours of the balanced-growth path cannot be directly measured, so its characteristics must be inferred using statistical analysis of observable data. Moreover, such estimates are necessarily uncertain and subject to revision, and the extent of that uncertainty may be highly relevant in determining the course of monetary policy. These considerations underscore the benefits of regular communication of the central bank's assessments of resource slack as well as the degree of uncertainty surrounding those assessments.

To illustrate these issues, the remainder of this section focuses on challenges in gauging the magnitude of labor market slack–an issue that is of particular relevance for U.S. and U.K. policymakers at the current juncture.

4.1. Deviations from Okun's law

In his classic work, Okun (1962) documented a set of empirical comovements between real output and the unemployment rate–often referred to as *Okun's Law*–that have proven to be remarkably robust over time and across a wide array of countries.[23] For example, the following version of Okun's Law is estimated using annual U.S. data from 1980 to 2007:

$$\Delta u_t = \underset{(0.16)}{1.26} - \underset{(0.04)}{0.43}\Delta y_t \tag{1}$$

where Δu_t denotes the change in the unemployment rate (Q4/Q4), Δy_t denotes the growth rate of real GDP (Q4/Q4), and the standard error of each regression coefficient is shown in parentheses. This equation has a remarkably good fit ($R^2 = 0.79$), and the residuals exhibit no serial correlation at all (DW = 1.89).

In effect, Okun's Law indicates that the unemployment rate will tend to decline when the growth of actual GDP exceeds its potential growth rate, and conversely, that unemployment will tend to show little or no improvement when real GDP growth is roughly in line with its longer-run normal rate. As shown in Fig. 5, however, the recent evolution of the U.S. economic outlook does not seem to have been consistent with that pattern.

As shown in the upper panel of the figure, real GDP growth from 2010 through early 2014 consistently underperformed relative to the FOMC's economic outlook.[24] For example, in November 2010 the FOMC indicated that the economic recovery had been "disappointingly slow" and launched its second round of large-scale asset purchases (QE2); at that time FOMC participants generally expected that by 2012 the pace of real GDP growth (Q4/Q4) would pick up to about 4 percent. In fact, however, output growth during 2011–2012 only averaged about 2 percent–not even reaching most participants' assessments of its longer-run normal rate. Consequently, in September 2012 the FOMC initiated a third round of asset purchases (QE3), with the expectation that output growth would subsequently pick up to around 3 1/2 percent.[25] Unfortunately, the economy underperformed yet again during 2013, with GDP growing notably slower than Committee participants' assessments of its potential growth rate (which had been revised downward about a half percentage point relative to their assessments three years earlier).

In light of Okun's Law, one might have expected that the persistent underperformance in economic growth would have been associated with relatively little improvement in the unemployment rate. In fact, however, as shown in the lower panel, the decline in unemployment over that timeframe was much steeper than the FOMC anticipated.[26] For example, the FOMC's June 2011 meeting statement conveyed the expectation that unemployment would "resume its gradual decline," and the statement issued in November 2011 indicated that the Committee expected that unemployment would "decline only gradually towards levels judged to be consistent with its mandate." At that FOMC meeting, participants generally projected that the unemployment rate would be close to 8 percent as of 2013:Q4. In fact, however, the unemployment rate plummeted to around 6 3/4 percent by the end of 2013 and to around 6 percent by mid-2014–only slightly higher than the upper end of the central tendency of FOMC participants' assessments of its longer-run normal rate.

[23] See recent studies by Ball et al. (2013) and Daly et al. (2014).

[24] In 2007 the FOMC initiated the quarterly publication of its Summary of Economic Projections (SEP), which reports the central tendency and range of Committee participants' projections for GDP growth, unemployment, and inflation. (The phrase "Committee participants" refers to all of the members of the Board of Governors and presidents of the Federal Reserve Banks.) In 2009 the FOMC further enhanced its communications by reporting on participants' estimates of the longer-run normal rates to which those variables would converge over time in the absence of further shocks. In effect, the SEP's longer-run projections convey participants' assessments of the characteristics of the balanced-growth path, that is, the *potential GDP growth rate* and the *natural rate of unemployment* (often referred to as the NAIRU).

[25] At that meeting, the FOMC also announced its expectation that a highly accommodative stance of policy would likely remain warranted "for a considerable period as the economic recovery strengthens" and that liftoff from the ZLB was not likely to be warranted "at least until mid-2015."

[26] From November 2010 to April 2011, FOMC meeting statements projected "a gradual return to higher levels of resource utilization." The June 2012 FOMC statement projected that the unemployment rate would "resume its gradual decline", while subsequent FOMC statements projected that the unemployment rate would "decline only gradually" (August 2011 to January 2012), "decline gradually" (March and April 2012), "decline only slowly" (June and August 2012), and "gradually decline" (January 2013 to January 2014).

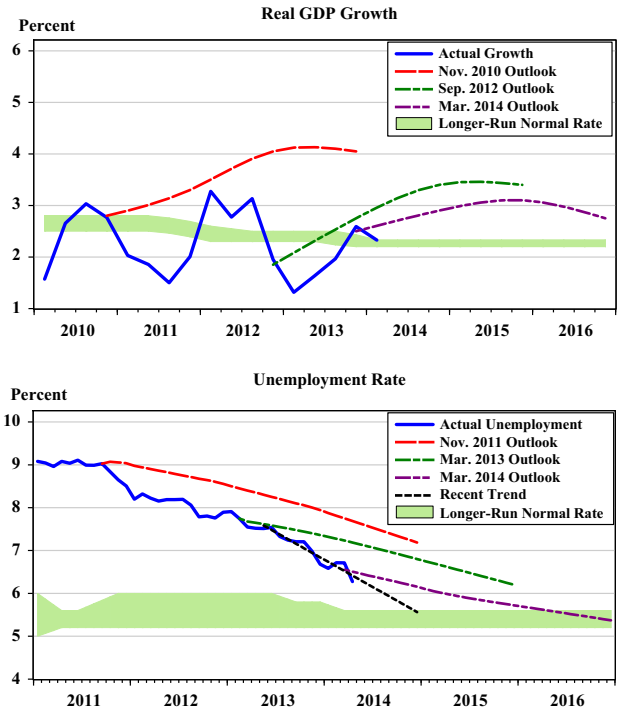

Fig. 5. The evolution of the U.S. economic outlook. *Note*: The upper panel depicts the actual path of U.S. real GDP growth (solid line) from 2010:Q1 through 2014:Q1, along with the midpoint of the central tendency of FOMC participants' projections for the trajectory of GDP growth (Q4/Q4) as of November 2010 (dashed), September 2012 (dot-dashed), and March 2014 (dot-dot-dashed). The lower panel depicts the actual path of the U.S. unemployment rate (solid line) from January 2011 through April 2014; the midpoint of the central tendency of FOMC participants' projections for the path of the unemployment rate (Q4 average) as of November 2011 (long-dashed), March 2013 (dot-dashed), and March 2014 (dot-dot-dashed); and the linear trend based on the latest 12 months of unemployment readings. In each panel, the shaded area denotes the evolution of the central tendency of FOMC participants' assessments of the longer-run normal rate; those central tendencies are simply extended from March 2014 through the end of 2016 for illustrative purposes.

These departures from Okun's Law can be gauged in terms of the out-of-sample forecast errors from Eq. (1) over the period from 2008 to 2013. As shown in the left panel of Fig. 6, the deviations from Okun's Law have been remarkably large and persistent. The historical residuals (1980–2007) have a standard error of 0.44 percent, so that a deviation of around −1 percent would be expected to occur no more than once in a 20-year period. And given that the historical residuals are serially uncorrelated, a sequence of *three consecutive deviations* of that magnitude would be exceedingly rare, say, once in 10,000 years.

In interpreting these deviations from Okun's Law, one key element is that potential GDP growth appears to have shifted downward substantially in recent years.[27] Indeed, CBO (2014) estimated that potential GDP growth had an average rate of about 1.5 percent during 2011–2013, compared with an average rate of about 3 percent over the period 1980–2007. Using the estimated slope coefficient of 0.43 in Eq. (1), that decline in potential GDP growth would induce a downward shift in the residuals of about 0.65 percent–roughly half the magnitude of the forecast errors shown in the left panel of Fig. 6.

However, it is also important to consider the possibility that the recent trajectory for unemployment may have at least partly reflected a decline in labor force participation that was induced by the sluggish pace of the economic recovery.[28] Indeed, Okun himself flagged this issue in his classic paper:

> In a slack labor market, people without a job may give up when they are convinced that job-hunting is a hopeless pursuit. They then may be viewed as having left the labor force though they stand ready and eager to work. The response of participation rates is likely to be a complicated lagged phenomenon which will not be closely tied to the current unemployment rate. While this aspect of the difference between potential and actual output is hard to quantify, zero is certainly not a satisfactory estimate. (Okun 1962, pp. 5–6)

[27] Fernald (2014) provides comprehensive and detailed analysis on this issue.

[28] A number of recent studies have analyzed this issue, including Aaronson et al. (2012), Sherk (2012), Van Zandweghe (2012), Hotchkiss and Rios-Avila (2013), Erceg and Levin (2013), and Hornstein et al. (2014).

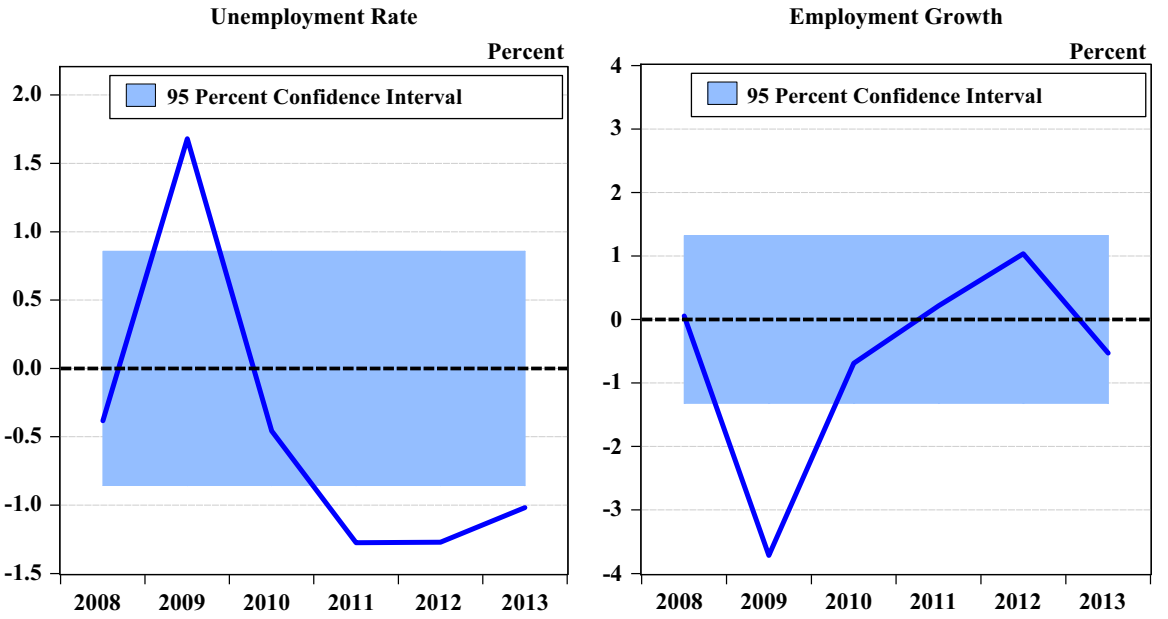

Fig. 6. U.S. Deviations from Okun's Law. Note: This figure depicts out-of-sample forecast errors for 2008 to 2013 as implied by two versions of Okun's Law estimated using U.S. annual data from 1980 to 2007. The left panel shows the forecast errors associated with equation (1), which is specified in terms of changes in the unemployment rate. The right panel shows the corresponding implications of equation (2), which is specified in terms of employment growth. In each panel, the shaded region denotes the 95 percent confidence interval based on the standard error of each regression.

Thus, we now turn to the following variant of Okun's Law involving *employment growth* rather than changes in the unemployment rate:

$$\Delta e_t = \underset{(0.23)}{-0.14} + \underset{(0.70)}{0.50}\Delta y_t \tag{2}$$

where Δe_t denotes the growth rate of total employment (Q4/Q4). As above, this specification has a good fit over the sample period 1980–2007 ($R^2 = 0.69$), and the residuals exhibit no serial correlation at all (DW = 1.74).

The out-of-sample forecast errors from Eq. (2) are shown in the right panel of Fig. 6. Notably, the forecast errors for the period 2010–2013 vary in sign from year to year and fall well within the 95 percent confidence interval–a much better out-of-sample fit than Eq. (1). These results bolster the view that the unexpectedly steep decline in unemployment over that timeframe was indeed related to the concomitant drop in labor force participation.

4.2. The composition of labor market slack

As discussed in the Bank of England's May 2014 *Inflation Report*, the employment gap can be represented as a sum of three components: the unemployment gap, the participation gap, and the underemployment gap. In particular, the *unemployment gap* is the deviation of actual unemployment from the NAIRU, and the *participation gap* is the deviation of the actual labor force from its equilibrium level. The *underemployment gap* refers to the incidence of involuntary part-time work relative to its normal level, that is, the incidence of individuals who are currently working part-time (less than 30 h/week) who would prefer to have a full-time job but are unable to find one.

The upper panel of Fig. 7 shows the Bank of England's assessments, as of May 2014, regarding the magnitudes of the specific components of the U.K. employment gap. Each component is scaled by its standard deviation over the period 1992–2007 in order to reflect the extent to which the current magnitude of that gap exceeds its normal variability. Evidently, all three components became quite large in the wake of the global financial crisis and remained sizeable through 2011. As the U.K. labor market subsequently improved notably, the participation gap essentially disappeared and the unemployment rate reverted close to its normal level, whereas the underemployment gap remained about two standard deviations away from Bank staff's current assessment of its medium-term equilibrium.

The lower panel depicts an assessment of the evolution of the total U.S. employment gap in terms of these three components. The unemployment gap refers to the deviation of actual unemployment from the CBO (2014) estimate of the NAIRU, and the participation gap refers to the difference between the actual size of the labor force and the CBO' (2014) estimate of the potential labor force. The estimate of the underemployment gap shown here is obtained using a trend-cycle decomposition of the incidence of involuntary part-time work; detailed information is provided in the appendix. Evidently, while U.S. labor market conditions improved substantially since 2010, this estimate suggests that the U.S. employment gap

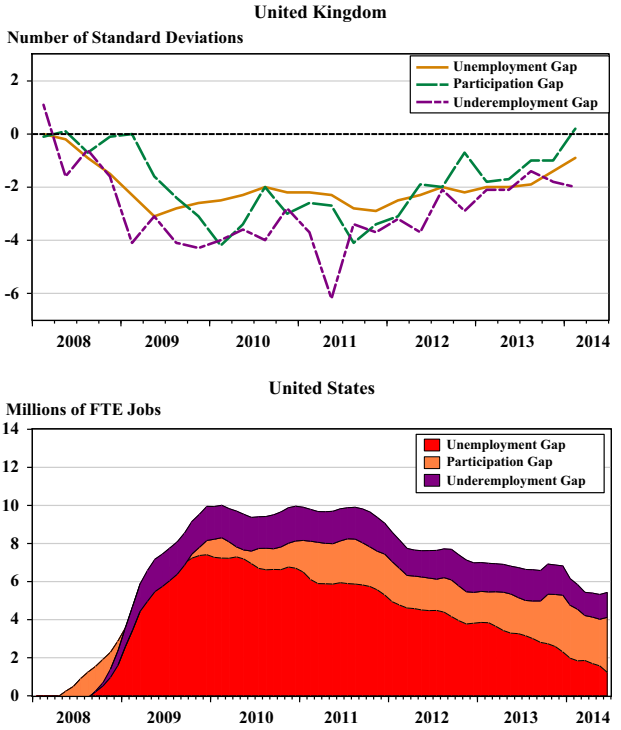

Fig. 7. The magnitude and composition of labor market slack. *Note*: In the upper panel (which borrows directly from Chart 3.7 of the Bank of England's May 2014 Inflation Report), the unemployment gap is the difference between the actual unemployment rate and the Bank staff's estimate of its medium-term equilibrium rate; the participation gap is the difference between the actual labor force participation rate and the Bank staff's estimate of its medium-term equilibrium rate; the underemployment gap is the difference between average weekly hours worked and Bank staff's estimate of its medium-term equilibrium level; and each of these gaps is scaled by its own standard deviation (computed for the period 1992–2007). The lower panel depicts the level of the U.S. employment gap (expressed in millions of full-time equivalent (FTE) jobs) and its components, where the unemployment gap is the deviation of actual unemployment from the CBO's estimate of its longer-run natural rate, the participation gap is the deviation of the labor force from the CBO's estimate of its potential level, and the derivation of the underemployment gap is shown in the appendix.

remained quite large as of spring 2014 and that the participation gap and the underemployment gap accounted for the bulk of that gap.[29]

5. Using simple policy rules as benchmarks

⇒ *Simple monetary policy rules can serve as valuable benchmarks in determining the course of monetary policy and explaining those judgments to the public.*

No macroeconomic model provides a completely satisfactory description of any economy in the real world. Indeed, the limitations of existing macroeconomic models have been underscored by the incidence of relatively large and persistent forecast errors in many advanced economies over the past few years.[30] Thus, rather than relying on the monetary policy implications of any single macro model, it seems to be sensible to develop simple rules that provide reasonably robust performance across a range of plausible models. Such rules can serve as valuable benchmarks in the decision-making process and in explaining those decisions to the public. For example, following the seminal work of Taylor (1993), a vast literature has investigated the specification and performance of simple monetary policy rules of the following form:

$$i_t = r^* + \pi_t + \alpha(pi_t - pi^*) + \beta(x_t - x_t^*) \tag{3}$$

where i_t denotes a measure of the short-term nominal interest rate, r^* denotes the equilibrium real interest rate, pi_t is a smoothed measure of inflation, pi^* is the central bank's inflation objective, $x_t - x_t^*$ is a measure of resource slack, and the coefficients α and β are chosen appropriately in order to foster the stability of economic activity and inflation. For example, the Taylor (1993) rule was specified in terms of GDP price inflation and the output gap, with $r^* = 2$, $\pi^* = 2$, and $\alpha = \beta = 0.5$.[31]

[29] Blanchflower and Posen (2014) analyzed panel data and found highly significant effects of the participation gap and the underemployment gap on nominal wage setting in the United States and the United Kingdom, respectively.

[30] See Romer and Romer (2014).

[31] Taylor (1980) set forth the seminal analysis of the "monetary policy frontier" in terms of the relative variability of economic activity and inflation. Taylor (1999) reported on a comprehensive analysis of the performance of simple policy rules across a wide range of macroeconomic models.

Nonetheless, there are two distinct reasons why it would be inadvisable for policymakers to mechanically follow the prescriptions of a rule whose specification has been permanently fixed:

- Economic conditions may occasionally arise that are not well-captured by any of the models that were used in formulating the policy rule. Thus, in certain circumstances policymakers might judge that the stance of policy should deviate temporarily from the path prescribed by the policy rule, and the rationale for doing so would need to be clearly explained to the public.
- The salient characteristics of the set of plausible models will inevitably evolve over time, reflecting new economic and financial data and ongoing improvements in analytical and empirical methods as well as changes in the structure of the economy itself. Consequently, the central bank should have a systematic procedure for considering potential adjustments to the specification of its policy rule. Minor technical adjustments may occasionally be warranted, but the basic specification of the policy rule would not be modified unless there were compelling reasons for doing so.

To illustrate these considerations, the remainder of this section focuses on two practical issues that are currently facing monetary policymakers in a number of advanced economies. It should be noted that a number of other important issues–such as the appropriate degree of policy inertia or implications of uncertainty about natural rates–cannot be addressed within the scope of this paper.[32]

5.1. The equilibrium real interest rate

Conceptually, the equilibrium real interest rate is the level of short-term real interest rates at which the economy evolves along its balanced-growth path and inflation remains at its objective.[33] Of course, as with other properties of the balanced-growth path, the level of the equilibrium real interest rate cannot be directly measured but must be inferred from observed economic and financial data. For example, Taylor (1993) specified the value $r^* = 2$ based on the historical average value of the real federal funds rate.

However, there are strong conceptual and empirical reasons to expect that the equilibrium real interest rate may move significantly in response to a shift in total factor productivity growth that changes the pace of output growth along the balanced-growth path. Moreover, econometric analysis suggests that the level of r^* may also vary over time in response to other domestic and global economic developments. Such shifts in the value of r^* can be consequential for the performance of a simple policy rule. For example, if the economy were on its balanced-growth path ($x_t = x_t^*$) but the true value of the equilibrium real interest rate were a percentage point lower than the value specified in the monetary policy rule, then inflation would persistently fall short of its objective; e.g., with $\alpha = 0.5$, the prevailing inflation rate would be zero instead of 2 percent.

As shown in Fig. 8, professional forecasters' assessments of equilibrium real interest rates shifted downward substantially over the past few years. Prior to the onset of the global financial crisis, the consensus outlook for the far-ahead forward real federal funds rate (left panel) was roughly in line with the value of 2 percent embedded in the Taylor (1993) rule. The consensus outlook subsequently declined to around 1 1/4 percent–a decrease that is roughly comparable to the reduction of about 0.6 percentage points in forecasters' longer-run projections for U.S. GDP growth (not shown). The dispersion in forecasters' views is evident from the interquartile range, which effectively covers the entire interval from 0 to 2 percent. Substantial downward revisions in r^* have also occurred for a number of other advanced economies (right panel).[34]

5.2. Measures of Inflation and Resource Slack

For a policy rule like Eq. (3) to serve as a practical benchmark for monetary policy, the central bank needs to clarify which measures of inflation and resource slack will be used in computing its prescriptions. During normal times, the particular specification of those measures may be fairly innocuous. For example, a quarter-point difference between two measures of inflation would only imply a difference of about 40 basis points in the prescriptions of the Taylor (1993) rule, and a half percentage point difference between two measures of resource slack would only affect the Taylor rule's prescriptions by 25 basis points.

In contrast, when a large shock has pushed the economy relatively far away from its balanced-growth path, the specification of the measures of inflation and resource slack may become highly consequential. For example, Taylor's (1993) rule was specified in terms of the output gap, which CBO (2014) estimated at -4.3 percent as of 2014:Q1. Thus, with the coefficient $\beta = 0.5$, the Taylor rule would imply a funds rate reduction of about 2 percentage points (assuming a constant value of r^* and with inflation at its target rate).

[32] Orphanides and Williams (2002) analyzed the implications of uncertainty about potential output and the natural rate of interest in the formulation of simple policy rules, and Eggertsson and Woodford (2003) analyzed the benefits of history dependence when the policy instrument is constrained by the ZLB; see also Woodford (2003).

[33] From Eq. (3), it is evident that the real interest rate $i_t - pi_t$ is equal to r^* when $\pi = \pi^*$ and $x_t = x_t^*$.

[34] Furceri and Pescatori (2014) provide comprehensive analysis of the evolution of global real interest rates over the past several decades and in the wake of the financial crisis.

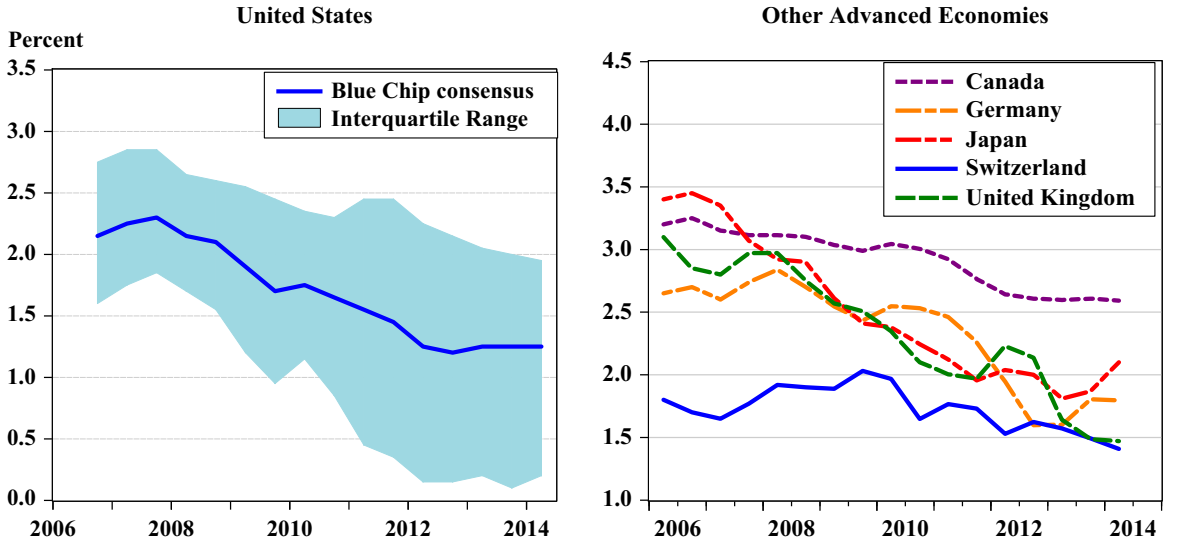

Fig. 8. The evolution of professional forecasters' assessments of equilibrium real interest rates. *Note*: The left panel shows the consensus outlook (solid line) and interquartile range (shaded area) of professional forecasters' projections for the average level of the U.S. 3-month treasury bill rate 6–10 years ahead, less the consensus of their projections for the average level of U.S. CPI inflation 6 to 10 years ahead, computed as a moving average of the latest two semiannual *Blue Chip Economic Indicators* longer-run surveys. Copyright (c) Aspen Publishers, Inc. The right panel shows corresponding results taken from Consensus Economics' semiannual longer-run surveys regarding the expected average level of 10-year Treasury bond yields 6 to 10 years ahead less the expected average level of CPI inflation 6 to 10 years ahead; these results are shown for Canada (short-dashed), Germany (dot-dashed), Japan (dot-dot-dashed), Switzerland (solid), and the United Kingdom (long-dashed). Copyright (c) Consensus Economics Inc.

One plausible alternative would be to use the unemployment gap as the measure of resource slack. Indeed, Orphanides and Williams (2002) suggested that the prescriptions from the following rule would be roughly equivalent to those of the Taylor rule:

$$i_t = r^* + \pi_t + 0.5(pi_t - pi^*) - 1.0(u_t - u_t^*) \tag{4}$$

where u_t denotes the actual unemployment rate, u_t^* denotes the NAIRU, and the coefficient of -1.0 on the unemployment gap was based on the usual application of Okun's Law.[35] CBO (2014) estimated that the NAIRU would remain steady at 5.5 percent through the remainder of this decade, implying that the unemployment gap was about 0.75 percentage points as of mid-2014. Consequently, according to this specification, the prevailing degree of resource slack would only call for a modest funds rate reduction of less than a percentage point, all else equal.

Conversely, the preceding analysis in Section 4 may provide a compelling rationale for specifying the benchmark rule in terms of the employment gap rather than the unemployment gap, especially when there are large and persistent deviations from the unemployment rate version of Okun's law. As shown in the lower panel of Fig. 7, the total U.S. employment gap was close to 3.5 percent as of 2014:Q1–that is, about three times as large as the unemployment gap. Consequently, using the same coefficient of -1.0 as in the preceding specification, this measure of resource slack would call for a funds rate reduction of about 350 basis points, all else equal.

6. Communication tools

6.1. Post-meeting statements and press conferences

⇒ *The head of the monetary policy committee should hold a press conference following every regular-scheduled meeting.*

In recent years, there have been numerous instances in which an abrupt shift in the economic outlook has warranted a prompt and decisive monetary policy response. That experience has underscored the importance of having regular monetary policy meetings at which policymakers can carefully consider the incoming economic and financial information and determine whether any action would be appropriate at that particular juncture. Moreover, policymakers need to be prepared to provide a prompt explanation to the public regarding the rationale for each policy decision, regardless of whether the decision involves action or inaction.

In all of the advanced economies, the monetary policy committee has a regularly scheduled meeting every few weeks. For example, the Bank of England's MPC and the Bank of Japan's policy board each convene on a monthly basis, while the

[35] See the discussion of Eq. (1) in Orphanides and Williams (2002).

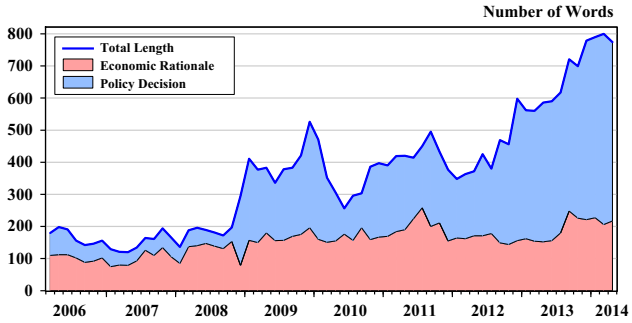

Fig. 9. The evolution of FOMC meeting statements. *Note*: This figure shows the number of words in each of the FOMC statements that were issued in conjunction with regularly scheduled meetings from March 2006 through April 2014. This word count does not include voting tallies, dissenting views (if any), or separate decisions of the Federal Reserve Board (as distinct from the FOMC). The content of each FOMC statement is categorized as follows: (i) the Committee's *policy decision*, that is, the actions taken at the meeting as well as any forward guidance about the likely future path of policy; and (ii) the Committee's *economic rationale*, including its synopsis of recent developments and its description of the economic outlook and the balance of risks.

FOMC and the Bank of Canada's governing council each hold meetings eight times per year.[36] Of course, a monetary policy committee can also convene unscheduled meetings as needed–either in person or via conference call–but such meetings are quite rare apart from crisis situations.

The standard practice for every monetary policy committee is to issue a written statement following the conclusion of each regularly scheduled meeting, but the purpose and structure of such statements varies significantly across central banks. In some cases, the post-meeting statement is very brief and simply conveys the substance of the current policy decision. For example, following its meeting on 8 May 2014, the ECB issued the following statement: "At today's meeting, which was held in Brussels, the Governing Council of the ECB decided that the interest rate on the main refinancing operations and the interest rates on the marginal lending facility and the deposit facility will remain unchanged at 0.25 percent, 0.75 percent, and 0.00 percent, respectively." On the same day, the Bank of England released the following statement: "The Bank of England's Monetary Policy Committee at its meeting today voted to maintain Bank Rate at 0.5 percent. The Committee also voted to maintain the stock of purchased assets financed by the issuance of central bank reserves at 375 billion."

In contrast, some central banks–including the Bank of Canada, the BOJ, and the FOMC–generally issue much longer post-meeting statements that provide a specific description of the policy decision and explain the economic rationale for that decision. As shown in Fig. 9, FOMC statements typically comprised about 150–200 words during the first two years of Chairman Bernanke's tenure in 2006–2007. The total length of FOMC statements surged during the financial crisis and continued rising over subsequent years to around 800 words by spring 2014. That upward trend mainly reflected the increased complexity of policy decisions involving large-scale asset purchases and forward guidance about the pace of purchases as well as the timing and pace of liftoff of the federal funds rate from the zero lower bound. In addition, the economic rationale in each FOMC statement was also expanded from about 100 words prior to the crisis to around 200 words more recently.

It has also become standard practice for central banks to hold regular press conferences at which the head of the monetary policy committee presents some opening remarks and then engages in Q&A.[37] The media participants typically represent a wide spectrum of news outlets, including mainstream and social media as well as the financial press. Consequently, central banks have generally found press conferences to be an effective platform for explaining the central bank's policies to the general public as well as for addressing more specific points that are relevant for analysts and other specialists. The frequency of press conferences varies noticeably across central banks. The Federal Reserve Chair holds a press conference following each quarterly FOMC meeting at which committee participants update their assessments of the economic outlook. At the Bank of Canada and the Bank of England, press conferences are held once per quarter in conjunction with the release of monetary policy reports. In contrast, at the BOJ and the ECB, press conferences take place every month at the conclusion of each monetary policy meeting.

Recent experience points to the merits of relatively frequent press conferences and the limitations of post-meeting statements. For example, as shown in the left panel of Fig. 10, all of the significant revisions to the FOMC's policy decisions from early 2012 through spring 2014 occurred in conjunction with quarterly press conferences. In principle, of course, the FOMC could make substantive adjustments to its policy stance at any meeting, even if there were not any press conference afterwards. But the reality is that 30-60 min of Q&A can provide a much more comprehensive explanation than a few hundred words in a written statement. Indeed, as shown in the right panel of the figure, revisions to the economic rationale in FOMC statements over the past few years rarely involved changing more than about 50 words. Consequently, there seems to be a strong case for arranging press conferences to be held in conjunction with *every* regularly scheduled meeting, so that the monetary policy committee has the flexibility to take action whenever warranted while ensuring that such actions are clearly and promptly communicated to the public.

[36] The ECB's governing council has traditionally held monthly policy meetings but recently announced that it will be shifting to a schedule of eight monetary policy meetings per year starting in 2015.

[37] At some central banks, one or more deputies also participate in the press conference and assist with the Q&A.

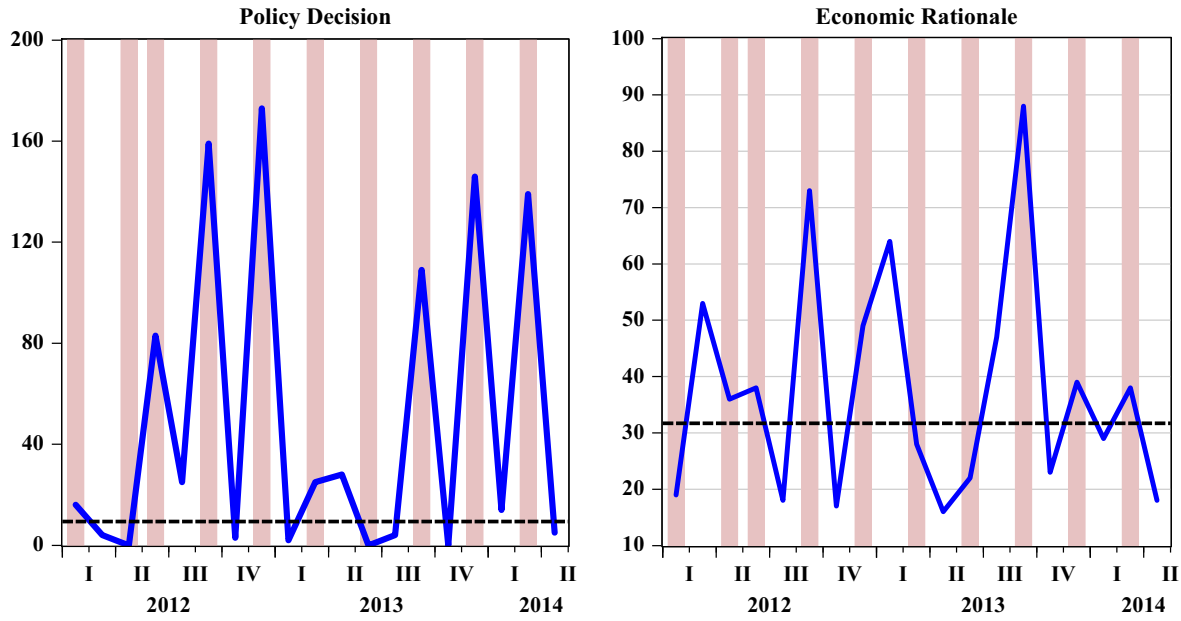

Fig. 10. Revisions in FOMC statement language (number of word changes from previous FOMC statement). *Note*: This figure depicts the incidence of revisions to the FOMC statement issued after each regularly scheduled meeting since January 2012 compared with the FOMC statement from its previous regularly scheduled meeting. The number of revisions is obtained by counting how many words have been inserted or modified (not including rearrangements in word order). The decomposition of the content into the policy decision (left panel) and economic rationale (right panel) is described in the notes to the preceding figure. In each panel, the shaded bars denote instances in which the Federal Reserve Chair held a press conference following the conclusion of the FOMC meeting, and the dashed line indicates the mean number of revisions which were made at FOMC meetings that did *not* include a press conference.

6.2. *Monetary policy reports*

⇒ *The central bank should publish quarterly monetary policy reports that provide a detailed rationale for its policy decisions.*

Press conferences and post-meeting statements are valuable tools for communicating broadly to the general public. However, it is also essential for the monetary policy committee to publish more detailed information about the rationale for its policy decisions. Such reports can be particularly helpful in ensuring that professional forecasters and financial market analysts have a clear understanding of the central bank's policy strategy, thereby reducing economic and financial uncertainty and facilitating the effectiveness of the monetary transmission mechanism. Such reports are also highly relevant for academic economists, who often play a key role in evaluating the central bank's policy framework and in contributing to its public accountability over time.

In particular, regular monetary policy reports can provide crucial information about the central bank's assessments of the economic outlook and the balance of risks. Such reports provide a means of discussing the specific details of economic and financial developments–and the methods used in analyzing those developments–that go well beyond the intrinsic limits of what can be communicated in a post-meeting statement or a press conference. Moreover, as noted above, monetary policy reports can present the implications of alternative scenarios that illuminate key risk-management issues.

From a practical standpoint, monetary policy reports are largely prepared by the central bank's staff. Consequently, such reports are typically viewed as effectively representing (either implicitly or explicitly) the views of the head of the monetary policy committee. However, such reports can also serve a valuable role in presenting the diversity of views of the entire committee. For example, the Bank of England's May 2014 *Inflation Report* frequently utilized phrases like “the central view of most MPC members” and “a range of views on the Committee.”

7. Conclusions

Clarity and transparency of communications play a key role in enhancing the effectiveness of monetary policy and in sustaining the central bank's operational independence over time. In recent years, many central banks around the world have made significant improvements to the clarity of their communications. However, such communication will inevitably be a work-in-progress that requires continual effort and engagement with the public. Moreover, there are numerous dimensions of policy strategy and communication for which further research is warranted by economists at central banks and international organizations as well as at academic institutions.

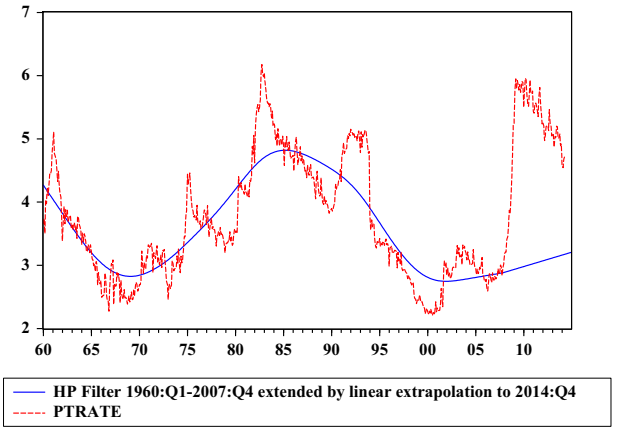

Fig. A1. Trend-cycle decomposition of U.S. involuntary part-time work.

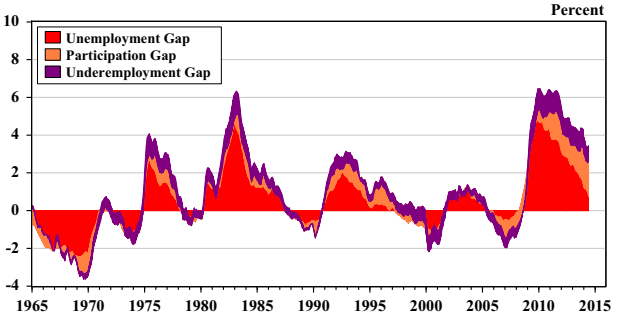

Fig. A2. The magnitude and composition of the U.S. employment gap since 1965.

Appendix A

This appendix describes the methodology used to construct each of the three components of the U.S. employment gap that are depicted in the lower panel of Fig. 7. The *unemployment gap* is the deviation of the civilian unemployment rate from the CBO (2014) assessment of the longer-run NAIRU, and the *participation gap* is the percent deviation of the actual labor force from the CBO (2014) assessment of the potential labor force.[38] The *underemployment gap* is defined as the number of full-time equivalent (FTE) jobs (expressed in proportion to the potential labor force) that would be required to eliminate the cyclical component of involuntary part-time work.

To construct the underemployment gap, the following three monthly time series were downloaded from the BLS website: (a) number of individuals working part-time for economic reasons (seasonally adjusted, BLS Identifier LNS12032194); (b) average hours per week of individuals working part-time for economic reasons (not seasonally adjusted, BLS Identifier LNU02033232); and (c) average hours per week of individuals who usually work full-time (seasonally adjusted, BLS Identifier LNS12505054). Henceforth these three series are denoted as *NINV*, *HINV*, and *HFULL*.[39] The relative shortfall in hours per week is given by $HRATIO = HINV/HFULL$.[40]

Next, the incidence of involuntary part-time employment was normalized by the potential labor force, i.e., $INVRT = 100*NINV/LFPOT$. The trend-cycle decomposition of *INVRT* was obtained by applying Eviews HP filtering algorithm over the sample period 1960:1 to 2007:12, where the smoothing parameter of 129,600 was determined by the Uhlig–Ravn formula. To project the trend beyond 2007, its monthly average change was computed for the period 2005:1 to 2007:12, and

[38] The CBO (2014) series were downloaded from http://www.cbo.gov/sites/default/files/cbofiles/attachments/KeyAssumptionsPotentialGDP.xlsx. Since the CBO (2014) series were published at an annual frequency, Eviews was used to interpolate each series to monthly frequency using the quadratic match average method.

[39] The Eviews X13 procedure was applied to *HINVOL*, since the BLS does not publish a seasonally adjusted version of that series.

[40] The BLS series on full-time hours is only available starting in 1994:1, and hence the mean value of 0.535 for *HRATIO* over the post-1994 sample was used in constructing the underemployment gap for all periods prior to 1994.

that slope (namely −0.0015) was used to extend the trend linearly from 2008:1 to 2014:4. The cyclical component *INVCYCLE* = *INVRT* − *INVTREND*; the resulting trend-cycle decomposition is shown in Fig. A1. Finally, the underemployment gap is obtained as (1 − *HRATIO*)∗*INVOLCYCLE*.

Using these methods, Fig. A2 depicts the evolution of the magnitude and composition of the U.S. employment gap over the past five decades.

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