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## **Potential Implications of Alternative Approaches to the Timing and Pace of Tightening**

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### **Section 1: Introduction**

The continued improvement in labor market conditions, near-certain end of quantitative easing in October, and debate within the FOMC on the “considerable time” language in the FOMC statement have brought to the fore discussions of the appropriate timing and pace at which the federal funds rate may rise. In this memo, we consider alternative strategies for adjusting the funds rate. One strategy – “later and steeper” (L&S) – delays liftoff until the economy comes close to full employment, and then raises the policy rate rapidly. The alternative – “earlier and gradual” (E&G) – involves an earlier liftoff, but commits to remove accommodation more gradually thereafter.

Under conditions typically assumed in models such as FRB/US, alternative strategies that imply substantially different policy rate paths may imply similar paths for long-term interest rates and hence lead to similar outcomes for inflation and unemployment. Because of this near-equivalence, the alternative adjustment strategies we highlight can be structured in a manner that would deliver the same overall degree of accommodation – a result which may make the choice of strategy appear inconsequential. But this near-equivalence result requires that the public understands well, and views as credible, the Committee’s policy strategy – conditions that may place high demands on the Committee’s communications. Taking account of potential communications challenges and uncertainty about the relative importance of short- and long-term interest rates on aggregate demand, the L&S strategy would probably have a slight edge in promoting a faster return to full employment and reducing the risk of having to return to the zero lower bound.

Our memo discusses some of the challenges that these alternative approaches to normalization may place on the FOMC’s communication efforts and credibility. While there is considerable uncertainty about how either strategy would play out in practice, a number of factors may suggest that it could be easier to convey to the public a gradual approach. In particular, the E&G would imply liftoff well before resource gaps closed (as has generally been the case in the past), and the gradual adjustment thereafter might seem more consistent with past FOMC behavior as well. This (admittedly loose) consistency with past behavior may also bolster market confidence in the Committee’s determination to keep inflation expectations firmly anchored. In contrast, an L&S approach may be perceived as a larger deviation from past behavior, which may place additional demands on efforts to explain the nature of the policy approach and how it may unfold as the economy evolves in unexpected ways.

Turning to financial stability, it is hard to draw a bright line between the alternative approaches, especially as they are designed to provide the same level of accommodation and of long-term interest rates. A later start to normalization, all else equal, would continue to provide incentives to borrow short-term, risking a more disorderly unwind in the future if firms became overly reliant on short-term funds or leverage. On the other hand, an earlier increase in short-term interest rates, in conjunction with communications emphasizing some degree of gradualism,

could increase perceptions that policy is on a pre-set course and thereby bolster investors' willingness to take on risk (as some have suggested happened in 2004 through 2006). Finally, an earlier start to normalization before the recovery is more solid may increase the risk that adverse developments force the FOMC to reverse course and return the short-term policy rate to the ZLB, which could undermine Federal Reserve credibility and also increase volatility.

The issues we raise naturally lead to the question of the appropriate degree of accommodation, and the final section discusses a number of key, but less widely-discussed, considerations that may bear on this question. We focus particularly on possible asymmetries in preferences, asymmetries in risks to the outlook, and the assessment of resource utilization.

A number of factors may suggest that the costs of unemployment and inflation are not symmetric around the natural rate of unemployment or the Committee's 2 percent inflation objective, and in particular that lower unemployment and inflation may be better than higher values. We use the FRB/US model to illustrate that in an environment in which policymakers regard a fall in unemployment below the natural rate as less costly than a corresponding increase, it may be desirable to provide more accommodation than in the typical optimal control simulations reported in Tealbook B which assume symmetric preferences. However, approaches based on asymmetric preferences may boost inflation expectations above the Committee's 2 percent target – as underscored by the related literature – and potentially weaken the confidence of the public in the Committee's commitment to a balanced approach. The memo concludes by discussing asymmetric risks and uncertainties in gauging resource slack, and suggests conditions under which additional accommodation may be appropriate.

## **Section 2: Near Equivalence of Strategies under Ideal Conditions**

In principle, policymakers have considerable latitude to substitute funds rate settings across time in adjusting policy accommodation. In particular, approaches that raise the federal funds rate earlier, but more gradually, can have very similar implications for long-term interest rates as alternatives in which liftoff is much later, but short-term interest rates rise more rapidly subsequently. This near-equivalence result for long-term interest rates, which rests on the link between long-term interest rates and the entire path of expected future short-term interest rates, will also imply near-equivalence for macroeconomic outcomes in models in which long-term interest rates are the primary channel through which monetary policy influences real economic activity.

To illustrate this result, Figure 1 examines two alternative strategies which provide very similar overall levels of accommodation. One strategy, referred to here as earlier and gradual (E&G), calls for liftoff to occur essentially immediately – in 2014:Q4 – but commits to raise policy rates gradually (conditional on economic outcomes); in practical terms, this strategy is simply that prescribed by the inertial version of the Taylor (1999) rule routinely presented in the Tealbook. The policy rate under this strategy increases about 1-1/4 percent in the first year following liftoff. Although this pace is slower than that realized in the first year of the 2004-06 tightening cycle, it is comparable to the pace of tightening that the staff envisioned in June 2004 when the

Committee decided to begin removing accommodation. The second strategy, later and steeper (L&S), delays liftoff until the economy comes close to full employment, and subsequently raises the policy rate rapidly. (In this case, the strategy involves a commitment to remain more accommodative than the inertial Taylor rule by holding the federal funds rate at the ZLB until unemployment falls to its natural rate, and then reversing the cumulative deviation from this rule over subsequent quarters). The policy rate rises over 250 basis points in the first year after liftoff in 2015:Q4. This four-quarter pace of increase is essentially identical to that in the 1994 tightening cycle; however, given that policy adjustment is very responsive to resource slack under L&S, it is worth noting that accommodation would be removed considerably more quickly if unemployment fell even a bit faster than under the modal outlook.

As can be seen in the remaining panels of the figure, given the July 2014 Tealbook baseline, these two strategies imply very similar paths for long-term interest rates, and thus for macroeconomic outcomes. This similarity of outcomes depends crucially on the assumption that the public understands the FOMC's policy strategies and expects the Committee to implement the plans. For example, under the L&S strategy, long-term interest rates rise markedly in 2015 – well before liftoff – because the public is confident that the Committee will carry through with a rapid removal of policy accommodation once the unemployment gap has closed. The E&G strategy also involves an important degree of commitment. In particular, while the E&G strategy removes more accommodation upfront, it makes a conditional commitment to keep policy rates low compared with L&S at a horizon of 2-3 years even as the economy moves beyond full employment. This promise of future accommodation is crucial for delivering a similar path of long-term interest rates in the scenario.

In broad terms, the prediction that similar macroeconomic outcomes will arise from alternative approaches that yield similar paths for long-term interest rates is shared by a broad class of models. That said, short-term interest rates may play a relatively larger role in affecting aggregate demand than implied by models such as FRB/US. In particular, while the economic effects of a given-sized rate cut in FRB/US are not very sensitive to the specific timing, the fact that many financial contracts are indexed to short-term interest rates suggests that near-term accommodation may have relatively stronger effects. Under such conditions, the L&S strategy would be likely to provide a greater degree of accommodation than under E&G.<sup>1</sup>

In addition, the central role of credibility, and the different demands on credibility that may be associated with earlier versus later starts to normalization, may impose different burdens on Committee communications. The implications for other economic conditions, such as financial stability, may also differ across these alternative approaches.

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<sup>1</sup> More precisely, with a reduced ability to substitute future for current policy easing, the policymaker under E&G would have to promise relatively more accommodation in the future to yield the same stimulus as under L&S.

### **Section 3: Demands on Credibility and Communications**

An earlier start to raising short-term interest rates can only be expected to deliver the same degree of overall accommodation as a later start if the public understands the strategy chosen and believes the FOMC will follow through on its plans. Of course, any approach adopted by the Committee requires effective adjustments in communications. Nonetheless, the challenges associated with effective communications may differ depending on whether the Committee chooses to begin normalization earlier or later.

While some of the issues we discuss are not simple to assign to distinct bins, we organize the set of issues into two broad categories: the challenge associated with signaling the desired degree of accommodation; and the challenge associated with ensuring credibility of announced plans.

**3.1 Challenges Associated With Signaling the Desired Degree of Accommodation:** Any decision to shift the public's perception of the policy outlook may be misperceived. For example, a principal challenge of pursuing an E&G approach is that it may well be misperceived as a shift toward a desire to provide less accommodation. Roughly speaking, the public might hear only the "early," and ignore – or at least discount – the "gradual." The decision to move earlier than markets expect may cause the public to revise its views about the Committee's policy approach (its "reaction function"), how it measures slack, its concerns about upside risks to inflation, or worries about increasing financial stability risks. Thus, to the extent that the announcement of an earlier-than-expected liftoff changed the public's views about the factors expected to influence future accommodation, long-term interest rates may rise somewhat more than in Figure 1.

On the flip side, the L&S approach may be perceived as a shift toward a desire to provide more accommodation, or may induce the public to infer that the FOMC regarded the recovery as faltering. The public may infer that the Committee is elevating the employment leg of the dual mandate relative to the inflation leg, perhaps weakening the Fed's credentials as an inflation fighter; alternatively, the public may think that the Committee regards inflation and financial stability risks – even when slack appears small – as relatively low. Moreover, the public could come to doubt the willingness of the Committee to eventually raise short-rates very sharply as resource gaps closed, at least if inflation remained quiescent, as envisioned under the modal outlook.

Communications from the Committee could reduce the likelihood of misinterpretations and ameliorate their macroeconomic effects. In many cases, such efforts could use the communication tools the FOMC already deploys, such as the statement, press conferences, the minutes and Summary of Economic Projections, and speeches. For example, if the Committee wished to reduce the possibility that a policy strategy could be incorrectly perceived as signaling a reduction in perceived economic slack, the policy statement could reiterate its assessment of resource utilization and emphasize the broad range of labor market conditions that the Committee takes into account in gauging progress toward full employment. Moreover,

discussions of the rationale for the unemployment rate forecast in the SEP could highlight their consonance with the Committee's intentions. Concerns about inappropriate signals regarding the outlook for inflation could be addressed in a similar manner. Nonetheless, it may be difficult to counteract the full range of possible misinterpretations with these communications tools, not least because the SEP falls short of a consensus view of the Committee; and the statement, and even press conferences, provide only limited opportunities for clarification.

In addition to *ex ante* communications, the Committee has latitude to counter the effects of misperceptions either by adjusting forward guidance or the policy rate. For example, if the Committee were to see that financial conditions tightened unexpectedly in response to announcement of an E&G approach to normalization, it could communicate more strongly its intention to raise interest rates more gradually than the path markets seemed to have in mind. Conversely, if a later start to normalization resulted in an undesired loosening in financial conditions, the Committee could simply move earlier, or retain the later date of liftoff but indicate an intention to move more forcefully.

Still, the scope for nimble, mid-course corrections for essentially tactical reasons should not be overstated. These types of adjustments may lead to volatility or hurt the Committee's credibility – both of which may affect the Committee's willingness to make such mid-course corrections. Moreover, in the case of the E&G strategy, policymakers may be averse to providing more accommodation through forward guidance about the medium-term, especially to the extent that it was perceived as difficult to provide a sufficient degree of economic conditionality.

**3.2 Challenges Associated with Ensuring Credibility of Announced Plans:** The “science” behind the credibility of policymakers is limited, but a few broad principles are applicable. First, credibility has, at times, been hard to gain, especially when policymakers attempt to implement policy strategies that differ markedly from historical experience. Second, policy announcements that imply outcomes that are well aligned with policymaker goals are likely to be more credible. And, finally, surprise developments that cause the policy stance to deviate, *ex post*, from initial expectations, are less likely to have an effect on credibility when policymakers have communicated, in advance, either implicitly or explicitly, how they intend to respond to unexpected developments.<sup>2</sup>

With regard to similarity to past behavior or historical experience, both the E&G and the L&S approaches differ importantly from past behavior, not least because the current level of short-term interest rate is unusual. That said, the E&G strategy is closer to past Committee behavior at least in the early phases of tightening, insofar as liftoff occurs while resource slack remains

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<sup>2</sup> The idea that deviations from historical precedent may require wrenching adjustments is consistent with experience during the Volcker disinflation; the notion that policies well aligned with policymaker goals are more credible underlies the literature on “credible plans” (e.g., Chari and Kehoe (1990)); and the emphasis on how policies are more effective when they incorporate contingency planning is discussed, for example, in Erceg, Kiley, and Lopez-Salido (2011).

somewhat sizeable. Moreover, the gradual adjustment thereafter – as in the inertial Taylor rule that might be regarded as roughly capturing an E&G strategy – has been well-documented in the empirical literature and emphasized in past policymaker communications.<sup>3</sup> In contrast, it would be historically very unusual to hold the policy rate at its effective lower bound as the unemployment rate approached the natural rate of unemployment.

Under the premise that both approaches result in the same macroeconomic outcomes, there is no distinction across the two policies in terms of the alignment of inflation and unemployment with the FOMC's long-run goals. However, if the L&S approach is misinterpreted as signaling a desire for more accommodation, the public may see the policy as inconsistent with the goal of maintaining the unemployment rate near its natural rate – one possible interpretation of the maximum employment objective.

Finally both approaches face important challenges in communicating how policy will adjust to surprises as data rolls in. How can the Committee balance some degree of commitment—in the E&G case, to move gradually and in the L&S case, to stand pat but then move rapidly—with an appropriate degree of responsiveness to emerging economic conditions? For example, a risk associated with the gradualist approach is that it may make policy adjustment appear to be on a largely pre-set course, a criticism some applied to the “measured pace” language adopted by the Committee in 2004 (and an issue to which we return in our discussion of financial stability).

Because of this challenge, efforts to move expectations among the public toward an E&G or L&S strategy may entail clarification for the public of the nature of the underlying strategy's reaction to changes in the outlook. For example, the Committee could choose to emphasize a simple rule, like the inertial Taylor rule, as broadly in line with its plan to, for example, follow an E&G strategy, subject to caveats. This could be communicated in the minutes and speeches. In addition, the FOMC may find it valuable to chart out the implications of its strategy (irrespective of which strategy it pursues) under a range of alternative scenarios: Such scenarios could be presented in speeches or as part of a process toward a consensus forecast or an Inflation Report.

#### **Section 4: Financial Stability**

While the alternative approaches may imply similar paths for long-term interest rates and macroeconomic outcomes along the modal path, alternative policy strategies may have different implications for risks to financial stability because such risks may be linked to financial conditions beyond the level of long-term interest rates, including the slope of the yield curve or level of volatility. As discussed in recent Quantitative Surveillance (QS) assessments, the prolonged low level of short- and long-term interest rates on Treasury securities has appeared to generate some pressure on asset valuations – especially in corporate credit markets, where froth

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<sup>3</sup> It is more debatable whether the commitment aspect of the E&G strategy – which requires policy to be relatively accommodative in the medium-run – is in line with past FOMC behavior. Insofar as the Taylor rule we consider embeds relatively modest inertia, it would seem reasonably consistent; but approaches that implied more inertia – and that heightened the risk of overshooting under certain conditions – probably would not be.

has been notable over the past year (despite the recent increase in spreads on lower-quality debt). But this pressure on asset valuations has not been accompanied by rapid growth in overall nonfinancial borrowing, and leverage and maturity transformation within the financial system remain notably below levels in the mid-2000s. As a result, the staff judges the risks to financial stability as moderate at this time. Nonetheless, low nominal interest rates boost incentives to increase exposure to duration and credit risk through higher leverage and greater maturity transformation.<sup>4</sup> And shifts in behavior brought about by the historically unusual level of interest rates may lead institutions to assume risks in more complex and opaque ways that prove more difficult than expected to measure and manage. The recent QS assessment noted that imbalances appear to be building, albeit slowly, which may reflect improved confidence and the ongoing recovery as well as some impetus from low interest rates.

It is difficult to draw clear lines between the financial stability implications of an earlier, but more gradual, rise in nominal interest rates and a later-but-steeper set of increases. To the extent the alternatives imply similar paths for long-term interest rates and macroeconomic activity, the alternatives may not differ notably in terms of overall financial incentives or the repayment capacity of borrowers. That said, a number of factors suggest potential differences. For example, a later-but-steeper path for the federal funds rate tends to produce a steeper yield curve, at least over the period during which the funds rate remains at its effective lower bound. A steeper yield curve may increase incentives to rely on short-term debt or increase leverage through such financing. Staff conversations with market participants over the summer indicated that most investors continue to see little downside risk in carry trades, but also that awareness of the risks associated with monetary policy normalization has been growing. A decision to start normalization later may reverse this latter trend and contribute to a buildup of risks.

In addition to growing awareness of the risks associated with policy normalization, market participants have indicated concern that markets may react strongly once rates begin to rise – as portfolio shifts may be significant, with sizable outflows from funds that have experienced huge inflows in recent years. Such flows could lead to large price movements, in part because dealers may prove unwilling to provide liquidity during a period of large price declines. Such concerns are reminiscent of the dynamic witnessed, on a small scale, during the “taper tantrum” over the spring of 2013.<sup>5</sup> To the extent such responses occur at the onset of increases in short-term interest rates, collateral damage – to the financial system or real economic activity – may be lower if the associated declines in asset prices occur while leverage and maturity transformation within the financial system are still relatively moderate. While staff view leverage and maturity transformation as currently moderate, imbalances appear to be building, albeit slowly, and hence conditions could shift by late next year or 2016, especially if the economy continues to strengthen, suggesting risks from a later-but-steeper approach.

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<sup>4</sup> Adrian and Liang (2014) discuss the research literature on monetary policy and financial stability.

<sup>5</sup> See Adrian, Fleming, Goldberg, Lewis, Natalucci, and Wu (2013).

Delaying the onset of interest rate increases, but then increasing rates rapidly, may also have adverse effects on money markets. For example, the FOMC may face challenges in its attempts to bring market interest rates in line with desired levels because of the large balance sheet and deployment of novel tools, and these challenges may be more acute if the FOMC needs to raise rates rapidly, as under a later approach. Moreover, banks have received a large inflow of deposits since the financial crisis. If short-term interest rates were to rise very rapidly, as may occur under a later-but-steeper approach, banks may face rapid deposit outflows (as investors adjust allocations toward, for example, money-market funds paying near-market rates) or be forced to raise deposit rates quickly; either development would be historically unusual, potentially creating new risks to credit supply or bank health.

Despite these potential risks from a later-and-steeper approach, there are also risks to financial stability from an earlier-and-gradual approach. First, if policy adjustments were very gradual and predictable, monetary policy may be perceived as likely to keep interest rates low even in a booming economy. Such perceptions may fuel asset-price overvaluation, credit growth, and leverage within the financial system. Indeed, some policymakers may view the relatively gradual and predictable pace of rate increases from 2004 to 2006 – a period over which policy moves were signaled well in advance and the federal funds rate was increased at a steady pace of 25 basis points per meeting over two years – as contributing to adverse developments within the financial system at that time. Second, an early start to normalization may weaken the economy inadvertently if policymakers were unable to mitigate signaling effects through communications. Against the backdrop of a weaker recovery and a reduced ability to offset negative shocks, the risks of returning to the ZLB would rise, and downside risks to financial stability associated with a weak economy would be heightened significantly. Finally, an earlier start to normalization may imply less testing of novel tools, which could lead to unexpected developments in money markets.

## **Section 5: Some Key Considerations in Gauging the Appropriate Degree of Accommodation**

Our discussion of some of the factors that may influence a decision to begin raising the funds rate earlier or later than assumed in the Tealbook projection, holding constant the intended level of accommodation, naturally leads to the question of what the appropriate degree of accommodation might be. A number of key considerations – each of which falls outside the set of assumptions used in typical Tealbook analyses of optimal policies – may bear on the appropriate degree of accommodation and hence be important in decisions regarding an earlier or later liftoff. We focus particularly on possible asymmetries in preferences, asymmetries in risks to the outlook, and the assessment of resource utilization.<sup>6</sup>

**5.1 Asymmetric Preferences:** The analysis of optimal policies in the Tealbook, as in much monetary policy analysis, assumes economic losses are symmetric about the natural rate of

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<sup>6</sup> For a more thorough discussion of the latter two issues, see de Groot, Gagnon, and Kiley (2014).



unemployment and the FOMC's 2 percent objective – that is, positive and negative deviations of unemployment from the natural rate and of inflation from 2 percent are equally costly. But such symmetry may not capture the true underlying economic costs.

Turning first to unemployment, policymakers may view the cost of a fall in the unemployment rate below the natural rate as considerably smaller than that of an equal-sized rise. In particular, they may regard high unemployment as having disproportionate costs because it operates through a number of channels – including worker skill deterioration – that would not apply to the case of unusually low unemployment. Moreover, policymakers may think that distortions in labor and product markets (such as market power on the part of firms or workers and distortionary taxes) may imply that the longer-run normal level of unemployment is inefficiently high.<sup>7</sup>

Similarly, while a number of factors, such as the zero-lower bound and downward nominal wage rigidity, push the optimal rate of inflation appreciably above zero, other factors, such as nominal illusion, taxation of nominal capital income, nominal price and wage rigidities, and the implicit tax of inflation on monetary assets, place an upper bound on the optimal rate of inflation which may be well below 2 percent – although this remains an active area of research.<sup>8</sup>

All else equal, the preference asymmetries we consider would lead policymakers to prefer lower unemployment and inflation, or at least to perceive unemployment or inflation below objective as less costly than unemployment above objective. To illustrate loss functions with this property, the red dashed line in Figure 2 compares an “asymmetric linear-exponential” loss function that attempts to capture such asymmetries, albeit in a stylized way, to a standard quadratic loss function.<sup>9</sup> While the latter – shown by the blue solid line – assumes that losses are symmetric about policymakers objective (associated with “0” in the figure) – the asymmetric loss function is calibrated to imply that the cost of a below-target outcome is considerably smaller than of a corresponding above-target outcome. In the current context, these preferences (conditional on the staff outlook) would suggest optimal policy would pursue greater accommodation than would be suggested by symmetric (quadratic) preferences of the type used in the Tealbook. To illustrate, Figure 3 presents optimal control, under commitment, for the standard quadratic loss

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<sup>7</sup> These ideas are well developed in the New-Keynesian literature on monetary policy, in which loss functions that are asymmetric around long-run values arise from inefficiencies in the economy. Typically, this literature illustrates this point via a (second-order) Taylor series approximation of losses, which result in a linear-quadratic (rather than simply quadratic) loss function when inefficiencies are present. The general notion of approximating social losses via a linear-quadratic function (or, equivalently, by a second-order Taylor series expansion around long-run values) follows Woodford (2003); Gali, Gertler, and Lopez-Salido (2007) present an example in which the social losses associated with fluctuations in economic activity have the properties we outline (e.g., their equation 19).

<sup>8</sup> The literature suggesting the optimal rate of inflation is lower than 2 percent even after accounting for the ZLB is sizable (e.g., see the discussion in Coibion, Gorodnichenko, and Wieland (2012)), but the difficult modeling choices involved in such an assessment make this finding difficult to assess. For a review of the larger set of issues, see Kiley, Mauskopf, and Wilcox (2007).

<sup>9</sup> Linear-exponential preferences have appeared in previous research on monetary policy; see, e.g., Nobay and Peel (2003), Ruge-Murcia (2003) and Surico (2007).

function (the black line), while the green line shows the results with asymmetric linear-exponential losses as calibrated in Figure 2, applied to both the unemployment gap and inflation gap. Under the asymmetric preferences, more accommodation is optimal because unemployment remains well above objective currently, which is more costly than some degree of undershooting of unemployment down the road. Accordingly, the federal funds rate rises more slowly under asymmetric than under symmetric quadratic preferences in Figure 3, and unemployment undershoots the natural rate to a somewhat greater degree. Given that the Phillips Curve is very flat in FRB/US, the contour of the loss function over inflation turns out to be nearly immaterial for these results; indeed, the policy prescriptions in the case of asymmetric losses over unemployment but symmetric losses over inflation would be nearly identical. It bears emphasizing that none of these results take into account risks around the outlook or the interaction of risks with asymmetries in the loss function.

While these results provide some suggestion that asymmetries in losses, which are reasonable from an economic standpoint, may rationalize additional accommodation, we see several cautionary notes as important in making such a judgment. For one thing, these results hinge on particular functional forms and on the baseline outlook for inflation, and the degree to which unemployment may undershoot the natural rate can depend on parameter values. More fundamentally, the greater accommodation that would be called for based on preference asymmetries over unemployment would run some risk of boosting inflation expectations above the Committee's 2 percent target. Asymmetric preferences over unemployment suggest it is optimal for policy to react more aggressively to downturns in the economy than to upturns or to systematically pursue unemployment below its natural rate. Such approaches may call into question the FOMC's "balanced approach." Moreover, although there may be short-run benefits to such a strategy if inflation expectations adjust gradually, a large literature has emphasized that the incentives facing policymakers in such a situation will cause inflation expectations and realized inflation to persistently exceed policymakers' desired levels; indeed, this research has suggested that a potentially important way for society to avoid such an unanchoring of inflation expectations is to demand that central bankers ignore such asymmetries, or offset their effects by lowering the weight they place on unemployment deviations in policy decisions.<sup>10</sup>

## **5.2 Asymmetric Risks to the Baseline Outlook**

While it is clear that the efficacy of alternative approaches to the setting of monetary policy over the next few years is crucially related to how such approaches perform in response to unexpected developments, we have not emphasized the balance of risks to economic activity and inflation in our discussion. At least three features of current conditions may create asymmetries in the macroeconomic outlook. First, with the federal funds rate at the zero-lower bound (ZLB) and the Federal Reserve balance sheet already very large, monetary policy's ability to offset adverse

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<sup>10</sup> The classic references are Barro and Gordon (1983) and Rogoff (1985). While those works use linear-quadratic preferences, Nobay and Peel (2003), Ruge-Murcia (2003), and Surico (2007) show how similar effects arise under asymmetric preferences of other forms (including the linear-exponential form we considered).

demand shocks is limited. Second, policymakers may view risks to the equilibrium real interest rate as skewed to the downside, which could amplify risks associated with the ZLB. All else equal, both of these features could motivate additional accommodation to “insure” against downside risks. Finally, the possibility that slack in the labor market is greater than estimated by the staff or that hysteresis-induced scarring can be unwound by an “overheated” labor market may suggest asymmetric risks to estimates of slack.

Each of these issues was considered in a memo sent to the FOMC in June.<sup>11</sup> In that memo, FRB/US-based stochastic simulations around the Tealbook baseline suggested that, despite the ZLB, risks were not noticeably skewed to the downside for economic activity or inflation, although an alternative (DSGE) model saw greater downside risks to economic activity. Downside risks were enlarged somewhat if the equilibrium real interest rate was (persistently and in a manner not seen in recent decades) lower than assumed in the staff projection over the medium term, thus increasing the likelihood of a prolonged episode at the ZLB. Overall, these results suggest that the insurance motive, in which additional accommodation is provided to insulate the economy against adverse shocks and an unexpectedly long duration at the ZLB, is not currently large, at least so long as policymakers agree with the staff forecast and view of the economy.

Despite these model results, other factors lead us to the view the risks to economic activity may remain somewhat skewed to the downside. In particular, macroeconomic models have tended to underestimate the risk of a prolonged period at the ZLB.<sup>12</sup> Indeed, the U.S. has witnessed a number of periods since the crisis when the economy appeared to be moving onto a more rapid growth track before falling back to more sluggish growth. Moreover, experience in Japan and the Euro area suggests it has been very difficult for economies stuck at the ZLB to gather sufficient momentum in economic activity or movement of inflation back to target levels to justify increasing short-term nominal interest rates. As a result, policymakers may want to let the economic recovery strengthen to an unusual extent before beginning to remove policy accommodation.

### **5.3 “Hidden Slack”**

A third possible asymmetry of risks relates to the degree of economic slack, as there are reasons to suspect that the current level of the unemployment rate, at 6.1 percent in August, may overstate progress toward full employment. As these issues have been discussed previously, we simply highlight some key considerations. First, the decline in the unemployment rate has been somewhat greater than broader measures of improvement in labor market conditions, according to a staff labor-market conditions index.<sup>13</sup> Looking specifically at key indicators, the increase in

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<sup>11</sup> See de Groot, Gagnon, and Kiley (2014).

<sup>12</sup> See Chung et al (2012).

<sup>13</sup> These considerations were discussed in a box in Tealbook A in July, 2014.

the employment-to-population ratio from its trough has been small, as the decline in the unemployment rate has been offset, arithmetically, by a decline in labor-force participation. Much of the decline in participation appears to owe to structural factors, most importantly the aging of the Baby Boom.<sup>14</sup> However, the decline in participation coincided with a period of substantial weakness in labor market conditions. As such, the risk that the decline in participation owes more to cyclical weakness than currently estimated is important to consider. An unusually large degree of cyclical weakness in participation would represent “hidden” or “shadow” slack that may require that the unemployment rate to fall notably below the natural rate of unemployment before full employment is reached. The notion that slack may be greater than the level implied by the current unemployment rate is further boosted by the unusually high level of workers reporting working part-time for economic reasons, which suggests a degree of underemployment that is not apparent in the unemployment rate.

While these factors suggest risks to assessments of resource utilization as tilted toward degrees of slack greater than that estimated by the staff, there are risks to the other side. One possibility of note is that the dislocations in the labor market have resulted in lasting labor-market damage. For example, it may be that the elevated rate of long-term unemployment reflects damage to the permanent labor-market prospects of such workers that is not amenable to remediation through stronger aggregate demand, although some research casts doubts on this possibility.<sup>15</sup> More generally, labor-market damage – perhaps through hysteresis – has complex implications for monetary policy: Such damage may create a wedge between the desirable level of labor market conditions and the labor market conditions consistent with inflation remaining below 2 percent; a balanced approach would consider pursuing inflation above 2 percent for a time in such circumstances.<sup>16</sup>

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<sup>14</sup> An analysis that is largely in line with staff thinking is Aaronson et al (2014); for an early example emphasizing the potential important role of slack in participation for monetary policy, see Erceg and Levin (2013).

<sup>15</sup> For example, Smith (2014).

<sup>16</sup> For example, see the analysis in Rudebusch and Williams (2014).

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Figure 1  
Outcomes under Earlier-and-Gradual and Later-but-Steeper Policies

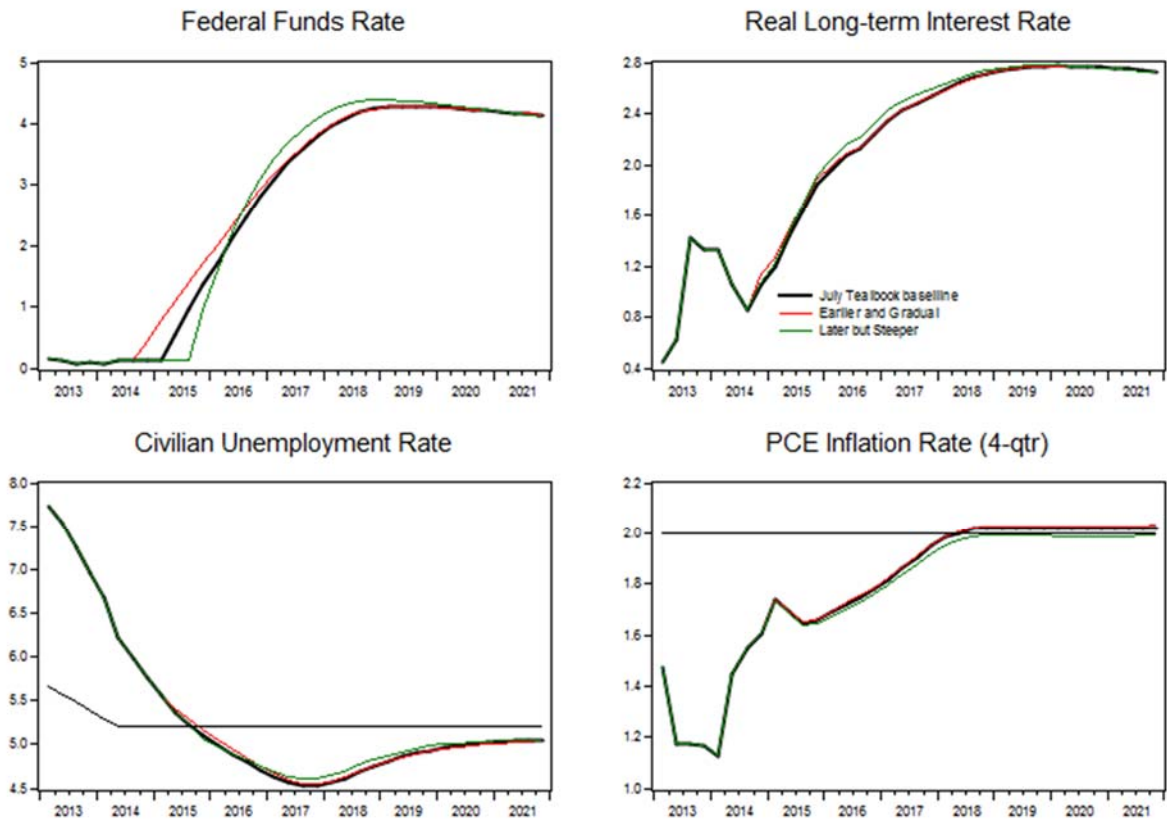


Figure 2: Examples of Symmetric and Asymmetric Loss Functions

(Blue solid – symmetric quadratic)  
(red dashed-dotted – asymmetric linear exponential)

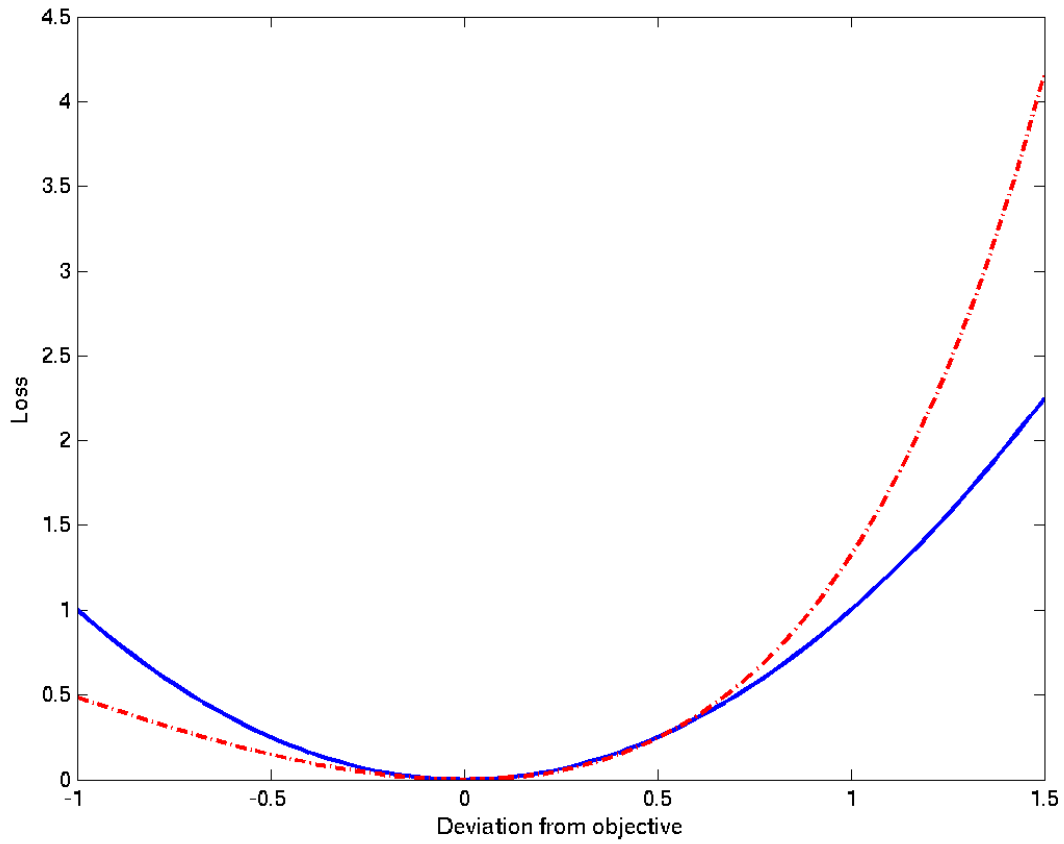




Figure 3  
Optimal Control Under Asymmetric Linear-Exponential and Symmetric Quadratic Preferences

