Peterson Institute for International Economics

Policy Brief

The World Needs Further Monetary Ease, Not an Early Exit

Joseph E. Gagnon

Joseph E. Gagnon, *senior fellow at the Peterson Institute for International Economics since September 2009, was visiting associate director, Division of Monetary Affairs (2008–09) at the US Federal Reserve Board. Previously he served at the US Federal Reserve Board as associate director, Division of International Finance (1999–2008), and senior economist (1987–90 and 1991–97). He has also served at the US Treasury Department (1994–95 and 1997–99) and has taught at the University of California's Haas School of Business (1990–91). He has published numerous articles in economics journals, including the* Journal of International Economics, *the* Journal of Monetary Economics, *the* Review of International Economics, *and the* Journal of International Money and Finance, *and has contributed to several edited volumes.*

INTRODUCTION AND SUMMARY

Governments and central banks around the world eased macroeconomic policies aggressively in response to the 2008 financial crisis, arguably forestalling a second Great Depression. More recently, however, policymakers have been talking about when to withdraw the stimulus. This focus on exit is misguided. Current forecasts show an extended period of economic stagnation in the developed world. We need addi-

tional stimulus now. In particular, central banks in the main developed economies should push long-term interest rates 75 basis points below the levels they would otherwise be by purchasing a combined $6 trillion in long-term public and private debt securities. Relative to current forecasts, this policy action is expected to boost GDP 3 percent or more over the next eight quarters and to reduce unemployment rates by between 1 and 3 percentage points.

Without additional stimulus, unemployment rates are likely to remain above equilibrium levels for many years at great cost to the world economy in terms of lost income and personal hardship. Moreover, with inflation rates already below desired levels, excess unemployment threatens to cause an unwelcome fall in prices that would further damp recovery and retard the necessary process of deleveraging.

In light of high and rising levels of public debt, additional monetary stimulus is preferable to additional fiscal stimulus. Indeed, monetary stimulus reduces the ratio of public debt to GDP by reducing interest expenses, increasing GDP, expanding tax revenues, and enabling an earlier start to fiscal consolidation.

The following specific actions in the near term would help set the world into a solid recovery with stable prices and a return of economic activity to its trend growth path by the end of 2011:

- The Federal Reserve should purchase an additional $2 trillion of longer-term debt securities with an average maturity of around seven years.

- The European Central Bank (ECB) should lower its main refinancing rate to 50 basis points, continue to extend unlimited 12-month credit to the banking system at this rate, and purchase €1 trillion of longer-term debt securities.

- The Bank of Japan should state more clearly its intention to return inflation to at least 1 percent over the next two years, purchase an additional ¥100 trillion of longer-term debt

securities with an average maturity of around seven years, and commit to a further ¥100 trillion in such purchases in 2011 if core inflation over the next 12 months remains negative.

■ The Bank of England should purchase an additional £200 billion of longer-term sterling bonds or an equivalent amount of longer-term foreign-currency bonds with the interest and principal hedged using currency swaps.

Renewed asset price bubbles and financial market excesses are unlikely in the current circumstances, but policymakers must be ready to use supervisory and regulatory tools to combat risky financial activities should they occur.

DO WE NEED MORE MACROECONOMIC STIMULUS?

It is widely agreed that the four main developed economies—the United States, the euro area, Japan, and the United Kingdom—currently are experiencing considerable economic slack and rates of inflation below the levels desired by their central banks. However, because macroeconomic policies operate only with a substantial lag, there is little that can be done to improve conditions in the immediate future. Rather, the policy choice today must be made with an eye to likely conditions beyond the next few months.

Studies typically find that the peak effect of monetary policy on economic growth occurs after one year and the peak effect of monetary policy on inflation occurs after two years.[1] Fiscal policies typically have a somewhat faster effect on the economy, but getting them through the legislative and executive hurdles to implementation takes time.[2] Overall, the stance of monetary and fiscal policies should be aimed at returning economic activity (GDP) reasonably close to its maximum sustainable level within two years and returning inflation close to its desired level over two to three years.[3] There are times when these two goals may be in conflict and policy must compromise between them, but such is not the case at present. Box 1 discusses the Taylor rule, which relates monetary policy to GDP and inflation.

---

1. See the chapter for the forthcoming *Handbook of Monetary Economics* by Boivin, Kiley, and Mishkin (2009). In terms of the level of GDP, the effect peaks around one to two years before dying out with the effect on employment peaking around, or just over, two years. In terms of the level of prices, the effect is permanent and largely completed after three years.

2. It is possible to design a fiscal policy with a nearly immediate effect on the economy after it is implemented (for example, a one-time cash transfer), but most fiscal policies have a more gradual effect.

3. A number of central banks generally aim to achieve their inflation targets within a horizon of two years, including the Bank of England, the Bank of Canada, and the Swedish Riksbank.

Recent forecasts by private-sector economists, government and international agencies, and central banks generally project years of lackluster growth and excess unemployment, with inflation rates that are at or below desired levels. Most of these forecasts assume that the current stance of monetary and fiscal policy will be tightened only gradually. The projections of prolonged economic stagnation thus strongly suggest that the current stance of policies is too tight.

Moreover, the cost of allowing unemployment to remain high is even greater than lost income and personal hardships in the next few years. Economic research shows that high levels of unemployment erode worker skills and employability, which causes an economy's structural rate of unemployment to rise (Blanchard and Summers 1986, Ball 2009). Getting back to the initial level of structural unemployment can take decades, with commensurate losses in economic output, not to mention social distress.

A common theme of most forecasts is that inflation—which currently is below the levels targeted by central banks—will rise over the next two to three years. Such projections are not consistent with the standard accelerationist model, which predicts falling inflation rates as long as the GDP gap is negative and/or excess unemployment is positive. The Organization for Economic Cooperation and Development (OECD) attributes the projected rise of inflation to its view that inflation expectations are well anchored at central bank target levels and that "speed-limit" effects push up prices when GDP grows faster than potential (OECD 2009, 65). However, in each of these economies, all previous occurrences of large negative GDP gaps since 1970 (using OECD estimates) were associated with declines in rates of inflation that persisted throughout recoveries that were faster than those projected for 2010 and 2011; inflation rates subsequently rose only when GDP gaps turned positive. Given the large magnitude and expected long duration of excess unemployment and the relatively modest growth rates projected, it is more reasonable to expect substantial further declines in rates of inflation.[4]

Some have argued that economies take longer than normal to return to full employment after financial crises (Reinhart and Rogoff 2009). However, there is a wide range of growth outcomes after financial crises, and the worst outcomes tended to be associated with the poorest policy responses.[5] The goal of policymakers should be to learn from the past and achieve

---

4. Indeed, in the United States the four-quarter changes in the employer cost index and hourly compensation have dropped sharply to levels not seen since World War II, suggesting that inflation may decline further.

5. See IMF (2009). In some cases, such as Japan in the 1990s, the financial crisis may have been caused or exacerbated by a structural slowdown in economic growth, which would vitiate any inference about the effect of the financial crisis on economic growth.

a better outcome than simply the average of past outcomes. In the current crisis, the zero bound on interest rates has been a major factor preventing monetary policymakers from doing as much as they otherwise would to speed recoveries. But, as discussed below, the zero bound is not a limit on what monetary policy can do. There is plenty of scope for further monetary stimulus.

Without additional stimulus, unemployment rates are likely to remain above equilibrium levels for many years at great cost to the world economy in terms of lost income and personal hardship. Moreover, with inflation rates already below desired levels, excess unemployment threatens to cause an unwelcome fall in prices that would further damp recovery and retard the necessary process of deleveraging.

United States

Table 1 presents prominent forecasts of the US economy. Unless otherwise noted, the GDP growth rate and the inflation rates are four-quarter percent changes. The unemployment rate is a percent of the labor force. Excess unemployment is the difference between the projected unemployment rate and the forecasting institution's estimate of the structural or long-run unemployment rate. The GDP gap is a percent of potential GDP. Except for the GDP gap, and unless otherwise noted, variables refer to the fourth quarter of each year.

The Blue Chip, Federal Reserve (Fed), OECD, and Congressional Budget Office (CBO) estimates of long-run unemployment are 5.8 percent, 5.1 percent, 5.0 percent, and 4.8 percent, respectively.[6] Based on these estimates, excess unemployment is currently around 4 to 5.5 percent, which is the highest level since the Great Depression according to the CBO's historical estimates. All of these forecasts show excess unemployment continuing to exceed 3 percent of the labor force at the end of 2011, eight quarters from now, and exceeding 2 percent of the labor force at the end of 2012.

Such a degree and duration of slack in the labor market has not been witnessed since the Great Depression.[7] Even the Mussa forecast, which is the most optimistic of these forecasts, shows an unemployment rate at the end of 2010 that is at least 3 percentage points higher than any of the estimates of the structural rate of unemployment.

The forecasts generally show modest GDP growth rates in 2010 with some pickup in 2011. However, these growth projections are far smaller than the 5 percent average GDP growth that occurred in the three years following each of the two previous recessions of comparable magnitude: 1974–75 and 1981–82. The GDP gaps are projected to remain large by historical standards in 2011. The slowness with which the GDP gaps are projected to close is particularly striking in light of the fact that these forecasters project that potential GDP growth has temporarily slowed in the near term by as much as 1.5 percentage points.

The Blue Chip and International Monetary Fund (IMF) forecasts have inflation rates quickly rebounding to about the Fed's desired level of close to 2 percent, whereas the Fed, the OECD, and the CBO see persistent shortfalls of inflation below this level.

Euro Area

Table 2 presents forecasts of the euro area economy. The data refer to annual averages or year-on-year changes, but are otherwise similar to those presented for the United States. The unemployment rate is uniformly projected to increase over the next two years. Excess unemployment also is projected to rise notably next year. The small drop in excess unemployment in 2011 is entirely accounted for by the OECD's projection of an increasing rate of structural unemployment caused by the increase in actual unemployment, a process also known as hysteresis. The increase in unemployment since 2008 is smaller than in the United States, despite a larger decline in GDP, likely reflecting activist employment policies and subsidies in some of the large euro-area countries. GDP growth is projected to be lackluster, with the GDP gap declining very little over the next two years.[8] Inflation is projected to remain below the ECB's target of just under 2 percent through 2012. It is difficult to overstate the bleakness of this outlook.

---

6. The OECD projects that structural unemployment will rise to 5.3 percent by 2011 and then return to 5.0 percent by 2017.

7. Indeed, both CBO and OECD historical estimates show that excess unemployment never exceeded 3 percent in even a single quarter for the 25 years from 1983 to 2008, including the 1990–91 and 2001 recessions.

8. Although the ECB did not publish a GDP gap in its December forecast, it noted that the output gap is projected to remain "significantly negative" through 2011.

Japan

Table 3 presents forecasts of the Japanese economy. Unemployment is projected to rise in 2010 and fall slightly in 2011. The OECD's projection of excess unemployment is large by Japanese historical standards. The Japanese economy suffered the largest drop in GDP of the four main developed economies. Forecasters generally predict more rapid growth in Japan in 2010 and 2011 than in the euro area, but the recovery is still slow by historical standards for such a sharp recession. There is considerable disagreement concerning the size of the GDP gap in Japan. Nevertheless, it clearly is negative and projected growth rates will not eliminate the GDP gap over the next two years.

Alone among these economies, Japan is currently experiencing significant deflation. Considering the substantial GDP gap and excess unemployment, forecasters are inexplicably optimistic that inflation will return toward zero over the next few years. In any event, there seems to be little chance over the next three or four years of a return to the 1 percent inflation rate that the Bank of Japan (BOJ) says it desires.

United Kingdom

Table 4 displays forecasts of the UK economy. As in the US forecasts, Q4 data are used where available. The unemployment rate is projected to rise next year and decline only modestly in 2011. Excess unemployment is projected to remain high and the GDP gap is projected to remain large through at least 2011. Notably, the Bank of England (BOE) (which does not publish a GDP gap) projects much faster GDP growth over the next two years than the other forecasters, including Mussa, who has the highest GDP forecast for each of the other economies.[9] The BOE publishes two forecasts: one based on market expectations of rising future policy rates and one based on future short-term policy rates held constant at their current value of 0.5 percent. Not surprisingly, the forecast assuming the constant low policy rate projects a higher GDP growth rate and higher inflation, with inflation rising above target by late 2011. Presumably, the GDP gap implicit in the BOE-Constant forecast is closed by the end of 2011, which suggests that the BOE's estimate of the current GDP gap is smaller than those of other forecasters or that the BOE has a lower estimate of the potential growth rate than other forecasters.

If the BOE's view of the economic outlook is correct, then there is little need for additional macroeconomic stimulus in the United Kingdom. However, if most other forecasters are right, then there is a need for substantial additional stimulus.

---

9. The BOE's median growth projections are even larger than the mean projections shown here.

Box 1   The Taylor Rule

In 1993, John Taylor showed that the traditional US monetary policy instrument, the federal funds rate, could be well described over the 1980s in terms of a simple relationship to inflation and an estimated GDP gap. Since the original Taylor (1993) paper, a number of studies have proposed alternative specifications of policy rules. A common theme is that it would be optimal for central banks to respond more strongly, especially to GDP gaps, than in the original Taylor rule. (See, for example, Rudebusch 2002, who also estimates a larger Fed response to the GDP gap than Taylor did.) However, these results are tempered somewhat by recognition of the substantial uncertainty surrounding estimates of the GDP gap (see box 2). Others have argued that it is not likely to be optimal for central banks to set policy solely on the basis of two variables. In particular, periods of unusual financial strains may call for lower policy rates than other times. (See, for example, Cechetti and Li 2005.)

Krugman (2009), Guha (2009), and Rudebusch (2009) have cited different variants of Taylor-style rules to suggest that the ideal policy rate in the United States (as of mid-2009) was much lower than zero, around –5 to –7 percent. On the other hand, John Taylor recently argued that a rate near zero is about right for the United States (http://blogs.wsj.com/economics/2009/10/14/). Indeed, application of the original Taylor coefficients to OECD estimates for US inflation and the GDP gap for 2009 Q4 yields a rate of about zero. However, applying the original Taylor coefficients (assuming target inflation of 2 percent in the euro area and the United Kingdom and 1 percent in Japan) to OECD estimates for 2009 Q4 yields rates of around –1 for the euro area and the United Kingdom and –3 for Japan.

Obviously, important issues remain unresolved concerning the use of Taylor-style rules for policy analysis. But at least some versions of Taylor-style rules currently call for significantly negative policy rates in all four of the major developed economies.

Box 2   Measuring excess unemployment and GDP Gaps

Orphanides (2001) argues that the Fed allowed inflation to get out of control in the 1970s because it repeatedly overestimated the (negative) size of the US GDP gap. In this view, the Fed did not raise interest rates sufficiently in response to rising inflation because of a misguided attempt to stimulate GDP growth. What are the risks to current policy from poorly measured economic slack?

GDP gaps and excess unemployment are notoriously difficult to estimate in real time. (See Kuttner and Posen 2004 for the difficulties caused by the Japanese slowdown in the 1990s.) However, there has been a sea change in our understanding of potential GDP and the structural rate of unemployment (sometimes called the nonaccelerating inflation rate of unemployment, or NAIRU) since the 1970s. According to Orphanides, between 1969 and 1988, real-time estimates of the US GDP gap were never positive and often exceeded (in magnitude) –10 percent. In comparison, the OECD's real-time estimates of the GDP gaps in Japan, the United Kingdom, and the United States were positive as recently as 2007, and even in the current deep recession no OECD economy is estimated to have a GDP gap greater than –10 percent. In the 1970s and 1980s, GDP gaps were almost always revised in a positive direction, whereas in the 1990s and 2000s, revisions in both directions have been common. The main explanation for these differences is that economists are now more aware of the possibility that the potential rate of growth and the NAIRU can change over time. Indeed, the IMF and the OECD both project that potential growth has slowed substantially this year in the wake of the financial crisis, and the OECD also projects an increase in the NAIRU for most countries.

The depth of the 2008–09 recession is so great that there is little doubt that excess unemployment is positive and GDP gaps are negative, even if there is uncertainty about their magnitudes. Moreover, unlike the 1970s when inflation was high and rising, inflation is currently low and falling, which reinforces the policy message from negative GDP gaps.

MONETARY POLICY EFFECTIVENESS AT THE ZERO BOUND

Central banks in the four major developed economies have pushed overnight interest rates to near-zero levels. They also have employed an array of nontraditional policies. Most of these policies were aimed at restoring normal functioning to financial markets and thus tended to offset financial headwinds rather than provide macroeconomic stimulus beyond that implied by the level of the policy interest rate. For example, actions by the Fed to support the commercial paper (CP) market quickly returned the spreads of CP interest rates over Treasury rates to historically normal levels from unusually elevated levels last fall. Nevertheless, the lingering effects of financial strains are continuing to curtail some of the traditional channels of policy stimulus. For example, surveys of bank lending standards in all four major developed economies show an exceptionally pronounced tightening of credit standards and terms in 2008 with further tightening (except for Japan) in 2009.[10] These headwinds are a major factor behind the forecasts of a slow economic recovery.

What More Can Central Banks Do?

One class of policies that can provide additional macroeconomic stimulus when traditional policy rates are near the zero bound is the large-scale purchase of long-term government bonds and other liquid long-term assets, which pushes down interest rates at longer maturities. The BOE and the Fed have purchased substantial quantities of such assets and these policies have reduced long-term interest rates.[11] Table 5 lists the movements in various interest rates over one- and two-day event windows surrounding Fed and BOE communications about such asset purchases.[12] The movements are always in the expected direc-

---

10. See the Fed's *Senior Loan Officer Opinion Survey on Bank Lending Practices*, the ECB's *Euro Area Bank Lending Survey*, the BOJ's *Senior Loan Officer Opinion Survey on Bank Lending Practices at Large Japanese Banks*, and the BOE's *Credit Conditions Survey*.

11. The ECB is purchasing €60 billion of covered bonds, which represents a much smaller program relative to GDP than the BOE and Fed programs. The BOJ has stepped up its purchases of government bonds significantly, but these purchases have been concentrated at shorter maturities. See McCauley and Ueda (2009).

12. On November 25, 2008, the Fed announced a program to purchase up to $100 billion of agency debt and $500 billion of agency mortgage backed securities (MBS). On December 1, Chairman Bernanke raised the possibility of buying longer-term Treasury securities. On December 16 the Fed confirmed the agency program and reiterated the possibility of buying Treasury securities. On January 28 the Fed disappointed markets by not announcing Treasury purchases. On March 18 the Fed announced a Treasury purchase program of up to $300 billion and expanded the agency MBS program to $1.25 trillion. On March 5 the BOE announced an asset purchase program of £75 billion, potentially expandable to £150 billion. Subsequent announcements involved much smaller amounts and were largely anticipated by markets. Notably,

tion—increased purchases of long-term assets reduce long-term interest rates. Moreover, the effects appear to be long lasting. For example, mortgage rates in the United States—a key target of the Fed's purchases—remain more than 1 percentage point lower than they were in mid-November 2008.[13]

The cumulative change in the 10-year Treasury yield across the five US events shown in table 5 is –94 basis points. If this change were attributed to the Fed's announced purchases of $1.75 trillion in longer-term assets, it would imply that each $1 trillion in such purchases would lower the 10-year yield 54 basis points. However, it seems likely that market participants initially attached a significant probability to increases in the amount of Fed purchases beyond $1.75 trillion, because the 10-year yield rose on balance after subsequent Fed announcements that did not indicate any increase beyond $1.75 trillion.[14] The cumulative yield movement around all Fed announcements concerning asset purchases is –67 basis points, or –39 basis points per $1 trillion.[15] This estimate must be considered very imprecise, however, because it assumes that all the effects of the Fed's actions showed up in market rates within narrow windows of time and that market participants did not change their views about the Fed purchases (up or down) outside these windows.

The ability of central banks to drive down long-term interest rates by purchasing long-term assets also is consistent with existing statistical analysis of the effect of Treasury debt issuance on the term structure of interest rates.[16] These studies uniformly show that large changes in the net public supply of long-term debt securities do have persistent effects on the spread between long-term and short-term interest rates of a magnitude (scaled by current nominal GDP) roughly consistent with the preceding estimate of –39 basis points per $1 trillion.

Central Banks or Finance Ministries?

The allocation of responsibilities between central banks and finance ministries is not universally agreed upon. In some countries, central banks hold foreign exchange reserves and in other countries finance ministries hold them. Both central banks and finance ministries may extend loans and guarantees to financial institutions. When the monetary policy interest rate is constrained near zero, either institution has the ability to push down longer-term interest rates by substituting more short-term debt for long-term debt.[17] However, engaging in such an action for macroeconomic stabilization is clearly a function that central banks are better organized to conduct because it is a natural extension of central bank policy control over interest rates.

More broadly, central bank efforts to ease monetary policy at the zero bound need not be limited to buying long-term bonds. Purchasing foreign exchange to reduce the value of the currency also is a traditional channel for policy ease that has been pursued this year by the Swiss National Bank.[18] In addition, during the Great Depression the Fed lent directly to private nonfinancial businesses. At times over the past 10 years or so, the BOJ and the Hong Kong Monetary Authority have purchased equities. Exploring the costs and benefits of these alternatives is beyond the scope of this paper.

HOW MUCH TO DO?

This section discusses the design and scale of appropriate monetary actions.

United States

The increase in excess unemployment in the United States has been larger in relation to the change in the GDP gap than was typical in past recessions.[19] This development suggests three possible inferences: (1) structural unemployment is higher than estimated; (2) the GDP gap is more negative than estimated; and/or (3) unemployment will fall faster than normal as the GDP gap closes. Because monetary policy has a more direct effect on GDP than on employment, I calibrate the desired policy action to close the GDP gap rather than the unemployment gap. This choice thus will be too timid if it turns out that the GDP gap is more negative than estimated. For that reason, and because of the possibility that the structural rate of unemployment may have risen more than estimated, direct labor market policies (Rosen 2009) may be an appropriate companion to the policies considered in this paper.

---

on November 5 the BOE announced a £25 billion increase in its purchases that was interpreted as the likely final installment, thereby reducing market expectations of the ultimate scale of the purchase program. Long-term interest rates rose moderately on that day.

13. Long-term Treasury yields have risen modestly since late March, but this rise reflects an unwinding of safe-haven flows, as long-term corporate yields have dropped sharply.

14. Indeed, on November 4, 2009, total targeted purchases were reduced to $1.725 trillion.

15. Using different techniques, Sack (2009) and Schofield (2009) estimate that the cumulative effect of Fed asset purchases has been to lower the 10-year Treasury yield around 50 basis points.

16. See Friedman (1981), Frankel (1985), Agell and Persson (1992), Kuttner (2006), and Greenwood and Vayanos (2008).

---

17. When the central bank's policy rate is not constrained, finance ministry swaps of short-term for long-term debt are as likely to raise short-term rates as to lower long-term rates. Indeed, Friedman (1981) found evidence of both effects.

18. Because exchange rate depreciation shifts demand away from the economies whose currencies are appreciating, such a strategy is less appropriate during a global recession, particularly for large economies.

19. According to the OECD, excess unemployment was about 60 percent of the GDP gap in the 1975 and 1982 recessions, whereas it is currently estimated to be about 100 percent of the GDP gap.

The OECD and the IMF project a GDP gap in 2011 of around –2 to –3 percent for the year as a whole. The implied gap in the fourth quarter of 2011 is a bit smaller than that because projected GDP growth that year is above potential. However, the CBO GDP gap projection for 2011 is much larger at around –5 percent. Thus, it seems reasonable for policy to aim at boosting the level of GDP around 3 percent by the end of 2011.

According to the Fed's Federal Reserve Board (FRB)/US model, a 75–basis point reduction of the 10-year Treasury yield would raise GDP 3 percent after eight quarters (Reifschneider, Tetlow, and Williams 1999). The lower Treasury rates are assumed to pass through to private long-term rates and cause equity prices to rise 13 percent and the dollar to fall 5 percent. In the event that other central banks also adopted such policies, there would be no depreciation of the dollar but US exports instead would be boosted by higher foreign aggregate demand. Overall, this policy is equivalent to a 175–basis point reduction in the federal funds rate.

Based on the evidence discussed in the previous section, to reduce the 10-year Treasury yield by 75 basis points, the Fed would need to buy about $2 trillion in debt securities (with an average maturity of roughly seven years) over and above what the Fed has already committed to buy. These purchases would be announced now but could be implemented over the course of 2010.

There is little chance that this policy would eliminate the GDP gap or return inflation to target before late next year. During 2010, policymakers would be able to adjust the program in light of incoming data about the pace of recovery

> **Central banks in the main developed economies should push long-term interest rates 75 basis points below the levels they would otherwise be by purchasing a combined $6 trillion in long-term public and private debt securities.**

in GDP and inflation. Even if it became apparent only after purchases were completed that GDP growth or inflation was considerably stronger than expected, there would be some ability for policymakers to implement a correction through a sharp temporary increase in short-term interest rates.[20] Such a scenario is described in the final section of this paper.

It is possible that the lingering strains in financial markets

would damp the effect of this policy action on the economy, so that the full 3-percent increment to GDP would not be achieved. There is little evidence with which to judge such a claim. But, if it were believed to be true, the correct policy response would be to conduct an even more aggressive policy. Box 3 explains that concerns about asset price bubbles should not prevent central banks from stabilizing GDP and inflation.

Euro Area

The euro area is projected to have a GDP gap roughly as large as that in the United States in 2011, but the rate at which the gap is projected to close is slower than in the United States. Moreover, inflation is projected to be more persistently below target in the euro area. Thus, the euro area needs even more stimulus than the United States.

The ECB has room to lower its policy rate, the main refinancing rate, which is currently set at 1 percent. Thus, a reasonable policy prescription is for the ECB to lower the main refinancing rate to 0.5 percent, to continue to extend unlimited 12-month credit to banks at this rate, and to purchase €1 trillion in longer-term debt securities, which is a share of GDP equivalent to the $2 trillion in recommended purchases by the Fed.

Japan

Uncertainty about the Japanese GDP gap is large, but Japanese inflation is far below its desired level and likely has caused the economy to perform below its potential for more than a decade. The BOJ should state more clearly its intention to return inflation to at least 1 percent. In addition, the BOJ should greatly increase its purchases of debt securities.[21] These purchases should be at longer maturities than those purchased previously, which had relatively short terms to maturity (McCauley and Ueda 2009). With the 10-year Japanese government bond yield already very low at 1.3 percent, reducing long-term yields in Japan is likely to require larger asset purchases than elsewhere. However, to the extent that the BOJ is able to raise long-term inflation expectations, it can stimulate GDP growth even without lowering the nominal bond yield. Overall, the additional BOJ purchases should be considerably larger in relation to GDP than those proposed for the United States and the euro area, around ¥100 trillion in 2010 with a promise to buy a further ¥100 trillion in 2011 if the core inflation rate (excluding food and energy prices) remains negative over the 12 months of 2010.

---

20. Although the peak effect of monetary policy occurs after about two years, there is a substantial effect within one year that gives policymakers some ability to "take back" stimulus that was previously applied.

21. The announcement on December 1 of an additional ¥10 trillion of three-month loans does not reflect a substantive move in this direction.

> **Box 3   Blowing bubbles?**
>
> Concern about asset price bubbles in the main developed economies is not warranted in the near term. As Mishkin (2009) reminds us, the harm caused by bursting bubbles arises almost entirely from excessive leverage used to finance asset purchases. At present, leverage is falling as banks continue to tighten credit standards and terms. Should unsafe lending practices return, financial supervisors need to aggressively shut them down. (Posen 2009 discusses systematic policies to counter lending booms and busts.) Equity prices have risen, but from excessively low levels, and price-earnings ratios remain within historical ranges. It is important to recognize that current and expected future low interest rates are a fundamental element of asset valuation that supports high asset prices. A bubble occurs only when asset prices significantly exceed their fundamental value.
>
> In the emerging markets, there is also little evidence of asset price bubbles, but there may be more reason for concern. The monetary policy stance appropriate for the developed economies is not likely to be appropriate for emerging markets that were hit less hard by the recent recession. Holding policy interest rates too low will lead to a new boom and bust of economic activity, inflation, and asset prices. Raising policy interest rates in emerging markets will damp this cycle both directly and indirectly through stronger currencies. Central banks need to take into consideration both the interest-rate and the exchange-rate channels of monetary transmission when setting policy so that they do not overtighten. In some cases, if capital inflows are deemed to exceed an economy's capacity to usefully employ them, capital controls may be warranted.
>
> The potential for rapidly rising commodity prices is another common concern. Rising commodity prices are to be expected as global economic growth resumes. However, most commodities are not subject to significant and persistent price bubbles because it is costly or difficult to store them. (Precious metals are an obvious exception.) For example, total private-sector storage capacity in the petroleum market is only a small fraction of annual consumption. In the absence of storage, commodity prices must equate production supply with consumption demand continuously.

United Kingdom

The policy prescription for the United Kingdom depends critically on the weight one attaches to the BOE forecast versus the other forecasts. Because the BOE forecast for GDP growth is higher, and the implicit BOE estimate of the current GDP gap is lower than those of all other main forecasts, the BOE may be too optimistic about the horizon over which the GDP gap will be closed. The other forecasters generally view the UK economy to be in a slightly worse position than that of the US economy. Shading this outlook a bit higher in light of the BOE forecast leads to a similar policy prescription to that for the United States. Accordingly, the BOE should expand its purchases of long-term debt securities by £200 billion in 2010.[22]

BUDGETARY IMPLICATIONS OF MONETARY AND FISCAL STIMULUS

Table 6 explores the budgetary impacts of the monetary policy proposed for the United States along with those of a fiscal stimulus calibrated to have the same effect on GDP and inflation.[23] Monetary stimulus reduces the deficit and fiscal stimulus increases it. The difference in the deficit under the two policies peaks at around 2 percent of GDP in 2011, or about $300 billion. Compared with the status quo, additional monetary stimulus gets the economy back to potential sooner and permanently reduces the national debt by about 3 percent of GDP. Fiscal stimulus also gets the economy back to potential sooner than the status quo, but it permanently raises the national debt by about 1 percent of GDP. If either stimulus policy proves to be more inflationary than expected, the Fed will have to raise interest rates (and federal interest expense) sharply, but even in such a scenario, the national debt is likely to end up lower with monetary stimulus than without it.

Baseline

The first section of the table is a baseline for key macroeconomic variables influenced primarily by the OECD forecast for 2010 and 2011 and then extrapolated to 2018. This baseline reflects "status quo" policies, including the asset purchases that the Fed has previously announced. Short- and long-term inter-

---

22. This expansion is large relative to the outstanding stock of gilts, and the UK corporate bond market is relatively small. An alternative to buying sterling bonds is to buy the equivalent amount of high-grade foreign-currency bonds and convert the stream of interest and principal to sterling through the large and liquid long-term currency swap market.

23. These scenarios are designed to illustrate plausible potential outcomes and are not based on any specific empirical model. A detailed explanation of the table is provided in the appendix to this paper.

est rates gradually rise to historic averages. Growth picks up and peaks in 2012 before tapering off toward potential growth of 2.5 percent.[24] The GDP gap is closed by 2014. Inflation remains low for the first two years and then gradually returns to its target rate of 2 percent. The budget deficit is large in the near term and remains over $1 trillion per year through 2014, but it declines steadily as a percent of GDP as tax increases and spending restraint are assumed to put the economy on a more stable trajectory. This deficit trajectory is notably higher than that in CBO's long-run baseline, reflecting an assumption that tax increases and spending cuts will not occur as fast as CBO assumes. The ratio of net federal debt to GDP rises to 80.3 percent by 2016 and then holds constant.

Monetary Stimulus: Expected Outcome

The second section presents the expected outcome under the additional monetary stimulus proposed. The Fed is assumed to purchase $2 trillion in additional long-term assets in 2010, mainly Treasury securities with an average maturity of seven years.[25] This action is assumed to lower the 10-year Treasury yield 75 basis points and the 7-year yield 60 basis points, both relative to baseline. The effect on the 7-year yield decays

Compared with the status quo, additional monetary stimulus gets the economy back to potential sooner and permanently reduces the national debt by about 3 percent of GDP.

by 10 basis points per year as the remaining maturity of the purchased assets declines. This policy boosts GDP growth 1 percentage point in 2010 and 2 percentage points in 2011, closing the output gap by the end of 2011. The Fed is assumed to hold the short-term interest rate at baseline in 2010 and 2011, but it raises the short-term rate faster in 2012 under this scenario than in the baseline in order to return growth to its potential rate and prevent inflation from exceeding its target. Inflation picks up somewhat earlier in this scenario than in the baseline.

The federal deficit is uniformly lower in this scenario,

mainly reflecting higher revenues in 2011 and 2012 arising from faster growth and higher inflation that are only partially offset by higher spending to keep up with inflation.[26] Although the federal government does save money from issuing long-term debt at lower rates, it has to roll over its short-term debt at higher rates in 2012, so the cumulative reduction in federal interest expense is small.[27] The net income on the Fed's portfolio rises at first but then falls below baseline in later years as the spread between the interest it earns on its long-term assets and the interest it pays on the short-term bank reserves created to buy the assets turns negative in 2013–17.[28] Fed net interest income does not turn negative, however, because a large portion of its liabilities are zero interest–bearing currency.[29]

The long-run effect of this policy is to lower the federal debt by nearly 3 percent of GDP.

Fiscal Stimulus: Expected Outcome

The third section of the table presents the expected outcome under a fiscal stimulus designed to have the same impact on GDP and inflation as the monetary stimulus in the second section. According to the Fed's FRB/US model, either an increase in government spending of nearly $250 billion per year in 2010 and 2011 or a cut in personal income taxes of more than $400 billion per year or some combination of the two would increase GDP 3 percent after two years. The table displays the results from an increase in federal expenditures of $250 billion per year in 2010 and 2011. Expenditures return to baseline in real terms starting in 2012.

The Fed is assumed to set the short-term interest rate as in the baseline and the fiscal stimulus is not assumed to raise long-term interest rates above baseline.[30] The paths of growth and inflation are the same as in the previous scenario, reflecting the assumption that the two policy shocks provide a similar degree of macroeconomic stimulus. The deficit rises sharply in 2010 and 2011 before dropping back to slightly below baseline in 2012 as spending drops and revenues remain

---

24. The potential growth rate of GDP is assumed to be 1.5 percent in 2010, 2.0 percent in 2011, and 2.5 percent thereafter. The CBO and the Fed project long-run potential GDP growth slightly above 2.5 percent. Slower potential growth in 2010 and 2011 reflects both lower investment and the effects of financial stress and economic restructuring.

25. For simplicity, all the long-term assets are assumed to have a maturity of seven years.

26. Federal revenues are assumed to increase by 20 percent of the increase in nominal GDP. Federal spending is assumed to increase in proportion to the price level.

27. Interest income and expense are each year is based on the debt stock and interest rate at the end of the previous year. Interest on the debt stock that is rolled over each year moves with the short-term and long-term interest rate under the assumption that 25 percent of the debt is short term and 75 percent is long term. The implied average maturity of the debt is just over five years, which is close to the historical average.

28. The Fed is assumed to hold its long-term assets to maturity.

29. Currency demand is assumed to grow in proportion to nominal GDP.

30. In reality, a substantial fiscal stimulus probably would raise long-term interest rates a modest amount, making the true cost of this policy somewhat higher than calculated here.

buoyed by the stronger economy. The debt ratio rises above baseline and remains permanently higher, although the higher revenues generated by the earlier recovery hold down the increase somewhat at first.

In the long run, the federal debt rises slightly more than 1 percent of GDP.

Inflation Scare

Two key risks of applying more stimulus are that current forecasts could be underestimating the underlying strength of the economy and that the stimulus policies may be more powerful than expected.[31] Either way, inflation would rise more quickly than expected, forcing the Fed to raise interest rates. Higher interest rates add to the fiscal deficit both directly and through the Fed's balance sheet. The final two sections of the table examine the implications of such an "inflation scare." In both scenarios, GDP growth is 2 percentage points higher than baseline in 2010 and inflation is 0.5 percentage points higher.

To damp growth and prevent an excessive rise in inflation, the Fed raises the short-term interest rate to 6 percent in 2011 and 5 percent in 2012 before returning it to 4 percent in 2013. Long-term rates also jump up, though by a bit less in the monetary stimulus scenario than in the fiscal scenario. Federal revenue surges under both scenarios, but this time federal interest expense also rises significantly.

In the monetary scenario, the Fed incurs temporary losses on its portfolio in 2012–13 because its long-term assets yield only 2.8 percent while it pays up to 6 percent on some of its short-term liabilities. Overall, the debt ratio still falls relative to baseline, but by only 1 percent of GDP compared with almost 3 percent of GDP in the monetary expected outcome scenario.

In the fiscal inflation scare scenario, the debt ratio rises by almost 4 percent of GDP, compared with 1 percent of GDP in the fiscal expected outcome scenario, reflecting the higher interest expense on the federal debt.

CONCLUSION

Altogether then, either monetary or fiscal stimulus would help to attain more satisfactory outcomes for economic activity, employment, and inflation than those envisaged by the main

economic forecasts. Monetary stimulus has the added advantage of also reducing net public debt, whereas fiscal stimulus increases net debt. In total, central banks in the four main developed economies should buy an additional $6 trillion in longer-term debt securities, which is expected to reduce 10-year bond yields around 75 basis points.

For the United States, the proposed monetary stimulus is calibrated to boost GDP about 3 percent relative to current forecasts by the end of 2011, which should return GDP close to its potential. A similarly sized stimulus (scaled by GDP) is proposed for the United Kingdom. A slightly larger stimulus is indicated for the euro area, reflecting weaker growth forecasts in the absence of additional stimulus. There is greater uncertainty about the size of the GDP gap in Japan, but the persistent deflation in Japan suggests that even more aggressive stimulus is needed there than in the other three economies.

The risks to these policy proposals appear balanced. On the one hand, economies may prove weaker than forecasted or the policies may be less effective than expected. On the other hand, economies may have greater underlying strength than forecasted or the policies may be more effective than expected. In either case, there is considerable scope for adjusting policies as new data become available. There is little risk that any of these economies will run out of excess capacity in the next year or so, and, if anything, the risks to inflation appear tilted to the downside. Of course, if and when inflation pressures do return, policymakers must act resolutely to maintain price stability.

APPENDIX: CONSTRUCTION OF MONETARY AND FISCAL SCENARIOS

Baseline

The baseline is roughly based on the OECD forecast for 2010 and 2011, which includes projections for GDP growth, the GDP gap, inflation, short-term and long-term interest rates, and fiscal deficits. Beyond 2011 potential GDP is assumed to grow at 2.5 percent, inflation to remain steady at 2 percent, and interest rates to revert roughly to post-1990 averages. Federal spending is assumed to be tightly constrained through 2013 and then to grow with nominal GDP. Revenues increase to keep the deficit as a share of GDP gradually declining to 3.5 percent by 2017, at which point the debt/GDP ratio stabilizes. The federal debt is assumed to be 25 percent short term and 75 percent long term and deficits are financed in a similar proportion. All long-term debt is assumed to have a 7-year maturity. Interest expense on the net federal debt is based on past interest rates according to the maturity cohort in which it was incurred. The initial stock of

---

31. Of course, there are also risks that the economy may be weaker than forecasted or that the stimulus policies will be less effective than expected. In these circumstances, stimulus is clearly preferable to the status quo.

long-term debt is assumed to bear an interest rate of 3.5 percent, which matches the implied total interest expense for 2010 to the CBO's projection. Fed assets are composed of $1.7 trillion in long-term debt purchased in 2009 at an average interest rate of 4 percent.[32] These assets are assumed to have a seven-year maturity. Fed liabilities consist of currency, which pays no interest, and bank reserves, which pay the short-term rate of interest. The stock of currency was $913 billion at year end 2009 and it is assumed to grow in proportion with nominal GDP.

Monetary Stimulus: Expected Outcome

The paths for interest rates, GDP, and inflation are adjusted to reflect the assumed impacts of additional Fed purchases of $2 trillion of 7-year Treasury securities. Federal spending differs from baseline in proportion to the difference in the price level, i.e., real spending is held constant. Federal revenues (excluding income transferred from the Fed) differ from baseline by 20 percent of any change in nominal GDP. Federal interest expense moves with the path of interest rates and debt stocks. Fed net income moves with changes in interest rates and the increase in its holdings of long-term assets. At the margin, these assets are entirely financed by increases in bank reserves, which pay the short-term rate of interest.

---

32. Most of the 2009 Fed asset purchases were agency debt and mortgage-backed securities, which have a higher yield than Treasury securities.

Fiscal Stimulus: Expected Outcome

Interest rates are unchanged from baseline. GDP and inflation move to reflect the assumed impacts of extra federal spending, which are calibrated to be the same as those of the monetary stimulus above. Federal spending increases by $250 billion in 2010 and 2011 plus an additional amount needed to hold original spending constant in real terms. Federal revenues increase by 20 percent of the increase in nominal GDP. Federal interest expense rises with the federal net debt. Fed net income is slightly higher than baseline, reflecting higher currency demand from the increase in nominal GDP, but the increase in net income is less than proportional to the increase in nominal GDP, so Fed net income falls slightly as a ratio to GDP.

Inflation Scare Scenarios

GDP and inflation rebound more vigorously in 2010 than in the expected outcome scenarios. The Fed pushes up the short-term interest rate in 2011 to stabilize GDP and inflation at desired levels. The long-term interest rate also rises, but by less in the monetary scenario than in the fiscal scenario, reflecting the downward effect of Fed asset purchases on the long-term rate. Federal interest expense is sharply higher beginning in 2012, pushing up the deficit and debt levels compared with the expected outcome scenarios. In the monetary inflation scare scenario, Fed net income turns negative in 2012 and 2013, reflecting the temporarily high cost of financing the long-term assets that were purchased in 2010.

Table 1   Forecasts for the US economy

	Unemployment rate (Q4, percent)	Excess unemployment (Q4, percent)	GDP growth (Q4/Q4, percent)	GDP gap (annual, percent)	Consumer inflation[1] (Q4/Q4, percent)	Alternate inflation[2] (Q4/Q4, percent)
2009						
Fed (Nov)[3]	10.0	4.9	−0.3	n.a.	1.2	1.5
OECD (Nov)	10.0	4.9	−0.3	−4.9	1.1	0.9
Blue Chip (Nov)	9.9	4.1	−0.3	n.a.	1.2	1.0
IMF (Oct)	9.3[Y]	n.a.	−1.1	−4.5	1.6	1.6[Y]
CBO (Aug)	10.1	5.3	−1.0	−7.0	1.2	1.7
2010						
Fed (Nov)[3]	9.5	4.4	3.0	n.a.	1.5	1.3
OECD (Nov)	9.7	4.5	2.5	−3.9	1.3	0.9
Blue Chip (Nov)	9.6	3.8	2.9	n.a.	1.7	1.5
IMF (Oct)	10.1[Y]	n.a.	1.9	−3.9	1.5	1.5[Y]
Mussa (Sep)	8.8	n.a.	4.0[Y]	n.a.	n.a.	n.a.
CBO (Aug)	9.9	5.1	2.8	−7.0	1.1	0.8
2011						
Fed (Nov)[3]	8.4	3.3	4.0	n.a.	1.5	1.3
OECD (Nov)	8.7	3.4	3.0	−2.8	1.4	1.1
Blue Chip (Oct)	9.0[Y]	3.2[Y]	3.1[Y]	n.a.	2.0[Y]	1.7[Y]
IMF (Oct)	n.a.	n.a.	2.8[Y]	−2.2	2.1	1.4[Y]
CBO (Aug)	8.5	3.7	3.8	−5.2	0.8	0.5
2012						
Fed (Nov)[3]	7.2	2.1	4.2	n.a.	1.6	1.4
Blue Chip (Oct)	8.1[Y]	2.3[Y]	3.3[Y]	n.a.	2.1[Y]	1.8[Y]
IMF (Oct)	n.a.	n.a.	2.6[Y]	−0.9	2.3	1.8[Y]
CBO (Aug)	7.2[Y]	2.4[Y]	5.0[Y]	−2.4	0.7[Y]	0.6[Y]
2013						
Blue Chip (Oct)	7.3[Y]	1.5[Y]	3.0[Y]	n.a.	2.2[Y]	1.9[Y]
IMF (Oct)	n.a.	n.a.	2.5[Y]	−0.1	2.2	1.9[Y]
CBO (Aug)	5.6[Y]	0.8[Y]	4.5[Y]	−0.4	0.8[Y]	0.8[Y]

n.a. = not available.
Y = Denotes whole year data.

1. Consumer price index (CPI) for Blue Chip, IMF, and OECD. Personal consumption expenditure (PCE) for CBO and Fed.
2. GDP deflator for Blue Chip, IMF, and OECD. Core PCE deflator for CBO and Fed.
3. Midpoint of central tendency.

Sources: Board of Governors of the Federal Reserve System (Fed), Organization for Economic Cooperation and Development (OECD), Aspen Publishers (Blue Chip), International Monetary Fund (IMF), Peterson Institute for International Economics (Mussa), and Congressional Budget Office (CBO).

Table 2   Forecasts for the euro area economy

	Unemployment rate (annual, percent)	Excess unemployment (annual, percent)	GDP growth (year over year, percent)	GDP gap (annual, percent)	Consumer inflation[1] (year over year, percent)	Alternate inflation[2] (year over year, percent)
2009						
ECB (Dec)[3]	n.a.	n.a.	−4.0	n.a.	0.3	n.a.
OECD (Nov)	9.4	1.5	−4.0	−4.5	0.2	1.0
SPF (Nov)	9.5	1.0	−3.9	n.a.	0.3	n.a.
Commission (Nov)	9.5	n.a.	−4.0	−2.9	0.3	1.3
IMF (Oct)	9.9	n.a.	−4.2	−2.9	0.3	0.6
2010						
ECB (Dec)[3]	n.a.	n.a.	0.8	n.a.	1.3	n.a.
OECD (Nov)	10.6	2.4	0.9	−4.5	0.9	0.5
SPF (Nov)	10.6	2.1	1.0	n.a.	1.2	n.a.
Commission (Nov)	10.7	n.a.	0.7	−3.0	1.1	1.1
IMF (Oct)	11.7	n.a.	0.3	−3.1	0.8	0.6
Mussa (Sep)	n.a.	n.a.	2.3	n.a.	n.a.	n.a.
2011						
ECB (Dec)[3]	n.a.	n.a.	1.2	n.a.	1.4	n.a.
OECD (Nov)	10.8	2.3	1.7	−3.8	0.7	0.7
SPF (Nov)	10.4	1.9	1.6	n.a.	1.6	n.a.
Commission (Nov)	10.9	n.a.	1.5	−2.5	1.5	1.7
IMF (Oct)	n.a.	n.a.	1.3	−2.5	0.8	0.9
2012						
Consensus (Oct)	n.a.	n.a.	2.0	n.a.	1.8	n.a.
IMF (Oct)	n.a.	n.a.	1.7	−1.6	1.1	1.1
2013						
Consensus (Oct)	n.a.	n.a.	2.0	n.a.	2.1	n.a.
IMF (Oct)	n.a.	n.a.	2.0	−0.8	1.3	1.3

n.a. = not available.

1. Harmonized index of consumer prices (HICP).
2. GDP deflator.
3. Midpoint of range.

Sources: European Central Bank staff forecast (ECB) and Survey of Professional Forecasters (SPF), Organization for Economic Cooperation and Development (OECD), Consensus Economics, Inc., European Commission, International Monetary Fund (IMF), and Peterson Institute for International Economics (Mussa). Consensus projections not shown for 2009–11 because they are nearly identical to SPF and do not include a long-run unemployment rate estimate.

Table 3 Forecasts for the Japanese economy

	Unemployment rate (annual, percent)	Excess unemployment (annual, percent)	GDP growth (year over year, percent)	GDP gap (annual, percent)	Consumer inflation[1] (year over year, percent)	Alternate inflation[2] (year over year, percent)
2009						
OECD (Nov)	5.2	1.2	−5.3	−3.3	−1.2	0.0
Consensus (Nov)	5.3	n.a.	−5.7	n.a.	−1.2	−5.1
BOJ (Oct)[3]	n.a.	n.a.	−3.2	n.a.	−1.5	−5.2
IMF (Oct)	5.4	n.a.	−5.4	−7.0	−1.1	−0.2
2010						
OECD (Nov)	5.6	1.6	1.8	−2.1	−0.9	−1.7
Consensus (Nov)	5.8	n.a.	1.4	n.a.	−0.9	−1.2
BOJ (Oct)[3]	n.a.	n.a.	1.2	n.a.	−0.8	−1.4
IMF (Oct)	6.1	n.a.	1.7	−5.5	−0.8	−0.8
Mussa (Sep)	n.a.	n.a.	2.5	n.a.	n.a.	n.a.
2011						
OECD (Nov)	5.4	1.4	2.0	−1.0	−0.5	−0.8
BOJ (Oct)[3]	n.a.	n.a.	2.1	n.a.	−0.4	−0.7
Consensus (Oct)	n.a.	n.a.	1.4	n.a.	−0.2	n.a.
IMF (Oct)	n.a.	n.a.	2.4	−3.6	−0.4	−1.0
2012						
Consensus (Oct)	n.a.	n.a.	1.8	n.a.	0.4	n.a.
IMF (Oct)	n.a.	n.a.	2.3	−2.1	0.1	−1.2
2013						
Consensus (Oct)	n.a.	n.a.	1.7	n.a.	0.9	n.a.
IMF (Oct)	n.a.	n.a.	2.0	−1.0	0.6	−0.6

n.a. = not available.

1. Consumer price index (CPI).
2. GDP deflator for IMF and OECD. Corporate goods price index for Consensus and BOJ.
3. BOJ forecasts are for fiscal years.

Sources: Organization for Economic Cooperation and Development (OECD), Consensus Economics, Inc., Bank of Japan (BOJ), International Monetary Fund (IMF), and Peterson Institute for International Economics (Mussa).

Table 4   Forecasts for the UK economy

	Unemployment rate (Q4, percent)	Excess unemployment (Q4, percent)	GDP growth (Q4/Q4, percent)	GDP gap (annual, percent)	Consumer inflation[1] (Q4/Q4, percent)	Alternate inflation[2] (Q4/Q4, percent)
2009						
BOE (Nov)[3]	n.a.	n.a.	−2.8	n.a.	1.9	n.a.
OECD (Nov)	8.8	3.3	−2.9	−6.2	1.7	0.8
Consensus (Nov)	n.a.	n.a.	−4.5[Y]	n.a.	2.1[Y]	1.3[Y]
Commission (Nov)	7.8[Y]	n.a.	−2.8	−3.7	1.5	1.1[Y]
IMF (Oct)	7.6[Y]	n.a.	−2.5	−4.9	1.2	1.3[Y]
2010						
BOE-Market (Nov)[3]	n.a.	n.a.	2.7	n.a.	1.6	n.a.
BOE-Constant (Nov)[3]	n.a.	n.a.	3.1	n.a.	1.7	n.a.
OECD (Nov)	9.5	3.8	1.9	−6.2	1.0	1.0
Consensus (Nov)	na	n.a.	1.2[Y]	n.a.	2.0[Y]	2.3[Y]
Commission (Nov)	8.7[Y]	n.a.	1.2	−3.7	1.3	1.7[Y]
IMF (Oct)	9.3[Y]	n.a.	1.3	−4.7	1.3	1.0[Y]
Mussa (Sep)	n.a.	n.a.	2.5[Y]	n.a.	n.a.	n.a.
2011						
BOE-Market (Nov)[3]	n.a.	n.a.	3.0	n.a.	1.7	n.a.
BOE-Constant (Nov)[3]	n.a.	n.a.	3.5	n.a.	2.4	n.a.
OECD (Nov)	9.4	3.5	2.5	−5.5	0.6	0.7
Commission (Nov)	8.0[Y]	n.a.	2.4	−2.9	1.7	2.0[Y]
Consensus (Oct)	n.a.	n.a.	1.8[Y]	n.a.	1.8[Y]	n.a.
IMF (Oct)	n.a.	n.a.	2.5[Y]	−3.5	1.7	2.6[Y]
2012						
BOE-Market (Nov)[3]	n.a.	n.a.	2.3	n.a.	2.2	n.a.
Consensus (Oct)	n.a.	n.a.	1.9[Y]	n.a.	2.1[Y]	n.a.
IMF (Oct)	n.a.	n.a.	2.9[Y]	−2.2	1.9	2.8[Y]
2013						
Consensus (Oct)	n.a.	n.a.	2.3[Y]	n.a.	2.8[Y]	n.a.
IMF (Oct)	n.a.	n.a.	2.9[Y]	−1.0	2.0	2.8[Y]

n.a. = not available.
Y = Denotes whole year data.

1. Consumer price index (CPI).
2. GDP deflator for OECD, Commission, and IMF. Output price for Consensus.
3. Mean forecast. "Market" assumes market interest rate expectations. "Constant" assumes the short-term interest rate is held constant at 0.5 percent (not available for 2012).

Sources: Bank of England (BOE), Organization for Economic Cooperation and Development (OECD), Consensus Economics, Inc., European Commission, International Monetary Fund (IMF), and Peterson Institute for International Economics (Mussa).

Table 5   Yield effects of central bank asset purchase announcements (basis points)

	United States					United Kingdom
	2008			**2009**		**2009**
	November 25	December 1–2	December 16–17	January 28–29	March18–19	March 5
	Buy more	Buy more	Buy more	Buy less	Buy more	Buy more*
1-year Treasury	0	−13	−5	4	−9	0
10-year Treasury	−24	−27	−33	30	−40	−28
10-year swap	−32	−23	−53	5	−37	−12
10+-year corporate**	−16	−27	−57	23	−29	−15

*All long-term rates fell significantly further the following day.

**Based on price indexes assuming 6 percent coupon and 12 years to maturity. US data are Barclays long-term corporate aggregate. United Kingdom data are FTSE Sterling 10–15 year corporate.

Note: Event windows are one-day for morning announcements and two-day for afternoon announcements.

Source: Datastream.

Table 6   Stimulus policies and the federal debt (Q4 values, percent)

	2010	2011	2012	2015	2018
Baseline					
Short interest rate	0.3	1.5	3.0	4.0	4.0
Long interest rate	3.4	4.2	4.7	5.0	5.0
GDP gap	−4.0	−3.0	−1.5	0.0	0.0
Inflation rate	1.0	1.0	1.5	2.0	2.0
Fed net income/GDP	0.4	0.4	0.4	0.2	0.2
Deficit/GDP	10.0	9.0	8.0	5.0	3.5
Net debt/GDP	61.6	68.2	72.6	79.7	80.3
Monetary stimulus—expected outcome					
Short interest rate	0.3	1.5	4.0	4.0	4.0
Long interest rate	2.8	3.7	4.3	4.9	5.0
GDP gap	−3.0	0.0	0.0	0.0	0.0
Inflation rate	1.0	1.5	2.0	2.0	2.0
Fed net income/GDP	0.4	0.7	0.5	0.1	0.2
Deficit/GDP	9.7	7.7	7.2	4.8	3.3
Net debt/GDP	60.8	64.8	69.2	77.3	77.6
Fiscal stimulus—expected outcome					
Short interest rate	0.3	1.5	3.0	4.0	4.0
Long interest rate	3.4	4.2	4.7	5.0	5.0
GDP gap	−3.0	0.0	0.0	0.0	0.0
Inflation rate	1.0	1.5	2.0	2.0	2.0
Fed net income/GDP	0.4	0.4	0.3	0.2	0.2
Deficit/GDP	11.4	9.7	7.6	5.0	3.5
Net debt/GDP	62.5	68.4	73.0	80.9	81.4
Monetary stimulus—inflation scare					
Short interest rate	0.3	6.0	5.0	4.0	4.0
Long interest rate	2.8	5.0	4.7	4.9	5.0
GDP gap	−2.0	0.0	0.0	0.0	0.0
Inflation rate	1.5	2.0	2.0	2.0	2.0
Fed net income/GDP	0.4	0.7	−0.2	0.1	0.2
Deficit/GDP	9.4	7.7	8.7	5.0	3.5
Net debt/GDP	59.8	64.0	69.9	78.7	79.4
Fiscal stimulus—inflation scare					
Short interest rate	0.3	6.0	5.0	4.0	4.0
Long interest rate	3.4	5.5	5.1	5.0	5.0
GDP gap	−2.0	0.0	0.0	0.0	0.0
Inflation rate	1.5	2.0	2.0	2.0	2.0
Fed net income/GDP	0.4	0.4	0.2	0.2	0.2
Deficit/GDP	11.4	9.7	8.7	5.3	3.8
Net debt/GDP	62.5	68.4	74.1	83.0	84.0

Note: The short interest rate is the federal funds rate. The long interest rate is the 7-year Treasury rate. The inflation rate is the four-quarter change in the GDP deflator. Net income on the Fed's portfolio is applied toward reducing the deficit and debt. Net debt is debt held by the public and does not subtract financial assets such those related to the Troubled Asset Relief Program (TARP) and the housing agencies.

Source: Author's projections and calculations.

REFERENCES

Agell, Jonas, and Mats Persson. 1992. Does Debt Management Matter? in *Does Debt Management Matter?* eds. Jonas Agell, Mats Persson, and Benjamin Friedman. Oxford: Clarendon Press.

Ball, Laurence. 2009. *Hysteresis in Unemployment: Old and New Evidence.* National Bureau of Economic Research Working Paper 14818. Cambridge, MA: National Bureau of Economic Research.

Blanchard, Olivier, and Lawrence Summers. 1986. Hysteresis and the European Unemployment Problem. *Macroeconomics Annual.* Cambridge, MA: National Bureau of Economic Research.

Boivin, Jean, Michael Kiley, and Frederic Mishkin. 2009. How Has the Monetary Transmission Mechanism Evolved over Time? Presentation at the Federal Reserve Board Conference on Key Developments in Monetary Economics. Available at www.federalreserve.gov.

CBO (Congressional Budget Office). 2009. *The Budget and Economic Outlook: An Update* (August). Washington.

Frankel, Jeffrey. 1985. Portfolio Crowding-Out, Empirically Estimated. *Quarterly Journal of Economics* 100: 1041–65.

Friedman, Benjamin. 1981. *Debt Management Policy, Interest Rates, and Economic Activity.* National Bureau of Economic Research Working Paper 830. Cambridge, MA: National Bureau of Economic Research.

Greenwood, Robin, and Dimitri Vayanos. 2008. *Bond Supply and Excess Bond Returns.* National Bureau of Economic Research Working Paper 13806. Cambridge, MA: National Bureau of Economic Research.

Guha, Krishna. 2009. Fed Study Puts Ideal Interest Rate at -5%. *Financial Times*, April 27. Available at www.ft.com.

IMF (International Monetary Fund). 2009. What's the Damage? Medium-Term Output Dynamics after Financial Crises. In *World Economic Outlook*. Washington: International Monetary Fund.

Kuttner, Kenneth. 2006. *Can Central Banks Target Bond Prices?* National Bureau of Economic Research Working Paper 12454. Cambridge, MA: National Bureau of Economic Research.

Kuttner, Kenneth, and Adam Posen. 2004. The Difficulty of Discerning What's Too Tight: Taylor Rules and Japanese Monetary Policy. *North American Journal of Economics and Finance* 15: 53–74.

Krugman, Paul. 2009. Zero Lower Bound Blogging. Available at http://krugman.blogs.nytimes.com.

McCauley, Robert, and Kazuo Ueda. 2009. Government Debt Management at Low Interest Rates. *BIS Quarterly Review:* 35–51. Bank for International Settlements (June).

Mishkin, Frederic. 2009. Not All Bubbles Present a Risk to the Economy. *Financial Times,* November 9. Available at www.ft.com.

OECD (Organization for Economic Cooperation and Development). 2009. General Assessment of the Macroeconomic Situation. *Economic Outlook* 86. Paris.

Orphanides, Athanasios. 2001. Monetary Policy Rules Based on Real-Time Data. *American Economic Review* 91: 964–85.

Posen, Adam. 2009. Finding the Right Tool for Dealing with Asset Price Booms. Speech to the MPR Monetary Policy and Markets Conference, December 1. Available at www.bankofengland.co.uk.

Reifschneider, David, Robert Tetlow, and John Williams. 1999. Aggregate Disturbances, Monetary Policy, and the Macroeconomy: The FRB/US Perspective. *Federal Reserve Bulletin* 1–19. (January).

Reinhart, Carmen, and Kenneth Rogoff. 2009. The Aftermath of Financial Crises. National Bureau of Economic Research Working Paper 14656. Cambridge, MA: National Bureau of Economic Research.

Rosen, Howard. 2009. Another Jobs Summit—Getting It Right This Time. Real Time Economic Issues Watch, December 3. Washington: Peterson Institute for International Economics. Available at www.piie.com.

Rudebusch, Glenn. 2002. Assessing Nominal Income Rules for Monetary Policy with Model and Data Uncertainty. *Economic Journal* 112: 402–32.

Rudebusch, Glenn. 2009. The Fed's Monetary Policy Response to the Current Crisis. *FRBSF Economic Letter* 2009-17. San Francisco: Federal Reserve Bank of San Francisco (May 22).

Sack, Brian. 2009. The Fed's Expanded Balance Sheet. Speech at the Money Marketeers of New York University, New York, December 2. Available at www.ny.frb.org.

Schofield, Mark. 2009, *Rates Comment: Quantifying the Impact of the End of QE on Bond Yields.* Citigroup Global Markets Newsletter (November 13).

Taylor, John. 1993. Discretion versus Policy Rules in Practice. *Carnegie-Rochester Conference Series on Public Policy* 39: 195–214.