

# ISSUE BRIEF

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## Research Review: Zero Lower Bound Interest Rates

By *Salim Furth, PhD*

In monetary policy, zero is an important number. Nominal interbank interest rates cannot normally sink below zero—that would mean one bank was paying the other to borrow its money. This is known as “the zero lower bound.” For central banks such as the Fed, the zero lower bound is a constraint on their ability to affect markets by moving key interest rates. In addition, zero-bounded interest rates are, in theory, unresponsive to most macroeconomic changes.

Since the key overnight interest rates have been very close to the zero lower bound since the financial crisis of 2008, economists have taken a renewed interest in studying how economies function when interest rates are zero.<sup>1</sup> Some models predict that fiscal stimulus is warranted specifically because the economy is stuck at the zero lower bound.

But has the economy even been at the zero lower bound throughout the recent economic trough? Economists Eric T. Swanson and John C. Williams find that only short-term interest rates were constrained during the recession.<sup>2</sup> Long-term rates had shown no sign of constraint through mid-2012.

**The Structure of Interest Rates.** The Fed, like other central banks, uses a few key overnight interest rates as levers to influence other interest rates,

which are set by supply and demand. When the Fed lowers the overnight rates, all the other rates tend to fall with it. But when the overnight rate hits zero, the Fed cannot lower it further, and it loses part of its leverage over market interest rates.

Long-term interest rates are almost always higher than short-term interest rates because of the risk inherent in making a long-term loan. Apart from the risk premium, long-term rates generally reflect the expected path of short-term interest rates for the life of the loan. Thus, if the one-year rate is 1 percent this year and expected to be 3 percent next year, the two-year rate will be about 2 percent plus a risk premium.

Normally, macroeconomic events and policy news can change the expectations of future overnight interest rates, in turn influencing current longer-term interest rates. But if future overnight rates are expected to be stuck at zero for a long time, even longer-term interest rates may not respond to such news.

Overnight Fed interest rates have indeed been very close to zero since December 2008, as seen in Chart 1. But longer-term rates, such as the one-year and five-year Treasury rates, have been higher and more volatile. For policymakers, the key question is whether those higher rates are *constrained*. That is, if policies change, will the rate change as well?

**Responsive Interest Rates.** Swanson and Williams set out to answer this question. They used the 1990–2000 period as a benchmark, because all rates stayed comfortably above zero throughout. In the benchmark decade, they estimate the magnitude of interest rate responses to various macroeconomic shocks, including news about employment, inflation, and new home sales.

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This paper, in its entirety, can be found at <http://report.heritage.org/ib3931>

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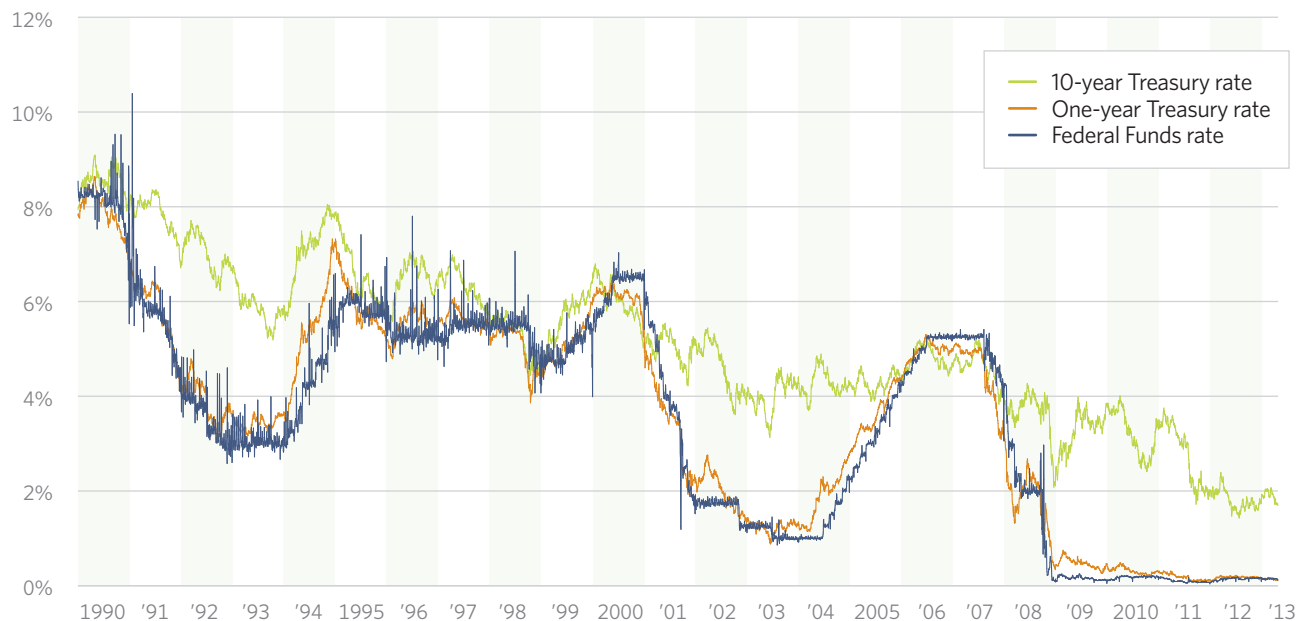
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CHART 1

## Key Variables: Federal Funds Rate and Treasury Rates



**Sources:** Federal Reserve Bank of St. Louis, “Effective Federal Funds Rate (FEDFUNDS),” <http://research.stlouisfed.org/fred2/series/FEDFUNDS> (accessed May 1, 2013); and U.S. Department of the Treasury, Daily Treasury Yield Curve Rates, <http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield> (accessed May 1, 2013).

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For interest rates with maturities from 30 days to 10 years, Swanson and Williams separately estimate the benchmark responsiveness of the interest rate to macroeconomic news.

Then, looking at rolling one-year windows from 2002 to 2012, they compare the responsiveness of each interest rate to its own baseline. For instance, to measure the responsiveness of the two-year interest rate on October 11, 2009, they look at all macroeconomic news shocks from April 12, 2009, to April 11, 2010. If the interest rate responded to those shocks with comparable or larger movements to those in the benchmark decade, then Swanson and Williams conclude that it was not constrained by the zero lower bound on October 11, 2009. If it moved significantly less, then they conclude that it

was partially constrained; if its movements were not significantly different from total unresponsiveness, they conclude it was fully constrained.

This answers a key question: If interest rates are responsive to macroeconomic news, they will also be responsive to policy changes, since both impact rates through expectations about the future.

One-year and two-year rates were responsive throughout the recession; they became constrained only in 2011 and 2012, respectively. The authors find that the three- and six-month rates were partially or fully constrained from sometime in 2009 until the time of writing.<sup>3</sup>

Five-year and 10-year rates have never become constrained and in fact have been significantly *more* responsive to macroeconomic news at times since

1. Michael Woodford, “Simple Analytics of the Government Expenditure Multiplier,” *American Economic Journal*, Vol. 3, No. 1 (January 2011), pp. 1–35; R. Anton Braun, Lena Mareen Körber, and Yuichiro Waki, “Some Unpleasant Properties of Log-Linearized Solutions When the Nominal Rate Is Zero,” Federal Reserve Bank of Atlanta, March 2012, <http://www.frbatlanta.org/documents/pubs/wp/wp1205.pdf> (accessed April 29, 2013).

2. Eric T. Swanson and John C. Williams, “Measuring the Effect of the Zero Lower Bound on Medium- and Longer-Term Interest Rates,” Federal Reserve Bank of San Francisco, January 2013, <http://www.frbsf.org/publications/economics/papers/2012/wp12-02bk.pdf> (accessed April 29, 2013).

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**John C. Williams** is President and chief executive officer of the Federal Reserve Bank of San Francisco.

**Michael Woodford** is the John Bates Clark Professor of Political Economy at Columbia University.

the financial crisis. The authors conclude that “monetary and fiscal policy were about as effective as usual until at least late 2011.”

Among the potential criticisms of Swanson and Williams’s measure is that the one-year windows they use are both too wide to pin down exactly when rates become constrained or unconstrained and too narrow to offer precise estimates of responsiveness. They respond to this and other possible criticisms by using a variety of methods and measurements to buttress their findings.

**Crowding Out the Private Sector.** If interest rates are responsive to news, most macroeconomic models agree that government “stimulus” spending crowds out private investment.

In usual times, with responsive interest rates, New Keynesian models<sup>4</sup> typically have a strong role for monetary (Fed) policy but little or no role for fiscal policy (stimulus spending or tax rebates). In Neoclassical<sup>5</sup> as well as New Keynesian models, government stimulus spending diminishes private activity—especially investment—as private borrowers are crowded out of the market by government borrowing.

In contrast, New Keynesian models suggest that when the interest rates relevant for investing are constrained by the zero lower bound, the crowding-out mechanism stops functioning and fiscal policy can be expansionary.

New Keynesian economist Michael Woodford<sup>6</sup> concludes a recent paper by noting:

Under circumstances like those of a Great Depression ... with the central bank’s policy rate at the lower bound of zero, and when there is feared to be a substantial probability of the constraint continuing to bind for years to come ... a case can be made for quite an aggressive increase in government purchases. ...

[However, w]hen monetary policy is not constrained by the zero lower bound, there is a good case for leaving output-gap stabilization largely to monetary policy, and basing decisions about government purchases primarily, if not entirely, on the principle of efficient composition of aggregate expenditure.<sup>7</sup>

This does not concede that government stimulus is the right course of action whenever the zero lower bound is actually binding. Indeed, if a large stimulus were successful, it would automatically push longer-term interest rates away from zero, returning the economy quickly to a situation in which crowding out again matters.

**Looking Back at the “Stimulus Package.”** Swanson and Williams’s findings imply that not all interest rates are constrained by the zero lower bound. Depending on the time horizon of firms’ investment, the five-year or 10-year rate may be a

3. In addition, they find the three-month rate constrained during 2003 and 2004, when overnight interest rates were held low (but non-zero) for an extended period. This suggests that a nuanced understanding of constraint is necessary; it also suggests that their definitions of “constrained” could be too broad.
4. See, for example, John F. Cogan et al., “New Keynesian Versus Old Keynesian Government Spending Multipliers,” *Journal of Economic Dynamics & Control*, Vol. 34 (2010), [http://www.stanford.edu/~johntayl/Onlinepaperscombinedbyyear/2010/New\\_Keynesian\\_vs\\_Old\\_Keynesian\\_Government\\_Spending\\_Multipliers\\_Journal\\_of\\_Economic\\_Dynamic\\_and\\_Control.pdf](http://www.stanford.edu/~johntayl/Onlinepaperscombinedbyyear/2010/New_Keynesian_vs_Old_Keynesian_Government_Spending_Multipliers_Journal_of_Economic_Dynamic_and_Control.pdf) (accessed April 29, 2013).
5. Some models result in crowding out of private investment regardless of the interest rate. Here, I limit my discussion to crowding out in which the interest rate plays a mediating role. Crowding out without interest rates occurs, for example, in Olivier Cardi, “A Note on the Crowding Out of Investment by Public Spending,” ERMES, Université Pantheon-Assas Paris 2, Département d’Economie, Ecole Polytechnique, June 2009, <http://hal.archives-ouvertes.fr/docs/00/42/01/32/PDF/2009-38.pdf> (accessed April 29, 2013).
6. Michael Woodford discussed Swanson and Williams’s findings at the 2012 Jackson Hole Symposium, where he presented “Methods of Policy Accommodation at the Interest-Rate Lower Bound,” August 20, 2012, <http://www.kansascityfed.org/publicat/sympos/2012/mw.pdf?sm=jh083112-4> (accessed April 29, 2013).
7. Woodford, “Simple Analytics of the Government Expenditure Multiplier.”

better indicator of the price of investment than the three-month or six-month rate. Appropriate macro-economic models will take into account the forward-looking nature of interest rates.

By contrast, in 2009, Christina Romer and Jared Bernstein published the economic bases of the Obama Administration's \$800 billion stimulus plan.<sup>8</sup> The cornerstones of their estimates were the multipliers reported on page 12, in a table entitled "Output effects of a *permanent* stimulus of 1% of GDP."<sup>9</sup> These estimates came from forcing their models to constrain all interest rates at the zero lower bound regardless of the performance of the economy.<sup>10</sup> If the recovery had proceeded as they predicted, achieving 5.2 percent unemployment by early 2013,<sup>11</sup> it is unlikely that short-run rates—let alone long-run rates—would have remained at the zero lower bound until now. Yet Romer and Bernstein used zero-constrained interest rates to predict multipliers out to 2013.

As Swanson and Williams showed, the one-year and two-year interest rates had not yet become constrained in 2009, and rates for periods longer than

two years never became fully constrained. Although Romer and Bernstein did not have the benefit of hindsight, they should have at least employed a model that made their predictions internally consistent—an economic recovery accompanied by rising interest rates.

This criticism is not new: It was made in 2009 by economists who read and understood Romer and Bernstein's work.<sup>12</sup> President Obama and others chose to pursue fiscal stimulus based on artificially favorable assumptions. Future policymakers would do better to take a scientific approach.

**Accurate Diagnosis Needed.** Swanson and Williams's research reminds us that policymakers need to ask tough questions about the assumptions of economic models before committing to new policies. The pressure to "do something" to spur the economy is powerful, but accurate diagnosis should precede enthusiastic prescription.

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8. Christina Romer and Jared Bernstein, "The Job Impact of the American Recovery and Reinvestment Act," January 10, 2009, [http://www.politico.com/static/PPM116\\_obamadoc.html](http://www.politico.com/static/PPM116_obamadoc.html) (accessed September 10, 2012).

9. Emphasis added. Perspicacious readers will note that the stimulus package was a temporary plan, not a permanent one.

10. "We considered multipliers for the case where the federal funds rate remains constant, rather than the usual case where the Federal Reserve raises the funds rate in response to fiscal expansion, on the grounds that the funds rate is likely to be at or near its lower bound of zero for the foreseeable future" (Romer and Bernstein, p. 12).

11. Romer and Bernstein, p. 4, Figure 1.

12. For instance, the working paper version of Cogan, Cwik, Taylor, and Wieland was distributed as a discussion paper by the Stanford Institute for Economic Policy Research in February 2009.