Reactions of real yields and inflation expectations to forward guidance in the United States

DNB Working Paper

De Nederlandsche Bank
Eurosysteem

Reactions of real yields and inflation expectations to forward guidance in the United States

Richhild Moessner *

Reactions of real yields and inflation expectations to forward guidance in the United States[*]

Richhild Moessner[a,b]

[a]De Nederlandsche Bank

[b]Cass Business School

November 2013

Abstract

We study the impact of forward guidance used as an unconventional monetary policy tool at the zero lower bound of the policy rate on real and breakeven US Treasury yield curves. We find that explicit FOMC policy rate guidance announcements led to a significant reduction in real yields. By contrast, breakeven inflation rates were barely affected, if at all, suggesting that inflation expectations have remained well-anchored, and that explicit FOMC policy rate guidance has not adversely affected central bank credibility.

JEL classification: E52, E58, G15.

Key words: Monetary policy, central bank communication, policy rate guidance, real yields, inflation expectations.

1　Introduction

Explicit policy rate guidance has become an important unconventional monetary policy tool since the zero lower bound was reached in the United States, and it is hoped that by affecting long-term interest rates, it can affect aggregate demand (Yellen (2013)). With reaching the zero lower bound on the policy rate in the wake of the global financial crisis, the FOMC could not decrease the short-term nominal rate further, and therefore could not decrease the short-term real interest rate further to stimulate the economy without raising inflation expectations. But by using forward policy rate guidance at the zero lower bound, the FOMC might be able to lower longer-term real interest rates further, without raising inflation expectations (Rajan (2013)). This is possible since longer-term nominal interest rates in the United States remained above zero even when the policy rate had reached the zero lower bound. This contrasts with Japan, where long-term bond yields are already very low, and can therefore not be lowered much further. In Japan, where deflationary expectations have become entrenched, the Bank of Japan would like to raise inflation expectations to the inflation target of 2% (Rajan (2013)). In January 2013 the Bank of Japan introduced an inflation target of 2%, and committed to "pursue monetary easing and aim to achieve this target at the earliest possible time" (Bank of Japan (2013)). The European Central Bank introduced explicit policy rate guidance in July 2013 (Draghi (2013)), and the Bank of England introduced explicit policy rate guidance in August 2013 (Bank of England (2013)).

Woodford (2012) considers the effects of forward policy rate guidance internationally and discusses relevant papers. Bank of England (2013) provides an overview of the literature on the effects of forward policy rate guidance internationally. An overview of the literature on central bank communication more generally is provided in Blinder et al. (2008). Bernanke, Reinhart and Sack (2004) study the effect of central bank communication more generally to shape public expectations about the future course of interest rates in the United States and Japan, using event studies and by estimating no-arbitrage term structure models. They find a potentially important role for central bank communication in the United States to try to shape public expectations of future policy actions, as do

Gürkaynak, Sack, and Swanson (2005) and Campbell et al. (2012).

Research on the effects of unconventional monetary policy at the zero lower bound of the policy rate on real yields and breakeven inflation rates has focussed on the effects of quantitative easing, rather than on the effects of explicit policy rate guidance. Neely (2010) finds that large-scale asset purchase (LSAP) buy announcements reduced long-term real US Treasury yields. Krishnamurthy and Vissing-Jorgensen (2011) find that an inflation channel operated in the Federal Reserve's first two Quantitative Easing programmes (QE1 and QE2), with evidence from both inflation swap rates and Treasury Inflation Protected Securities (TIPS) yields showing that expected inflation increased, implying larger reductions in real than in nominal yields. Using a structural VAR to identify the effects of monetary policy shocks for the period November 2008 to December 2010, Wright (2011a) finds slight evidence that stimulative monetary policy shocks led to a rotation in breakeven rates derived from TIPS, with short-term breakeven rates rising and long-term forward breakeven rates falling. Hofmann and Zhu (2013) have studied whether central bank asset purchases have led to higher inflation expectations in the United States and the United Kingdom. They find that central bank asset purchases had significant effects, but that their quantitative importance was uncertain. They conclude that the reaction of inflation swap rates on the days of programme announcements suggests that central bank asset purchases were probably not the main driver of the shifts in inflation expectations.

Recent research on the effects of quantitative easing by the Federal Reserve finds a greater role for a signalling channel and for forward policy rate guidance in its effects on government bond yields than earlier research did. Bauer and Rudebusch (2012) find that Federal Reserve government bond purchases have important signalling effects which lower expected future short-term interest rates, and that the signalling channel is more important than earlier research had suggested. Using model-based analysis, Curdia and Ferrero (2013) conclude that their analysis suggests that forward policy rate guidance is essential for quantitative easing to be effective, and that communication about the beginning of federal funds rate increases will have stronger effects on bond yields than communication about the end of asset purchases.

Moessner (2013a, 2013b) studied the effect of explicit FOMC policy rate guidance

announcements on short- to long-term nominal interest rates, and found that they led to a significant reduction at a range of maturities. In this paper we quantify the impact of explicit FOMC policy rate guidance announcements used as an unconventional monetary policy tool at the zero lower bound on real and breakeven US Treasury yield curves. To the best of our knowledge this is the first paper to quantify the impact of the FOMC's explicit policy rate guidance announcements at the zero lower bound on real yields and breakeven inflation rates.

The outline of the paper is as follows. Section 2 presents the data, section 3 presents the method and results, and section 4 concludes.

2   Data

We study the reactions of real US Treasury yields across the yield curve derived from TIPS both for instantaneous forward rates 2 to 10 years ahead (Figure 1) and for zero-coupon yields of maturities between 2 and 10 years (Figure 2).

[Figures 1 and 2 about here]

We also study the reactions of breakeven inflation rates across the yield curve derived from TIPS and conventional US Treasury bonds, again both for instantaneous forward rates (Figure 3) and for zero-coupon rates (Figure 4), at the same horizons and maturities between 2 and 10 years.[1]

[Figures 3 and 4 about here]

We control for the effect of macroeconomic news on real yields and breakeven inflation rates by including surprises in the following 11 US macroeconomic indicators in the regressions, CPI inflation, GDP, hourly earnings, housing starts, industrial production, the ISM manufacturing index, changes in nonfarm payrolls, PPI inflation, retail sales,

---

[1]The real yields and breakeven inflation rates are calculated following the methodology of Gürkaynak, Sack, and Wright (2008) as made available on the Federal Reserve website at http://www.federalreserve.gov/pubs/feds/2008/200805/200805abs.html (accessed on 22 April 2013).

the trade balance, and the unemployment rate. The macroeconomic data surprises are calculated as the difference between the real-time data releases and median Bloomberg survey expectations, normalised by their standard deviation.

For a description of the FOMC's use of explicit forward policy rate guidance as an unconventional monetary policy tool at the zero lower bound of the policy rate see Yellen (2013). Relevant excerpts on new explicit policy rate guidance announcements from FOMC statements are reproduced in Table 1. We consider announcements from 18 March 2009, after the zero lower bound on policy rates had been reached.

[Table 1 about here]

3 Method and results

3.1 Effects on real yields

To determine the reactions of real US Treasury bond yields to explicit policy rate guidance by the FOMC, we use the approach which Moessner (2013a) applied to study the reactions of Eurodollar futures rates, as described in the following. Daily changes in m-year-ahead real US Treasury instantaneous forward rates (in percentage points), $y^m(t) - y^m(t-1)$, for expectations m =2 to 10 years ahead, are regressed on a dummy variable for the announcements of explicit FOMC policy rate guidance, $d_{PRG}(t)$, and on the surprise components of 11 US macroeconomic data releases, $surprise_j(t)$, $j = 1, ..., 11$, to control for the effect of economic news,

$$y^m(t) - y^m(t-1) = c + a * d_{PRG}(t) + \sum_{j=1}^{11} (b_j * surprise_j(t)) + \varepsilon_t \qquad (1)$$

where $d_{PRG}(t)$ takes the value of 1 on days when the FOMC provided new explicit policy rate guidance, as listed in Table 1, and zero otherwise. The variable $surprise_j(t)$ takes on the value of the normalised surprises on the dates of the release of the macroeconomic indicator j, and zero on other days. We use Newey-West adjusted standard errors. Similar regressions are performed below for real US Treasury zero-coupon yields with maturities of m =2 to 10 years.

Regressions are also performed with a dummy variable separately for those announce-ments where the guidance was not associated with asset purchase announcements, $d_{PRG}^{nap}(t)$, and those where it was associated with asset purchase announcements, $d_{PRG}^{wap}(t)$,

$$y^m(t) - y^m(t-1) = c + a_1 * d_{PRG}^{nap}(t) + a_2 * d_{PRG}^{wap}(t) + \sum_{j=1}^{11} (b_j * surprise_j(t)) + \varepsilon_t \quad (2)$$

The dummy variable $d_{PRG}^{nap}(t)$ equals 1 on dates when the FOMC provided new explicit policy rate guidance but did not make announcements on asset purchases (9 August 2011 and 25 January 2012), and zero otherwise. The dummy variable $d_{PRG}^{wap}(t)$ takes the value of 1 on dates when the FOMC provided new explicit policy rate guidance and also made announcements on asset purchases (18 March 2009, 13 September 2012 and 12 December 2012), and zero otherwise, with $d_{PRG}(t) = d_{PRG}^{nap}(t) + d_{PRG}^{wap}(t)$. The dates of asset purchase announcements are taken from Hofmann and Zhu (2013).

[Tables 2 and 3 about here]

Table 2 shows the results of equation (1) estimated for instantaneous forward real US Treasury yields. We can see that explicit FOMC policy rate guidance announcements had a significant effects on real forward rates at horizons of 2 to 5 years ahead, with the largest effect of 23 basis points on average per announcement at the 3-year ahead horizon. Table 3 shows the results of equation (2). We can see that while explicit FOMC policy rate guidance announcements not associated with asset purchase announcements had a significant effects on real forward rates at horizons of 2 to 10 years ahead, with the largest effect of 17 basis points on average per announcement at the 3-year ahead horizon, those associated with asset purchase announcements had a significant effects on real forward rates only at horizons of 2 and 3 years ahead, again with the largest effect at the 3-year ahead horizon, at 27 basis points on average per announcement. These results suggest that the effect of the FOMC's explicit policy rate guidance on real yields was not just due to associated asset purchase announcements.

[Tables 4 and 5 about here]

6

Table 4 shows the results of equation (1) estimated for real US Treasury zero-coupon yields. We can see that explicit FOMC policy rate guidance announcements had a significant effects on real zero-coupon at maturities of 2 to 10 years, with the largest effect of 18 basis points on average per announcement at the 5-year ahead horizon. Table 5 shows the results of equation (2) for real US Treasury zero-coupon yields. We can see that while explicit FOMC policy rate guidance announcements not associated with asset purchase announcements had a significant effect on real zero-coupon yields at horizons of 2 to 10 years ahead, those associated with asset purchase announcements had a significant effect on real zero-coupon yields at horizons up to 5 years ahead.

3.2   Effects on breakeven inflation rates

To determine the reactions of breakeven inflation rates to explicit policy rate guidance by the FOMC, we perform the regressions of equations (1) to (2), but replacing real yields by breakeven inflation rates. Results for equations (1) and (2) for forward breakeven inflation rates are shown in Tables 6 and 7, respectively. We can see that forward breakeven inflation rates were little affected by the explicit policy rate guidance, with a reduction of 6 to 7 basis points on average per announcement at horizons of 6 to 8 years ahead. We can also see that such guidance not associated with asset purchase announcements led to a reduction in forward breakeven inflation rates of around 5 to 10 basis points on average per announcement at horizons of 4 to 7 years ahead. Such guidance associated with asset purchase announcements led to a small increase in forward breakeven inflation rates at horizons of 3 and 4 years ahead.

[Tables 6 and 7 about here]

Results for equations (1) and (2) for zero-coupon breakeven inflation rates are shown in Tables 8 and 9, respectively. Zero-coupon breakeven inflation rates were little affected by the explicit policy rate guidance, with an increase of 5 basis points on average per announcement at horizons of 2 and 3 years ahead. Such guidance not associated with asset purchase announcements had no significant effect on zero-coupon breakeven inflation rates. Explicit policy rate guidance associated with asset purchase announcements led to

7

an increase in zero-coupon breakeven inflation rates of up to 9 basis points on average per announcement at horizons of 2 to 7 years ahead.

[Tables 8 and 9 about here]

Besides real rate and inflation expectations, real government bond yields and breakeven inflation rates also reflect risk premia. There is great uncertainty to what extent changes in real government bond yields and breakeven inflation rates reflect changes in expectations or changes in risk premia. Decomposing the reactions of real yields and breakeven inflation rates to explicit FOMC policy rate guidance announcements into changes due to expectations and those due to changes in risk premia is beyond the scope of this paper. Estimating the decomposition of bond yields into the expectations and risk premia components is subject to great model uncertainty. Bank for International Settlements (2013), based on monthly data shown in their Graph 4, note that the nominal term premium became negative in 2011 and continued to fall in 2012, mainly due to a lower real rate premium due to monetary policy easing, but with little change in the inflation risk premium (Figure 5). Bauer and Rudebusch (2013) find a greater role for reductions in real interest rates and long-run inflation expectations in explaining the decline in US government bond yields over the last two decades, compared with earlier research which found a greater role for lower risk premia and reduced uncertainty about future inflation (see e.g. Wright (2011b)). Chadha et al. (2013) discuss non-monetary factors that are likely to have contributed to higher demand for government bonds by banks, pension funds and insurance companies and thereby to lower long-term government bond yields, including prudential regulation and mark-to-market accounting (Turner (2011)); increased demand for collateral in financial transactions in wholesale markets due to a decline in unsecured interbank lending; and flight to safety.

[Figure 5 about here]

4   Conclusions

We studied the impact of explicit policy rate guidance by the FOMC used as an unconventional monetary policy tool at the zero lower bound of the policy rate on real and breakeven US Treasury yield curves. We found that explicit FOMC policy rate guidance announcements led to a significant reduction in real yields. By contrast, breakeven inflation rates were barely affected, if at all, suggesting that inflation expectations have remained well-anchored, and that explicit FOMC policy rate guidance has not adversely affected central bank credibility.

References

[1] Bank for International Settlements, 2013. Markets grow confident on continued support. BIS Quarterly Review, March 2013, 1–13.

[2] Bank of England, 2013. Monetary policy trade-offs and forward guidance. Available at http://www.bankofengland.co.uk/publications/Documents/inflationreport/2013/ir13augforwardguidance.pdf.

[3] Bank of Japan, 2013. Introduction of the "Price Stability Target" and the "Open-Ended Asset Purchasing Method". Monetary Policy Release, 22 January.

[4] Bauer, M., and Rudebusch, G., 2012. The Signaling Channel for Federal Reserve Bond Purchases. Federal Reserve Bank of San Francisco Working Paper No. 2011-21.

[5] Bauer, M., and Rudebusch, G., 2013. What Caused the Decline in Long-term Yields? Federal Reserve Bank of San Francisco Economic Letter 2013-19, July.

[6] Bernanke, B., Reinhart, V. and Sack, B., 2004. Monetary Policy Alternatives at the Zero Lower Bound: An Empirical Assessment. Federal Reserve Board Finance and Economics Discussion Series No. 2004-48.

[7] Blinder, A., Ehrmann, M., Fratzscher, M., de Haan, J. and Jansen, D.-J., 2008. Central Bank Communication and Monetary Policy: A Survey of Theory and Evidence. Journal of Economic Literature, American Economic Association, vol. 46(4), 910–45, December.

[8] Campbell, J., Evans, C., Fisher, J. and Justiniano, A., 2012. Macroeconomic effects of FOMC forward guidance. Manuscript.

[9] Chadha, J., Turner, P. and Zampolli, F., 2013. The interest rate effects of government debt maturity. BIS Working Paper No. 415.

[10] Curdia, V., and Ferrero, A., 2013. How stimulatory are large-scale asset purchases? Federal Reserve Bank of San Francisco Economic Letter 2013-22, August.

[11] Draghi, M., 2013. Introductory statement to the press conference (with Q&A). 4 July.

[12] Gürkaynak, R., Sack, B. and Swanson, E., 2005. Do Actions Speak Louder than Words? The Response of Asset Prices to Monetary Policy Actions and Statements. International Journal of Central Banking 1 (1), 55–93.

[13] Gürkaynak, R., Sack, B. and Wright, J., 2008. The TIPS Yield Curve and Inflation Compensation. Federal Reserve Board Finance and Economics Discussion Series No. 2008-05.

[14] Hofmann, B. and Zhu, F., 2013. Central bank asset purchases and inflation expectations. BIS Quarterly Review, March, 23-35.

[15] Hördahl, P., Tristani, O. and Vestin, D., 2006. A joint econometric model of macroeconomic and term structure dynamics. Journal of Econometrics 1 (31), 405–44.

[16] Hördahl, P. and Tristani, O., 2007. Inflation risk premia in the term structure of interest rates", BIS Working Papers No. 228.

[17] Krishnamurthy, A., Vissing-Jorgensen, A., 2011. The effects of quantitative easing on interest rates: channels and implications for policy. Brookings Papers on Economic Activity, Fall, 215–87.

[18] Moessner, R., 2013a. Effects of explicit FOMC policy rate guidance on interest rate expectations. Economics Letters, vol. 121, 170–173.

[19] Moessner, R., 2013b. Effects of explicit FOMC policy rate guidance on market interest rates. DNB Working Paper No. 384.

[20] Neely, C., 2010. The Large-Scale Asset Purchases had large international effects. Federal Reserve Bank of St. Louis Working Paper No. 2010-018C.

[21] Rajan, R., 2013. A step in the dark: unconventional monetary policy after the crisis. Andrew Crockett Memorial Lecture, 23 June.

[22] Rudebusch, G., and Williams, J., 2008. Revealing the Secrets of the Temple – The Value of Publishing Central Bank Interest Rate Projections. In *Asset Prices and Monetary Policy*, National Bureau of Economic Research, chapter 6, 247–289.

[23] Turner, P., 2011. Is the long-term interest rate a policy victim, a policy variable or a policy lodestar?. BIS Working Paper No. 367.

[24] Woodford, M., 2012. Methods of Policy Accommodation at the Interest-Rate Lower Bound. Paper presented at Jackson Hole Symposium on "The Changing Policy Landscape", August 31-September 1.

[25] Wright, J., 2011a. What does monetary policy do to long-term interest rates at the zero lower bound? NBER Working Paper No. 17154.

[26] Wright, J., 2011b. Term Premia and Inflation Uncertainty: Empirical Evidence from an International Panel Dataset. American Economic Review 101(4), 1514–1534.

[27] Yellen, J., 2013. Remarks at Panel Discussion on "Monetary Policy: Many Targets, Many Instruments. Where Do We Stand?" at a conference sponsored by the International Monetary Fund on "Rethinking Macro Policy II", Washington, D.C., April 16.

Figure 1: US Treasury instantaneous forward real rates, 2 to 10 years ahead (in percent)
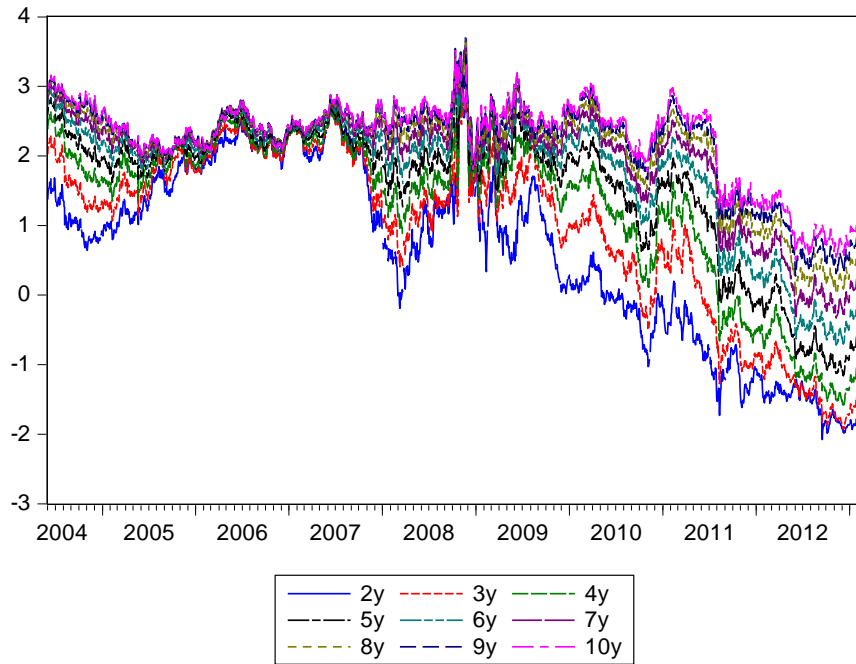
	2y	3y	4y
	5y	6y	7y
	8y	9y	10y

Figure 2: US Treasury zero-coupon real yields for maturities of 2 to 10 years (in percent)
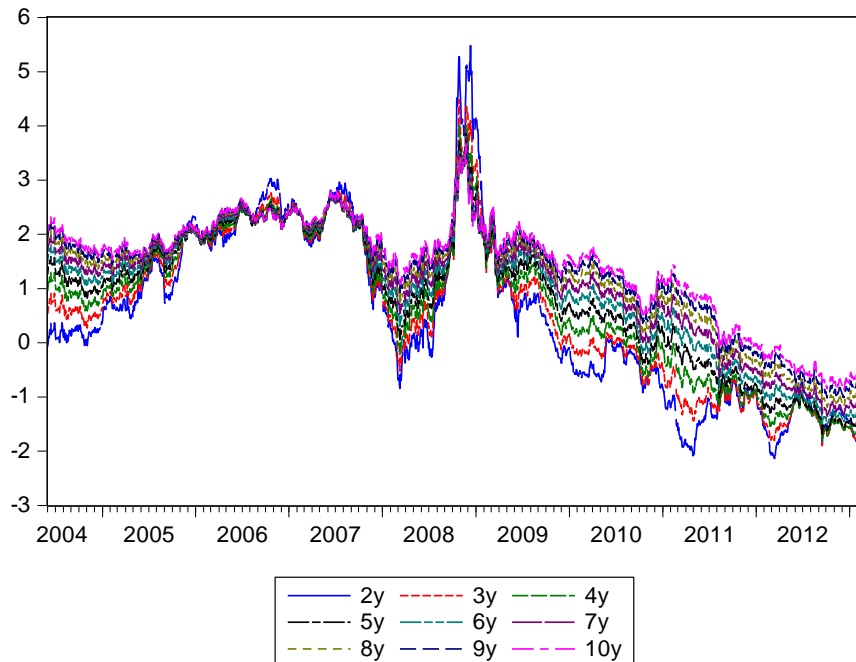
	2y	3y	4y
	5y	6y	7y
	8y	9y	10y

Figure 3: US Treasury instantaneous forward breakeven inflation rates, 2 to 10 years ahead (in percent)
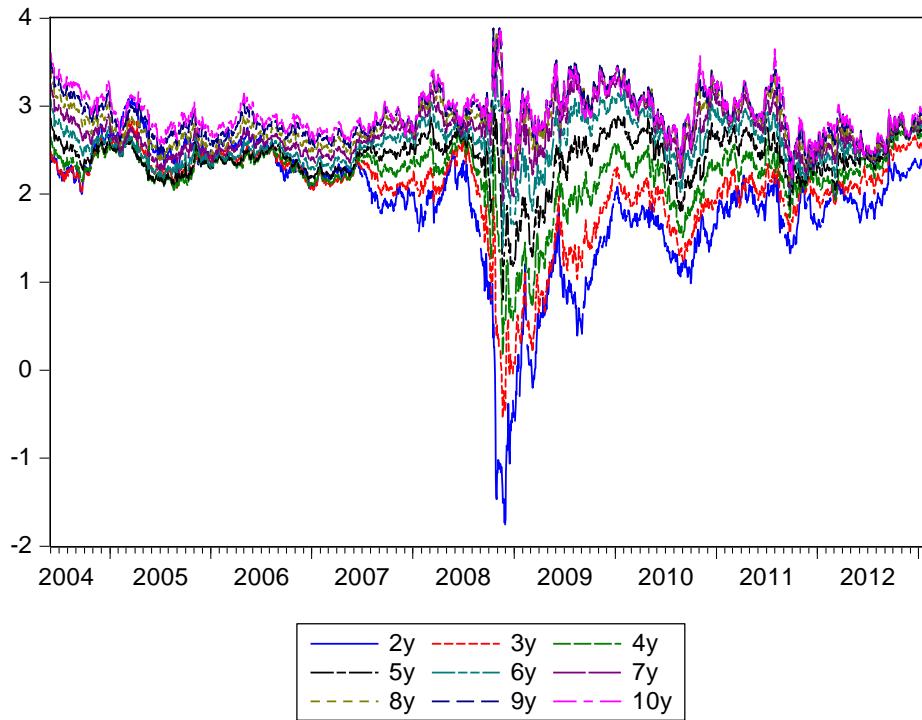
Source: Computed following the methodology of Gürkaynak, Sack, and Wright (2008) as made available on the Federal Reserve website at http://www.federalreserve.gov/pubs/feds/2008/200805/200805abs.html (accessed on 22 April 2013).

Figure 4: US Treasury zero-coupon breakeven inflation rates for maturities of 2 to 10 years (in percent)
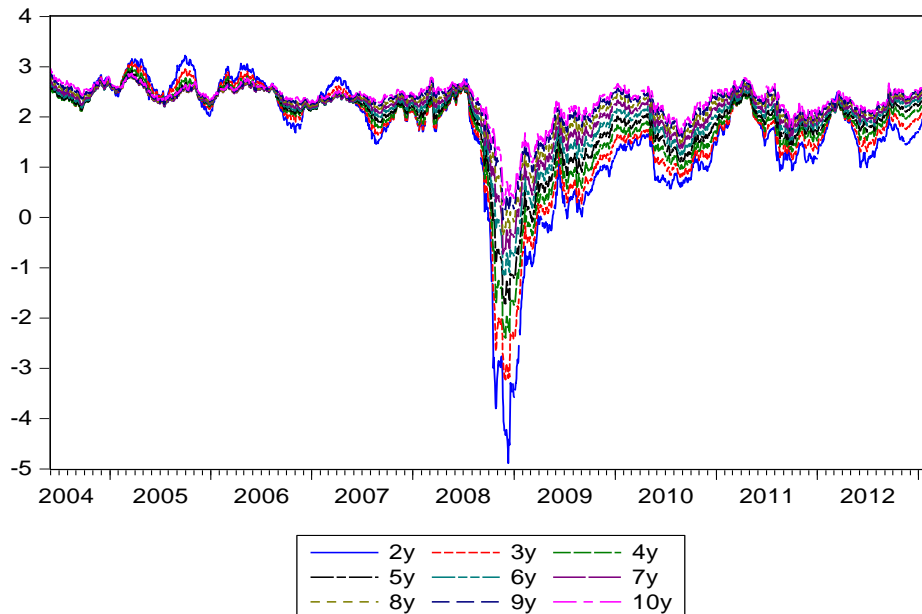
Source: Computed following the methodology of Gürkaynak, Sack, and Wright (2008) as made available on the Federal Reserve website at http://www.federalreserve.gov/pubs/feds/2008/200805/200805abs.html (accessed on 22 April 2013).

Figure 5: US government bond risk premia (in percent)[1]
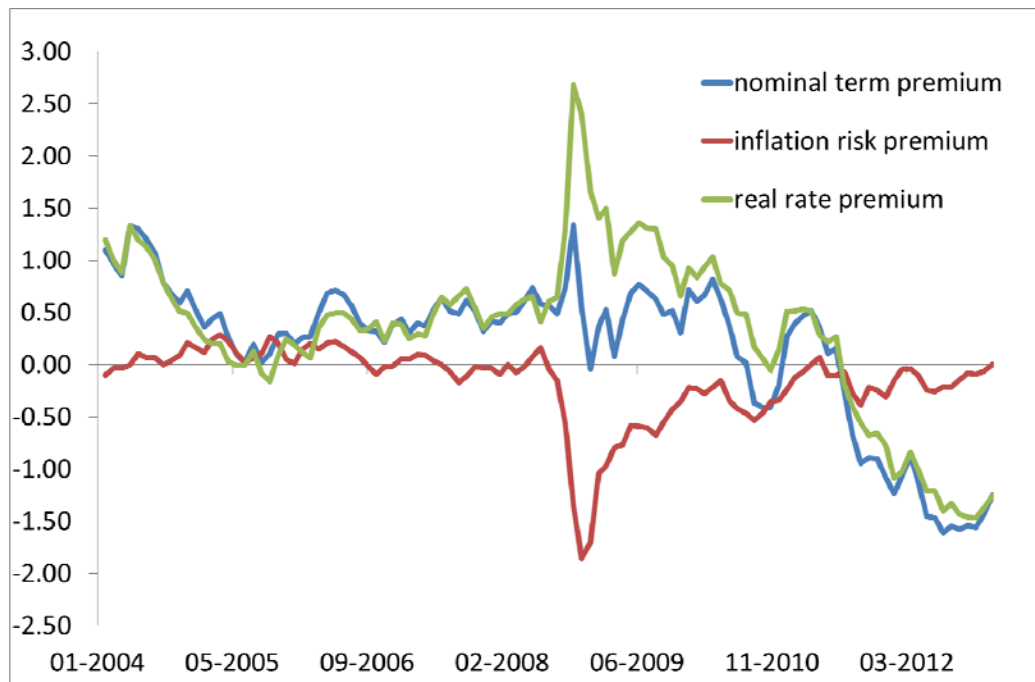
Sources: Bloomberg, Consensus Economics, national data, BIS calculations.

Table 1: Explicit FOMC policy rate guidance announcements

Date[a]	FOMC statements[a]
16 December 2008	The Federal Open Market Committee decided today to establish a target range for the federal funds rate of 0 to 1/4 percent. […] the Committee anticipates that weak economic conditions are likely to warrant exceptionally low levels of the federal funds rate for some time […]
18 March 2009	[…] the Committee will maintain the target range for the federal funds rate at 0 to 1/4 percent and anticipates that economic conditions are likely to warrant exceptionally low levels of the federal funds rate for an extended period.
9 August 2011	The Committee currently anticipates that economic conditions--including low rates of resource utilization and a subdued outlook for inflation over the medium run--are likely to warrant exceptionally low levels for the federal funds rate at least through mid-2013.
25 January 2012	[…] the Committee […] currently anticipates that economic conditions--including low rates of resource utilization and a subdued outlook for inflation over the medium run--are likely to warrant exceptionally low levels for the federal funds rate at least through late 2014.
13 September 2012	[…] the Committee […] currently anticipates that exceptionally low levels for the federal funds rate are likely to be warranted at least through mid-2015.
12 December 2012	[…] the Committee […] currently anticipates that this exceptionally low range for the federal funds rate will be appropriate at least as long as the unemployment rate remains above 6-1/2 percent, inflation between one and two years ahead is projected to be no more than a half percentage point above the Committee's 2 percent longer-run goal, and longer-term inflation expectations continue to be well anchored.[…]

[a] Based on FOMC press releases.

Table 2: Reactions of US Treasury real forward rates to explicit FOMC policy rate guidance

Dependent variable: Changes in US Treasury instantaneous forward rates m years ahead									
Variable	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years
c	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.0005
d_{PRG}	-0.183***	-0.231**	-0.226**	-0.194*	-0.155	-0.118	-0.086	-0.063	-0.047
Adj. R^2	0.025	0.046	0.044	0.035	0.026	0.018	0.013	0.011	0.011
No. obs	2121	2121	2121	2121	2121	2121	2121	2121	2121

***, ** and * represent significance at the 1%, 5% and 10% levels, respectively. Newey-West adjusted standard errors. Coefficients on surprises in 11 US macroeconomic variables not shown. Sample period: 6/02/2004–2/15/2013.

Table 3: Reactions of US Treasury real forward rates to explicit FOMC policy rate guidance, distinguishing whether or not associated with asset purchase announcements

Dependent variable: Changes in US Treasury instantaneous forward rates m years ahead									
Variable	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years
c	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.0005
d^{nap}_{PRG}	-0.142***	-0.172***	-0.166***	-0.143***	-0.114***	-0.087***	-0.067***	-0.053***	-0.045***
d^{wap}_{PRG}	-0.210**	-0.271*	-0.265	-0.229	-0.183	-0.138	-0.100	-0.069	-0.048
Adj. R^2	0.025	0.046	0.044	0.035	0.026	0.018	0.013	0.011	0.011
No. obs	2121	2121	2121	2121	2121	2121	2121	2121	2121

***, ** and * represent significance at the 1%, 5% and 10% levels, respectively. Newey-West adjusted standard errors. Coefficients on surprises in 11 US macroeconomic variables not shown. Sample period: 6/02/2004–2/15/2013.

Table 4: Reactions of US Treasury zero-coupon real yields to explicit FOMC policy rate guidance

Dependent variable: Changes in US Treasury zero-coupon real yields with maturity of m years									
Variable	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years
c	-0.0005	-0.0007	-0.0008	-0.0008	-0.0008	-0.0009	-0.0009	-0.0008	-0.0008
d_{PRG}	-0.134**	-0.160**	-0.178**	-0.184**	-0.183**	-0.176**	-0.167**	-0.157*	-0.146*
Adj. R^2	0.026	0.031	0.037	0.040	0.041	0.040	0.038	0.036	0.034
No. obs	2121	2121	2121	2121	2121	2121	2121	2121	2121

***, ** and * represent significance at the 1%, 5% and 10% levels, respectively. Newey-West adjusted standard errors. Coefficients on surprises in 11 US macroeconomic variables not shown. Sample period: 6/02/2004−2/15/2013.

Table 5: Reactions of US Treasury zero-coupon real yields to explicit FOMC policy rate guidance, distinguishing whether or not associated with asset purchase announcements

Dependent variable: Changes in US Treasury zero-coupon real yields with maturity of m years									
Variable	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years
c	-0.0005	-0.0007	-0.0008	-0.0008	-0.0008	-0.0009	-0.0009	-0.0008	-0.0008
d^{nap}_{PRG}	-0.062***	-0.095***	-0.114***	-0.122***	-0.123***	-0.120***	-0.115***	-0.108***	-0.102***
d^{wap}_{PRG}	-0.181**	-0.203**	-0.220*	-0.226*	-0.223	-0.214	-0.202	-0.189	-0.176
Adj. R^2	0.027	0.032	0.038	0.042	0.042	0.041	0.039	0.037	0.035
No. obs	2121	2121	2121	2121	2121	2121	2121	2121	2121

***, ** and * represent significance at the 1%, 5% and 10% levels, respectively. Newey-West adjusted standard errors. Coefficients on surprises in 11 US macroeconomic variables not shown. Sample period: 6/02/2004−2/15/2013.

Table 6: Reactions of US Treasury breakeven forward rates to explicit FOMC policy rate guidance

Dependent variable: Changes in US Treasury breakeven instantaneous forward rates m years ahead									
Variable	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years
c	0.0003	0.0001	0.0001	0.00002	-0.0001	-0.0003	-0.0004	-0.0006	-0.0007
d_{PRG}	0.029	0.029	-0.002	-0.036	-0.061**	-0.071**	-0.067**	-0.051	-0.027
Adj. R^2	0.012	0.015	0.015	0.015	0.017	0.018	0.017	0.015	0.013
No. obs	2089	2089	2089	2089	2089	2089	2089	2089	2089

***, ** and * represent significance at the 1%, 5% and 10% levels, respectively. Newey-West adjusted standard errors. Coefficients on surprises in 11 US macroeconomic variables not shown. Sample period: 6/02/2004−2/15/2013.

Table 7: Reactions of US Treasury breakeven forward rates to explicit FOMC policy rate guidance, distinguishing whether or not associated with asset purchase announcements

Dependent variable: Changes in US Treasury breakeven instantaneous forward rates m years ahead									
Variable	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years
c	0.0003	0.0001	0.0001	0.00002	-0.0001	-0.0003	-0.0004	-0.0006	-0.0007
d^{nap}_{PRG}	-0.008	-0.026	-0.052***	-0.076***	-0.088***	-0.089**	-0.079	-0.061	-0.039
d^{wap}_{PRG}	0.055	0.066***	0.032**	-0.010	-0.042	-0.058	-0.058	-0.044	-0.020
Adj. R^2	0.012	0.016	0.016	0.015	0.017	0.018	0.017	0.015	0.013
No. obs	2089	2089	2089	2089	2089	2089	2089	2089	2089

***, ** and * represent significance at the 1%, 5% and 10% levels, respectively. Newey-West adjusted standard errors. Coefficients on surprises in 11 US macroeconomic variables not shown. Sample period: 6/02/2004−2/15/2013.

Table 8: Reactions of US Treasury zero-coupon breakeven rates to explicit FOMC policy rate guidance

Dependent variable: Changes in US Treasury zero-coupon breakeven rates with maturity of m years								
Variable	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years
c	-0.00001	0.0001	0.0001	0.0001	0.00004	0.00001	-0.00003	-0.0001	-0.0001
d_{PRG}	0.051*	0.045*	0.037	0.026	0.013	0.002	-0.007	-0.013	-0.016
Adj. R^2	0.033	0.029	0.023	0.019	0.016	0.015	0.015	0.016	0.016
No. obs	2089	2089	2089	2089	2089	2089	2089	2089	2089

***, ** and * represent significance at the 1%, 5% and 10% levels, respectively. Newey-West adjusted standard errors. Coefficients on surprises in 11 US macroeconomic variables not shown. Sample period: 6/02/2004−2/15/2013.

Table 9: Reactions of US Treasury zero-coupon breakeven rates to explicit FOMC policy rate guidance, distinguishing whether or not associated with asset purchase announcements

Dependent variable: Changes in US Treasury zero-coupon breakeven rates with maturity of m years								
Variable	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years
c	-0.0001	0.0001	0.0001	0.0001	0.00005	0.00001	-0.00003	-0.0001	-0.0001
d^{nap}_{PRG}	-0.005	-0.009	-0.016	-0.026	-0.036	-0.043	-0.049	-0.051	-0.051
d^{wap}_{PRG}	0.088***	0.080***	0.073***	0.061***	0.046***	0.032*	0.021	0.012	0.008
Adj. R^2	0.034	0.030	0.024	0.020	0.018	0.017	0.017	0.017	0.017
No. obs	2089	2089	2089	2089	2089	2089	2089	2089	2089

***, ** and * represent significance at the 1%, 5% and 10% levels, respectively. Newey-West adjusted standard errors. Coefficients on surprises in 11 US macroeconomic variables not shown. Sample period: 6/02/2004−2/15/2013.

Previous DNB Working Papers in 2013

Previous DNB Working Papers in 2013 (continued)