How Effective Is Central Bank Forward Guidance?

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Abstract

In this paper, we use survey forecasts to investigate the impact of forward guidance on the predictability of future short- and long-term interest rates in four countries: New Zealand, Norway, Sweden, and the United States. New Zealand began providing forward guidance in 1997, Norway in 2005, and Sweden in 2007. The United States had two periods of implicit forward guidance: 2003-2005 and 2008-2011. Overall, we find little or no convincing evidence that forward guidance actually improves markets' ability to forecast future rates or that any improvement in forecasting short-term rates is reflected in longer-term yields. The weak support we do find is at the short end of the yield curve and at relatively short forecast horizons and only for Norway and Sweden. There is no evidence that forward guidance has increased the efficacy of monetary for New Zealand, the country with the longest—15-year—forward guidance history.

Keywords: monetary policy; central bank transparency; interest rates; term structure; forecasting

JEL Codes: E52, E43, E47

1. INTRODUCTION

Since the late 1980s, monetary policy has steadily become more transparent in most developed countries. Initially, transparency was seen as a crucial ingredient of accountability which, in turn, was considered essential for central bank independence: Greater transparency increases central bank credibility, which improves the efficacy of monetary policy. In addition, many economists now advocate greater transparency in its own right, claiming that monetary policy is most effective when the central bank is transparent (e.g., Woodford, 2003, 2005; and Svensson, 2006, 2008). Federal Reserve Chairman Ben Bernanke (2007) stresses the latter argument, arguing that increased transparency can improve financial and economic performance by anchoring long-term inflation expectations, reducing economic and financial uncertainty, and encouraging financial markets to anticipate and reinforce monetary policy actions.

However, the idea that greater transparency is necessarily beneficial is not shared by all. For example, Amato, Morris, and Shin (2002); Morris and Shin (2002); Thornton (2003); Mishkin (2004); Walsh (2007, 2008); Gosselin, Lotz, and Wyplosz (2006); and Kool, Middeldorp, and Rosenkranz (2011) suggest various reasons to question whether transparency per se is desirable.

The most recent innovation in monetary policy transparency is *forward guidance*. Forward guidance is the idea that the efficacy of policy can be enhanced if policymakers inform the market of the expected path for the central bank's policy rate. Forward guidance monetary policy stems from Woodford's (1999) concept of optimal policy inertia. Specifically, Woodford (1999) argues that monetary policy will have a larger effect on longer-term rates the longer the central bank credibly commits to maintaining its policy rate.

Based on the belief that the central bank's interest rate policy will be more effective the larger its effect on longer-term rates (see, e.g., Woodford, 2001; Rosenberg, 2007; and Svensson, 2008), several central banks began the practice of providing forward guidance. As was the case with inflation targeting, the Reserve Bank of New Zealand (RBNZ) took the lead. In 1997 it started to announce a path for its 3-month bank bill rate. The Norges Bank and the Riksbank followed in 2005 and 2007, respectively, and the Czech National Bank adopted forward guidance in 2008. The Federal Reserve began using *implicit* forward guidance in August 2003 but stopped the practice in December 2005. However, the Fed once again adopted implicit forward guidance in the wake of the financial crisis beginning in December 2008: The Fed's forward guidance became explicit in August 2011.

Empirical evidence on the effectiveness of forward guidance is limited. This paper contributes to the literature by investigating the impact of forward guidance on the predictability of future short- and long-term interest rates for New Zealand, Norway, Sweden, and the United States.[1] Our approach is based on the hypothesis that the usefulness of forward guidance is determined by the extent to which forward guidance enhances a central bank's ability to affect longer-term bond yields. Consistent with policy inertia, this depends on the extent to which forward guidance enables market participants to more accurately predict future short-term rates.[2]

The empirical evidence in the paper consists of two parts. First, we assess the quality of the central bank interest rate projections in New Zealand, Norway, and Sweden relative to a naïve, random walk (RW) benchmark. Second, we use survey forecasts to evaluate the extent to

[1] We do not include the Czech Republic for two reasons. First, the number of relevant observations is very small and second, Czech financial markets and institutions are less developed than those in the other countries we study.

[2] Alternatively, Lange, Sack, and Whitesell (2003) use conventional tests of the expectations hypothesis to investigate whether the increase in predictability of the Fed's policy rate between 1983 and 2000 had a significant effect on longer-term yields. Due to well-documented econometric problems associated with such tests (see, e.g., Bekaert, Hodrick, and Marshall, 1997; Kool and Thornton, 2004; and Thornton, 2006), we focus on the predictability of future interest rates directly.

which forward guidance improves market participants' ability to forecast short-term and long-term interest rates. We compare the improvement in forecast accuracy after adopting forward guidance with that of a benchmark projection. Two alternative benchmark projections are used: the naïve, RW forecasts and the forecasts of a benchmark country (i.e., a country with similar characteristics that does not provide forward guidance). For New Zealand, the country benchmark is Australia; for Sweden and the United States, the United Kingdom; for Norway, Canada. The survey forecasts for all countries are from Consensus Economics (CE). For the United States we also use Blue Chip Financial's (BC) interest rate forecasts.

2. FORWARD GUIDANCE: THE THEORY

Noting that "aggregate demand depends not upon current short rates alone, but rather upon expected long-term real rates, which in turn depend upon expected future short rates," Woodford (1999, p. 14) suggested that policy effectiveness could be enhanced if interest rate policy was more inertial. Similarly, Rudebusch and Williams (2008) use the link between future short- and long-term interest rates in a New Keynesian model to demonstrate that publishing the forecast of the interest rate path makes the private agents' estimate of the central bank's reaction function more precise, which improves welfare. The theoretical basis for forward guidance is the expectations hypothesis of the term structure of interest rates, which hypothesizes that the long-term rate at time *t* is equal to the average of the market's time-*t* expectation for the short-term rate over the maturity of the longer-term asset plus a constant risk (or term) premium. More inertia in short-term interest rates increases both short-term and long-term interest rate predictability.

Not everyone believes that forward guidance necessarily increases the efficacy of monetary policy. Several authors have suggested that forward guidance could disrupt financial markets if economic agents place too much confidence in the announced policy path and disregard other information relevant for the future path of rates. The result could be herding behavior and overreaction to policy announcements. Morris and Shin (2002) demonstrate that under certain conditions higher transparency can drive expectations away from fundamentals. In the same vein, Kool, Middeldorp, and Rosenkranz (2011) use a theoretical model to show that more central bank information under near-risk neutrality of market participants may lead to crowding out of private information acquisition, thereby resulting in a deterioration of forecast precision. Walsh (2007) and Gosselin, Lotz, and Wyplosz (2009) apply a New Keynesian model to demonstrate that the optimal degree of transparency depends on the central bank's ability to forecast demand and supply shocks. Using a similar model, Brzoza-Brzezina and Kot (2008) show that the benefits of publishing interest rate forecasts are marginal once macroeconomic forecasts are provided.

Forward guidance might also cause central banks not to adjust the policy rate as rapidly as they should in response to new information. Such a delay could occur because of an unwillingness to transmit extra disturbances to the market or concern about a loss of credibility (e.g., Mishkin, 2004; Blinder and Wyplosz, 2004; and Goodhart, 2005). Using a New Keynesian framework, Gersbach and Hahn (2008a) show that if forward guidance increases the central bank's commitment to a chosen strategy model, deviating from its own forecast imposes welfare costs. As a result, the announcement of a future interest rate path always results in welfare losses. Using an alternative framework, however, Gersbach and Hahn (2008b) conclude that forward guidance will improve welfare if costs of reneging on earlier commitments are sufficiently low.

The desirability of forward guidance also has been questioned for a variety of other reasons. For example, Moessner and Nelson (2008) provide a brief summary of practitioners'—

central bankers'—views on the pros and cons of providing interest projections to the market. Quoting, among others, Kohn (2005, 2008), Issing (2005), Rosenberg (2007), Bergo (2006), and Archer (2005), they conclude central bankers generally acknowledge the benefits of reducing uncertainty about the central bank's objectives and being able to better manage market expectations. However, these authors are concerned about the ability of policymakers to reach a consensus on the interest rate path.[3] Goodhart (2009) raises similar practical concerns about the feasibility and effectiveness of forward guidance.

3. FORWARD GUIDANCE: PREVIOUS EVIDENCE

Empirical investigations of the effects of forward guidance have been relatively limited. Most research has focused on New Zealand because of its relatively long period of providing forward guidance. Andersson and Hofmann (2010) do a comparative event-type analysis of the effectiveness of forward guidance in New Zealand, Norway, and Sweden, dividing monetary policy surprises into target and path surprises. The former is measured as the change in the 1-month interbank rate on the day of the announced target change; the latter is measured as the change in the 1-year-ahead 3-month implied future swap rate that is uncorrelated with the target surprise. They estimate the effect of target and path surprises on 5- and 10-year Treasury yields and the 5-year-forward rate using daily data and an exponential generalized autoregressive conditionally heteroskedastic (EGARCH) model. They also include dummy variables for several macroeconomic announcement dates and find "some mild support for the notion that the publication of an interest rate path forecast may enhance the central bank's leverage over medium term (5-year) interest rates."

[3] This concern would appear to be well founded given the range of paths of Federal Open Market Committee participants.

Using a similar methodology, Moessner and Nelson (2008) analyze the effects of forward guidance for the RBNZ and the Fed. They conclude that the effect of surprises in monetary policy announcements on expectations of future rates is relatively small and that there is no evidence that deviations from prior forward guidance unsettle the markets.

Ferrero and Secchi (2007) analyze the variability of market interest rates around policy decision dates under forward guidance for the United States, the euro area, Norway, and New Zealand over the period 1999-2006 and find mixed results. Subsequently, they focus exclusively on New Zealand. Similar to Moessner and Nelson (2008), they find small responses of 3- and 12-month-ahead 3-month futures rates to monetary surprises contained in the revision of the central bank's interest rate projections. In addition, they report that the changes in interest rates between two successive path announcements are similar to the subsequent revision of the path. They take this as evidence that "market operators have well understood the conditionality of the central bank's projections" (Ferrero and Secchi, 2007, p. 30). However, it is possible that policymakers merely revise their projected path based on the observed behavior of rates during the period between successive path announcements (e.g., Andersson and Hofmann, 2010). Finally, they find that when the direction of the official interest rate changes, market expectations move in the opposite direction.

Drew and Karagedikli (2008) provide evidence on the impact of monetary policy surprises on the yield curve in New Zealand using intraday data and an event study methodology. Monetary policy surprises are measured as the change in the Official Cash Rate (OCR)—New Zealand's policy rate—relative to both survey expectations and expectations derived from futures and swap rates. At the 1-year horizon, there is nearly a one-to-one relation between the surprise and changes in market yields. However, the magnitude of the effect declines and becomes essentially zero after 5 years. No attempt is made to estimate forecast performance. In a related study using the same methodology, Karagedikli and Siklos (2008) find significant high-frequency effects of monetary policy surprises on the New Zealand exchange rate.

All of the above research focuses on monetary policy surprises on announcement days and the effect of these surprises on short-term and long-term interest rates. Obviously, any test of the effect of forward guidance then is a joint test, conditional on the appropriateness of the surprise measures. Furthermore, Thornton (2009) has shown that because market rates respond to news every day, the event study methodology can overestimate the response of interest rates to surprise policy actions. Overall, the evidence suggests a relatively small impact at short horizons of surprise announcements on market rates.

Our analysis is most closely related to that of McCaw and Ranchhod (2002), Turner (2006), and Goodhart and Lim (2011). McCaw and Ranchhod (2002) find evidence that the RBNZ's interest rate projections do not significantly outperform a RW. Turner (2006) compares RBNZ forecasts to CE forecasts and finds no difference in performance at the 3-month horizon but some improvement for the RBNZ at the 12-month horizon. Goodhart and Lim (2011) test the forecasting power of the RBNZ's projected interest path using Mincer-Zarnowitz (Mincer and Zarnowitz, 1969) regressions. They find that the RBNZ forecasts have significant predictive power for the 1-quarter-ahead money market rate and some predictive power for 2 quarters ahead, but none for longer horizons. Interestingly, when the same analysis is performed for the United Kingdom using market forecasts derived from the yield curve, very similar results are found. Goodhart and Lim (2011) also report that forecasts systematically underpredict during periods with rising rates and overpredict during periods with falling rates, suggesting that this is a consequence of mean-reverting behavior of the macroeconomy.

4. THE EFFECTIVENESS OF CENTRAL BANK FORWARD GUIDANCE

This section provides a comprehensive analysis of the forecast power of interest rate projections under forward guidance regimes of the central banks of New Zealand, Norway, and Sweden. We use CE data to measure market expectations. We also provide evidence on the effectiveness of the Federal Market Open Committee (FOMC)'s implicit forward guidance using both CE and BC's survey data.

4.1 Central Banks' Practice of Forward Guidance

Monetary policy in New Zealand is based on the Reserve Bank of New Zealand Act of 1989 and has focused on inflation targeting since February 1990. New Zealand has a floating exchange rate regime. The official policy rate set by the RBNZ is its OCR. However, RBNZ projections are for the 90-day bank bill rate.[4] The RBNZ started to publish its own interest rate projections in its quarterly Monetary Policy Statement of December 1997. Projections are for the average daily interest rate in the calendar quarter under consideration, including the current quarter.

Norway's monetary policy is characterized by inflation targeting and a floating exchange rate. Its central bank, the Norges Bank (NB), started to publicly communicate model-based interest rate projections in its Monetary Policy Report (MPR) of October/November 2005. Consequently, the fourth quarter of 2005 is assumed to be the start of NB's forward guidance. Interest rate projections are for the average daily key policy rate in a calendar quarter. The policy rate is the sight deposit rate—the rate at which banks can deposit at NB. The projections are published in the MPR, which is issued three times a year (March, June, and October). Typically

[4] Archer (2005, p. 4, footnote 13) states this is due to historical reasons and has only second-order implications that are swamped by the uncertainty surrounding the policy path itself.

the MPR contains projections for the remainder of the current year plus the three subsequent years.[5]

Sweden's Riksbank (RB) used inflation targeting and a flexible exchange rate over the period of analysis. The RB policy rate is the repo (repurchase) rate. The RB began publishing model-based projections for the repo rate in its Monetary Policy Report (MPR) in February 2007. The repo rate projections are for quarterly horizons three years ahead and are typically released three times a year (February, July, and October).[6] The projections are averages of the daily rate for calendar quarters.

4.2 Forecast Performance of Central Bank Interest Rate Projections

Our primary interest is whether forward guidance enables central banks to influence longer-term yields. However, we begin by testing whether forecasts by central banks outperform forecasts from the naïve RW model. Forecast accuracy is extremely important for affecting longer-term rates via the expectations hypothesis (e.g., Guidolin and Thornton, 2010). Consequently, if forecasts by central banks are not significantly better than the no-predictability alternative, it is difficult to see how forward guidance could significantly improve a central bank's ability to influence longer-term yields over time because the market would eventually become aware of the relative uselessness of the central bank's interest rate projections.

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[5] Due to the timing and frequency of Norway's MPR and interest rate projections, the 1-quarter-ahead October forecast—for next year's first quarter—has a slightly longer horizon than the 1-quarter-ahead March forecast for this year's second quarter and the June forecast for this year's third quarter. The same holds for the other horizons. Preliminary testing shows that this difference does not show up significantly in our results, so we ignore it hereafter.

[6] Similar to Norway, the frequency and timing of the projections in Sweden's MPR induce a slight difference in actual horizon across the three projection dates. The *n*-quarter-ahead forecast made in February in fact has a slightly shorter horizon than the corresponding forecasts made in July and October. In the analysis, we abstract from this difference. About halfway between two successive MPR publication dates typically there is a monetary policy update. However, repo rate projections remain virtually unchanged in the update; consequently, we do not consider the updates.

The Diebold-Mariano (DM) test procedure (Diebold and Mariano, 1995) is used to test for differences in forecast performance. The DM test statistic is based on the difference in forecast performance for a pair of models indexed as λ_1 and λ_2. Specifically,

$$DM^{\lambda_1,\lambda_2} = \frac{\bar{d}}{\sqrt{\hat{V}(\bar{d})}}, \quad (1)$$

where $\bar{d}$ denotes the mean of a differential loss function of the general form $d_t = L(e_{t,h}^{\lambda_1}) - L(e_{t,h}^{\lambda_2})$, $L(\cdot)$ denotes a generic loss function, $e_{t,h}^{\lambda_j}$ denotes the forecast error for model $j = 1, 2$, made at time t for h quarters ahead, and $\hat{V}(\bar{d})$ denotes the estimate of the variance of $\bar{d}$. $\hat{V}(\bar{d})$ is estimated using a Newey-West procedure. Based on the work of Harvey, Leybourne, and Newbold (1997), we used the modified DM test (MDM) to correct for size distortions associated with the original DM test:

$$MDM^{\lambda_1,\lambda_2} = [\frac{T + 1 - 2n + \frac{1}{T} n(n-1)}{T}]^{1/2} DM^{\lambda_1,\lambda_2}. \quad (2)$$

The exact date when the central bank's projections are made is unknown, so it is impossible to know exactly what interest rate realizations were available at the time the projections were made. We assume that for projections made in a given month policymakers would have at least known the interest rate at the end of the previous month. Therefore, for the RW forecasts we used the average rate during the last five market days of the month before the forecast month.

The results for New Zealand, Norway, and Sweden are presented in Tables 1 through 3, respectively. The tests are performed for the sample period of forward guidance for each country. The tables report $\bar{d}$, $\sqrt{\hat{V}(\bar{d})}$, and the MDM statistic for the mean absolute error (MAE) and the mean squared error (MSE) loss functions. A negative value of $\bar{d}$ implies that the central bank's projection outperforms the RW forecast on average. The difference in forecasting performance is tested for up to eight quarters ahead.[7]

The quantitative results vary somewhat across countries; however, the results are qualitatively similar. Specifically, with only a few exceptions, the central bank's forecasts are better than those from the naïve RW model at nearly all forecast horizons for both metrics. The differences in forecast performance are quantitatively small for New Zealand; the differences for either Norway or Sweden are substantially larger and of a similar order of magnitude. However, consistent with the findings by Goodhart and Lim (2011) and Middeldorp (2011), the differences are statistically significant only at relatively short horizons and, with two exceptions, only for the MAE metric.[8]

4.3 Forward Guidance and the Efficacy of Monetary Policy

The fact that the central bank's forecasts outperform those of a naïve model provides some support, albeit relatively weak, for the potential usefulness of central bank forward guidance. However, a stronger test is whether forward guidance improves the central bank's ability to affect longer-term yields that matter more for economic activity. The conditional expectation of the short-term rate at time t for horizon k, $E_t(i^s_{t+k})$ is unobservable. We use survey forecasts of short-term rates as a proxy for $E_t(i^s_{t+k})$. Specifically, we test whether survey forecasts of the relevant short-term rate improve after the central bank adopts forward guidance. CE forecasts are available monthly with two forecast horizons: 3 and 12 months ahead. The availability of monthly forecasts mitigates the small sample problem associated with using

[7] Note that the samples for Norway and Sweden are extremely small, especially at longer horizons. For Norway, only twelve 8-quarter-ahead forecasts are available; for Sweden, only eight quarters are available.

[8] The unusually large forecast errors in the final quarters of 2008 associated with the financial market turmoil after Lehman Brothers' bankruptcy announcement potentially explain the lack of MSE significance as extreme errors impose a relatively large penalty on the MSE loss function.

quarterly data.[9] We present the results for the mean 3-month-ahead (1 quarter) and 12-month-ahead (4 quarters) forecasts for the 3-month bill rate and the 10-year bond yield. The sample period for each country is determined by the availability of the CE forecasts. For New Zealand, Norway, and Sweden the samples begin on December 1994, January 1998, and June 1998, respectively. For all three countries, the sample ends on August 2011 for the 3-month-ahead forecasts and November 2010 for the 12-month-ahead forecasts.

We investigate whether the CE forecasts of the 3-month bill rates and 10-year bond yields improved significantly after the introduction of forward guidance. To control for other factors that could affect interest rate predictability, we test for the change in forecast performance relative to the RW and country benchmarks.[10] The test is performed by estimating the equation

$$d_t = \alpha + \beta Dum + \varepsilon_t, \qquad (3)$$

where d_t is the difference in the forecast error for a given loss function between the CE forecasts and each of the benchmarks, and Dum is a dummy variable that takes the value 1 during the period of forward guidance and zero otherwise. As before, we use the MAE and MSE loss functions. Specifically, we then test the hypothesis $\beta = 0$; that is, there is no change in $\bar{d}$ after a country's adoption of forward guidance. A significantly negative estimate of β indicates an improvement in survey forecast performance relative to the benchmark.[11]

Estimates of β and its standard error are reported in Tables 4 through 6 for New Zealand, Norway, and Sweden, respectively. The results at most provide weak support for the

[9] Unfortunately, we cannot directly match CE forecasts with central bank projections. CE forecasts are forecasts for end-of-month rates at a 3-month and 12-month horizon, respectively, while central banks provide projections for the average rate in future calendar quarters.

[10] For the RW benchmark, we compare the survey forecasts made in month t for the end of months $t+3$ and $t+12$ ahead with the rate observed on the last working day in month $t-1$.

[11] The estimate of α measures the relative forecast performance against the benchmark in the pre-forward guidance period, where $\alpha > 0$ implies the benchmark performs better.

idea that forward guidance improves the efficacy of monetary policy. Specifically, for the 3-month-ahead forecasts of the 3-month bill rate the estimates of β are always negative, but quantitatively small, benchmark dependent, and never statistically significant.

At the 12-month-ahead horizon, the quantitative results for the bill rate vary across central banks. For New Zealand the performance deteriorates, though only significantly so, for the MAE measure using the country benchmark. For Norway and Sweden, there is a statistically significant improvement in both the MAE and the MSE relative to the RW benchmark. Moreover, the improvement is relatively large—a 60-basis-point improvement in the MAE for Norway and an 84-basis-point improvement for Sweden. These results are not robust to the choice of the benchmark; the estimated gains are cut in half and are not statistically significant for the respective country benchmarks.

The results indicate no improvement in the survey forecasts of the 10-year bond yield at the 3-month-ahead horizon. The estimates of β are either negative but very small or positive. Moreover, in no instance is the estimate statistically significant. At the 12-month-ahead horizon, however, there is some statistically significant improvement relative to the country benchmark for Norway, but only for MSE; however, the estimates suggest a sizable and statistically significant deterioration for New Zealand. Relative to the RW benchmark there is no significant improvement. For Sweden, the CE bond forecasts deteriorate relative to the RW at a 12-month-ahead horizon.[12]

In general, the evidence of forecasting improvement is weak and varies by country, benchmark, and loss function. The evidence is strongest for the 3-month-ahead bill rate at a 12-

[12] The discrepancy in effects on the 12-month-ahead horizon for the country benchmark versus the RW benchmark makes us skeptical of the country benchmark results. It suggests that other factors in the benchmark countries unrelated to forward guidance may play a significant role. Unreported results where we alternatively use Australia, Canada, and the United Kingdom for each forward guidance country support the impact of other factors. However, these do not lead to qualitatively different outcomes and conclusions.

month-ahead horizon against the RW benchmark for Sweden and Norway. The results are much weaker for bond yields than for bill rates. Perhaps the most striking result is the lack of evidence of improved forecasting accuracy for New Zealand—the country with the longest experience with forward guidance.

The results can be interpreted more easily by looking at the MAEs of the 12-month-ahead RW and CE forecasts for the 3-month-ahead bill rate. Figures 1 through 3 show the results for New Zealand, Norway, and Sweden, respectively.[13] The vertical line denotes the beginning of forward guidance for each country. Figure 1 shows why there was no evidence of improvement for New Zealand. For a period of a couple of years immediately following the adoption of forward guidance, there was some improvement of the surveys relative to the RW; however, later the survey forecasts deteriorated relative to the RW forecasts. For the entire period since the adoption of forward guidance Figure 1 shows no sign of marked difference in forecast performance. Indeed, an MDM test of the difference in forecasting performance between the CE and RW forecasts indicates no statistically significant difference in forecasting performance since New Zealand adopted forward guidance.

The forecast errors for Norway (shown in Figure 2) indicate a marked improvement of CE forecasts relative to RW forecasts following the adoption of forward guidance. Indeed, the average difference in MAEs since the adoption of forward guidance is –62 basis points, which is statistically significant. However, the improvement in forecasting performance began about a year in advance of the adoption of forward guidance: The average difference for the year before forward guidance was –55 basis points. This may be taken as evidence supporting the usefulness of forward guidance because the period roughly coincides with a change in the communications strategy of NB, focusing more directly on interest rate conditions, including information of a

[13] The sample periods are the longest period of continuous CE forecasts for each country.

quantitative range for the likely level of the short-term interest rate on a 3- to 4-month horizon (see Ferrero and Secchi, 2007).

The MAEs for Sweden (shown in Figure 3) also suggest an improvement in survey forecasting performance; the RW errors are consistently larger than the survey forecast errors since the adoption of forward guidance. As with Norway, however, the increase in performance begins in advance of the adoption of forward guidance. Indeed, the average difference in MAE is –77 basis points after the adoption of forward guidance and –87 basis points for the 18 months before the adoption of forward guidance. In both instances the difference is highly statistically significant.

Figures 1 through 3 reveal a characteristic of the data that may be very important for interpreting the results presented in Tables 4 through 6. Specifically, the figures show that the difference in forecasting performance is highly persistent. The high degree of persistence suggests that it may take a relatively long time frame to determine whether forward guidance policy significantly improves forecasting ability. Consequently, the evidence from Norway and Sweden should be viewed with caution. In this regard, it is interesting to note that the results for the country with the longest history of forward guidance are the least supportive of its effectiveness.

Since the intent of forward guidance is to enable central bank short-term interest rate policy to have a larger affect on longer-term interest rates, we also investigate this possibility directly. Given the limitation of the CE data our results are only suggestive. Specifically, we investigate whether the improvement in CE forecast performance for short-term rates following the adoption of forward guidance is reflected in changes in longer-term rates, using the following regression:

$$\Delta R_t^n = \alpha_0 + \alpha_1 \Delta E_t(i_{t+3}^3) + \alpha_2 \Delta E_t(i_{t+12}^3) + u_t, \quad (4)$$

where ΔR_t^n denotes the change in the interest rate on a bond with maturity of n years and $\Delta E_t(i_{t+3}^3)$ and $\Delta E_t(i_{t+12}^3)$ denote the change in the CE forecasts for the 3-month bill rate for 3 and 12 months ahead. For New Zealand and Norway $n = 2$ and for Sweden $n = 3$; u is a zero-mean, constant variance stochastic error. Equation (4) is estimated for the period before and after forward guidance. If forward guidance increased the central bank's ability to affect interest rates further out on the term structure, we would expect the estimate of R^2 to be higher after forward guidance than before.

Table 7 reports the estimate of R^2 for the pre- and post-forward guidance periods as well as the likelihood ratio statistic for a test of no difference between the two periods. For all countries the estimate of R^2 is larger for the post-forward guidance period; however, the difference is statistically significant only for Sweden.[14] The results are qualitatively the same as those reported in Tables 4 through 6. Specifically, there is essentially no evidence of improvement for New Zealand; somewhat stronger, but not statistically significant, evidence for Norway; and the strongest for Sweden.[15]

4.4 Forward Guidance and the Efficacy of Monetary Policy: The United States

The Fed did not publish an explicit path for it policy rate until August 2011. However, the Fed has provided implicit forward guidance during two periods before August 2011. Specifically, beginning with its August 2003 meeting—the meeting after the FOMC reduced its funds rate target to the then-historically low level of 1.0 percent—the Committee announced that

[14] Using the same approach with changes in the 10-year bond yield as dependent variables fails to lead to significant results for all countries.
[15] A caveat applies: In contrast to our earlier analyses, we do not control for other factors that may have changed the predictability of interest rates. This may be particularly important for the Swedish results as the Riksbank started its forward guidance almost simultaneously with the start of the global financial crisis.

it believed “that policy accommodation can be maintained for a considerable period.” The “considerable period” language was meant to signal its intention to keep the funds rate near 1 percent for a longer period than might otherwise have been expected in the hope of having a larger effect on longer-term yields and, hence, economic activity.[16] The FOMC repeated the statement at each of its next three meetings. The statement was modified slightly at the January and March 2004 meetings to “the Committee believes that it can be patient in removing its policy accommodation.” The FOMC signaled its intention to start slowly increasing the target at its May 2004 meeting by stating “the Committee believes that policy accommodation can be removed at a pace that is likely to be measured.” The target was increased by 25 basis points at each of the next 16 meetings; however, the forward guidance language was dropped at the December 2005 meeting, when the target had reached 4.0 percent.

The FOMC returned to forward guidance again in December 2008, when following its decision to reduce the funds rate target to between zero and 0.25 percent, the Committee announced that “economic conditions are likely to warrant exceptionally low levels of the federal funds rate for some time.” This or very similar language appeared in the FOMC’s statement until August 2011 when the FOMC noted that economic conditions “are likely to warrant exceptionally low levels for the federal funds rate at least through mid-2013”—an attempt to reduce longer-term yields by being more explicit about how long the rate would remain at zero. This statement was repeated at the November and December 2011 FOMC meetings. At its January 2012 meeting the FOMC extended forward guidance until “late 2014.”

[16] Woodford (2005, p. 2) referred to this as the Fed’s “bold recent experiment in greater explicitness about the future outlook for interest rates.”

This section investigates whether the Fed's forward guidance contributed to the ability of private market participants to forecast future interest rates. We investigate the effectiveness of forward guidance for the Fed by estimating the equation

$$d_t = \alpha + \beta_1 Dum_1 + \beta_2 Dum_2 + \varepsilon_t, \tag{5}$$

where Dum_1 is a dummy variable that takes the value 1.0 from August 2003 through December 2005 and zero elsewhere, and Dum_2 is a dummy variable that is 1.0 since December 2007. For the United States we have survey projections from both CE and BC. The BC forecasts are slightly different from the CE forecasts because they refer to the average rate in the forecasted calendar quarter.[17]

Table 8 presents the results using CE forecasts.[18] The top panel shows the results for the RW benchmark, the bottom panels the results for the country benchmark. For the first period of forward guidance, there is a statistically significant improvement in forecasts of the 3-month rate with either loss function and at both the 3-month and 12-month horizons relative to RW forecasts. The gains are relatively small at the 3-month horizon but very large at the 12-month horizon: 125 to 300 basis points. The evidence supporting forward guidance vanishes when the country benchmark is used, however. Moreover, there is no improvement for the 10-year bond yield regardless of loss function, forecast horizon, or benchmark. The results are even less encouraging for the second period of forward guidance: For the bill rate, all four coefficients are positive, three significantly so, compared with the RW forecast. They are negative and

[17] Note that this implies that the January 1-quarter-ahead forecast, the February 1-quarter-ahead forecast, and the March 1-quarter-ahead forecast are for the same second calendar quarter. As a result, we may expect January forecasts to be worse than February forecasts, and so on; checking the data confirms this. However, since all our results are for the BC forecast error relative to a benchmark with the same characteristics, the heterogeneity in forecast ability across months plays no role.

[18] The sample starts in January 1990.

insignificant for the U.K. benchmark. For the bond yield, all coefficients are positive, significantly so for the MSE loss function using either the RW or country benchmark.

Table 9 shows the results using the BC forecasts with the RW benchmark.[19] Only RW benchmark results are presented because corresponding survey forecasts are unavailable for other countries. The results are quantitatively and qualitatively the same as those based on the CE forecasts. The similarity in the parameter estimates suggests that the two sets of survey forecasts are very similar.

5. SUMMARY AND CONCLUSIONS

In this paper, we investigate the impact of forward guidance on the predictability of future short- and long-term interest rates in four countries: New Zealand, Norway, Sweden, and the United States. New Zealand started providing forward guidance in 1997, Norway in 2005, and Sweden in 2007. The United States used implicit forward guidance in the periods 2003-2005 and 2008-2011.

We find that central bank interest rate projections outperform naïve random walk forecasts but are statistically significant only for Norway and Sweden at horizons up to three quarters. For these countries, the gain compared with the random walk forecasts can be as large as 30 to 50 basis points. In contrast, for New Zealand there is little evidence of forecasting performance superior to that of the naïve random walk forecasts.

Using 3-month-ahead and 12-month-ahead monthly survey forecasts of the 3-month bill rate and the 10-year bond yield, we find some evidence supportive of forward guidance. However, the evidence is generally weak and varies by forecast horizon, benchmark, and loss function. The evidence is strongest for the 3-month bill rate at a 12-month horizon for Sweden

[19] We choose the RW benchmark for the BC forecasts as the average interest rate in the last five working days of the month before the forecast.

and Norway and weakest for the 10-year bond yield, where no significant results are found for any country. There is no evidence of improvement in the case of New Zealand—the country with the longest history of forward guidance. A likelihood ratio test of no change in the ability of survey forecasts to explain changes in 2- and 3-year bond yields after the start of forward guidance is rejected only for Sweden. For 10-year bond yields, the null hypothesis is not rejected for any country.

The U.S. evidence—using two sets of survey forecasts—is consistent with that for New Zealand, Norway, and Sweden. There is a significant improvement relative to the random walk forecasts during the first period of implicit forward guidance, 2003-2005; however, the improvement vanishes when the random walk benchmark is replaced by the country benchmark. Moreover, there is no improvement using bond yields. During the second period of forward guidance, 2008-2011, indeed, the performance appears to deteriorate.

Overall, we find no compelling evidence that forward guidance actually improves markets' ability to better forecast future rates. The weak support we do find is at the short end of the yield curve, at relatively short forecast horizons, and only for Norway and Sweden where the time series under forward guidance are relatively short. In contrast, there is no evidence that forward guidance improves the efficacy of monetary for New Zealand, the country that has been practicing forward guidance since 1997.

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Table 1
Difference between central bank and RW forecasts: New Zealand

	MAE			**MSE**		
Quarters ahead	**Mean**	**SE**	**MDM**	**Mean**	**SE**	**MDM**
1	–0.045	0.025	–1.79	–0.053	0.061	–0.85
2	–0.107	0.044	**–2.37***	–0.316	0.167	–1.84
3	–0.107	0.072	–1.43	–0.514	0.300	–1.63
4	–0.096	0.102	–0.88	–0.679	0.471	–1.34
5	–0.044	0.132	–0.30	–0.711	0.605	–1.07
6	–0.012	0.130	–0.08	–0.789	0.651	–1.08
7	–0.004	0.135	–0.02	–0.812	0.687	–1.03
8	–0.058	0.142	–0.34	–1.009	0.782	–1.09

Note: *Significant at 5 percent level. Significant coefficients are printed in bold.

Table 2
Difference between central bank and RW forecasts: Norway

	MAE			**MSE**		
Quarters ahead	**Mean**	**SE**	**MDM**	**Mean**	**SE**	**MDM**
1	–0.332	0.095	**–3.40****	–0.488	0.344	–1.38
2	–0.505	0.124	**–3.73****	–0.959	0.581	–1.50
3	–0.528	0.196	**–2.24***	–1.346	0.776	–1.44
4	–0.517	0.254	–1.56	–1.440	0.856	–1.29
5	–0.660	0.293	–1.53	–1.838	0.981	–1.27
6	–0.697	0.286	–1.40	–2.340	1.088	–1.24
7	–0.663	0.358	–0.85	–2.415	1.550	–0.71
8	–0.492	0.446	–0.41	–1.716	2.191	–0.29

Note: *Significant at 5 percent level; **significant at 1 percent level. Significant coefficients are printed in bold.

Table 3
Difference between central bank and RW forecasts: Sweden

	MAE			**MSE**		
Quarters ahead	**Mean**	**SE**	**MDM**	**Mean**	**SE**	**MDM**
1	–0.378	0.124	**–2.92****	–0.696	0.510	–1.31
2	–0.529	0.148	**–3.15****	–0.961	0.687	–1.24
3	–0.559	0.192	**–2.31***	–1.183	0.828	–1.13
4	–0.449	0.248	–1.23	–1.163	1.016	–0.78
5	–0.281	0.300	–0.51	–0.699	1.320	–0.29
6	–0.380	0.364	–0.47	–0.442	1.580	–0.13
7	–0.307	0.376	–0.22	0.150	1.788	0.02
8	–0.031	0.374	0.00	0.956	1.906	0.00

Note: *Significant at 5 percent level; **significant at 1 percent level. Significant coefficients are printed in bold.

Table 4
Changes in survey (CE) forecast performance (β): New Zealand

	MAE		MSE	
	$\hat{\beta}$	**SE**	$\hat{\beta}$	**SE**
Australian benchmark				
Bill				
3-mo-ahead	–0.294	0.202	–0.466	0.385
12-mo-ahead	**0.949***	0.467	2.364	1.485
Bond				
3-mo-ahead	–0.062	0.12	–0.18	0.225
12-mo-ahead	**0.644****	0.19	**1.864****	0.579
Random walk benchmark				
Bill				
3-mo-ahead	–0.104	0.114	–0.367	0.313
12 mo-ahead	0.226	0.322	–0.493	1.09
Bond				
3-mo-ahead	0	0.056	–0.079	0.077
12-mo-ahead	–0.071	0.141	–0.194	0.318

Note: *Significant at 5 percent level; **significant at 1 percent level. Significant coefficients are printed in bold.

Table 5
Changes in survey (CE) forecast performance (β): Norway

	MAE		MSE	
	$\hat{\beta}$	**SE**	$\hat{\beta}$	**SE**
Canada benchmark				
Bill				
3-mo-ahead	–0.121	0.142	–0.236	0.332
12-mo-ahead	–0.275	0.383	–1.319	1.461
Bond				
3-mo-ahead	–0.005	0.062	–0.029	0.056
12-mo-ahead	–0.146	0.087	**–0.341***	0.157
Random walk benchmark				
Bill				
3-mo-ahead	–0.161	0.096	–0.39	0.371
12-mo-ahead	**–0.600****	0.210	**–2.479***	0.974
Bond				
3-mo-ahead	0	0.051	0.02	0.053
12-mo-ahead	0.01	0.129	–0.059	0.21

Note: *Significant at 5 percent level; **significant at 1 percent level. Significant coefficients are printed in bold.

Table 6
Changes in survey (CE) forecast performance (β): Sweden

	MAE		MSE	
	$\hat{\beta}$	SE	$\hat{\beta}$	SE
U.K. benchmark				
Bill				
3-mo-ahead	–0.003	0.087	–0.034	0.105
12-mo-ahead	–0.343	0.204	–1.12	0.679
Bond				
3-mo-ahead	–0.02	0.079	0.048	0.133
12-mo-ahead	–0.189	0.119	–0.539	0.293
Random walk benchmark				
Bill				
3-mo-ahead	–0.107	0.095	–0.384	0.362
12-mo-ahead	**–0.837****	0.168	**–2.684****	0.846
Bond				
3-mo-ahead	0.08	0.061	0.157	0.107
12-mo-ahead	0.236	0.129	0.285	0.260

Note: **Significant at 1 percent level. Significant coefficients are printed in bold.

Table 7
Explanatory power of survey forecasts for longer-term yields

	New Zealand	Norway	Sweden
R^2 Pre-forward guidance	0.7	11.1	6.6
R^2 Post-forward guidance	8.0	23.1	27.9
Likelihood ratio test statistic	1.45	1.23	6.14**

Note: ** Significant at 1 percent level

Table 8
Changes in survey (CE) forecast performance: United States

	MAE				MSE			
	$\hat{\beta}_1$	**SE**	$\hat{\beta}_2$	**SE**	$\hat{\beta}_1$	**SE**	$\hat{\beta}_2$	**SE**
Random walk benchmark								
Bill								
3-mo	**–0.297****	0.086	**0.081****	0.027	**–0.221****	0.076	**0.070***	0.034
12-mo	**–1.268****	0.134	**0.426****	0.124	**–3.014****	0.470	0.224	0.270
Bond								
3-mo	0.019	0.074	0.032	0.059	0.015	0.055	0.090	0.098
12-mo	0.131	0.187	0.422	0.226	0.095	0.243	**0.759***	0.372
U.K. benchmark								
Bill								
3-mo	–0.017	0.083	–0.073	0.091	0.033	0.171	–0.013	0.175
12-mo	–0.047	0.210	–0.279	0.199	–0.647	0.690	–0.842	0.692
Bond								
3-mo	0.045	0.062	0.101	0.064	0.085	0.095	0.216	0.116
12-mo	0.060	0.116	0.210	0.114	0.026	0.215	**0.498***	0.252

Note: *Significant at 5 percent level; **significant at 1 percent level; Significant coefficients are printed in bold.

Table 9 Changes in survey (BC) forecast performance: United States (Random Walk Benchmark)

	MAE				MSE			
	$\hat{\beta}_1$	**SE**	$\hat{\beta}_2$	**SE**	$\hat{\beta}_1$	**SE**	$\hat{\beta}_2$	**SE**
Bill								
3-mo	**–0.307****	0.078	**0.066***	0.028	**–0.218****	0.068	0.034	0.033
12-mo	**–1.329****	0.144	**0.588****	0.133	**–3.005****	0.463	0.426	0.312
Bond								
3-mo	0.033	0.082	0.031	0.060	0.016	0.062	0.079	0.093
12-mo	0.204	0.226	0.376	0.223	0.231	0.278	0.690	0.372

Note: *Significant at 5 percent level; **significant at 1 percent level Significant coefficients are printed in bold.

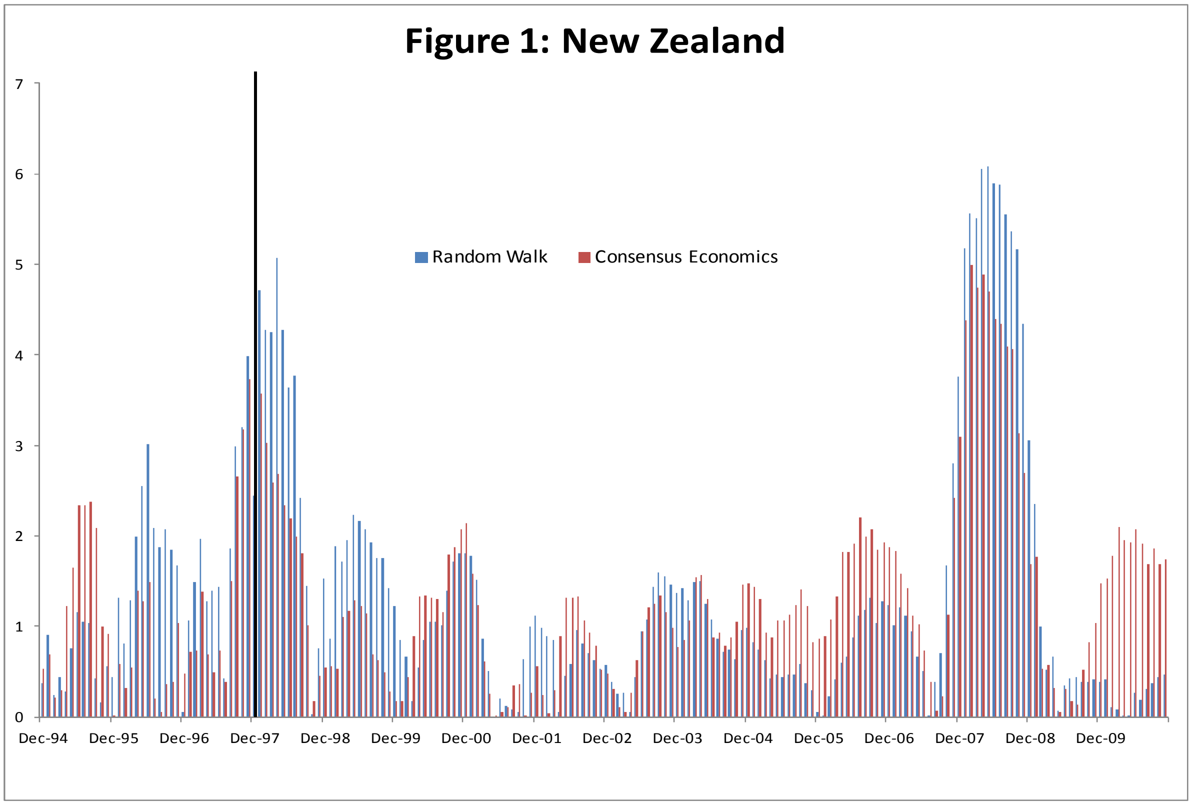

Figure 1 12-Month Ahead Absolute Forecast Errors of the 3-Month Bill Rate

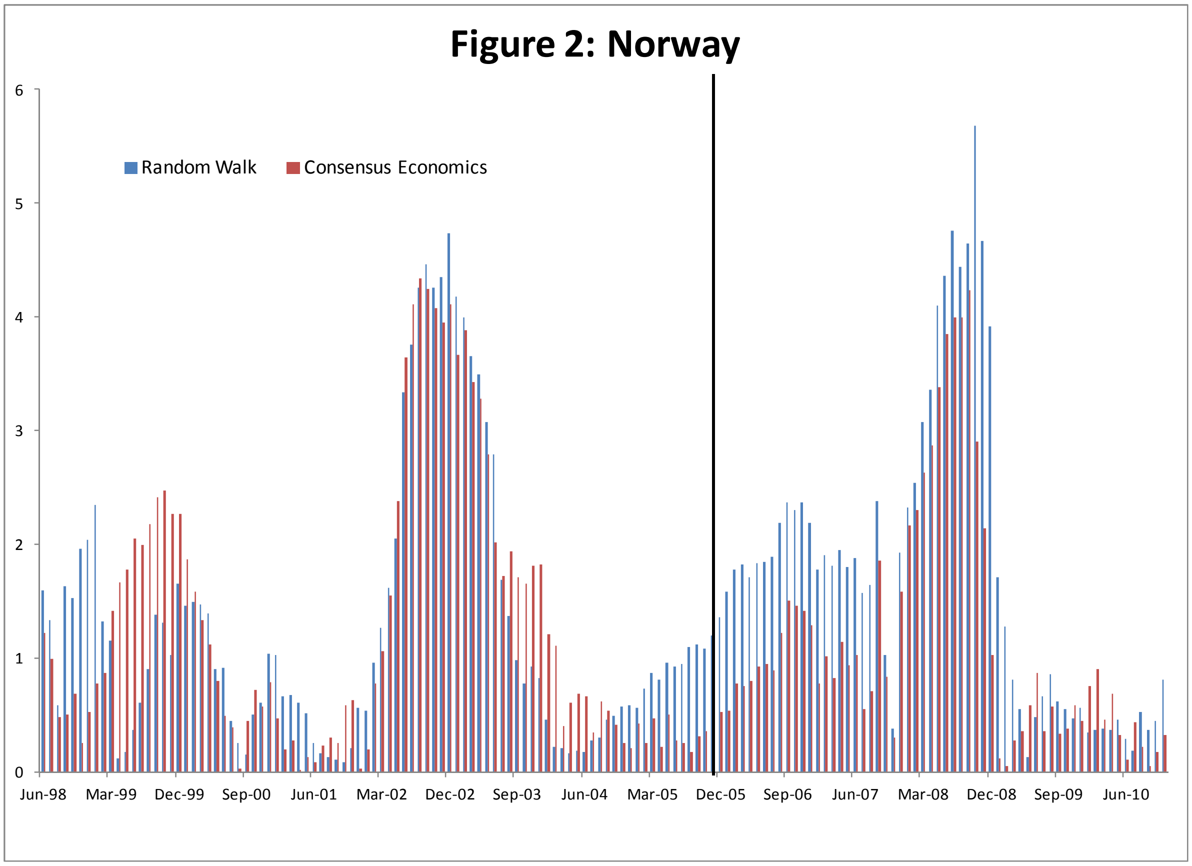

Figure 2 12-Month Ahead Absolute Forecast Errors of the 3-Month Bill Rate

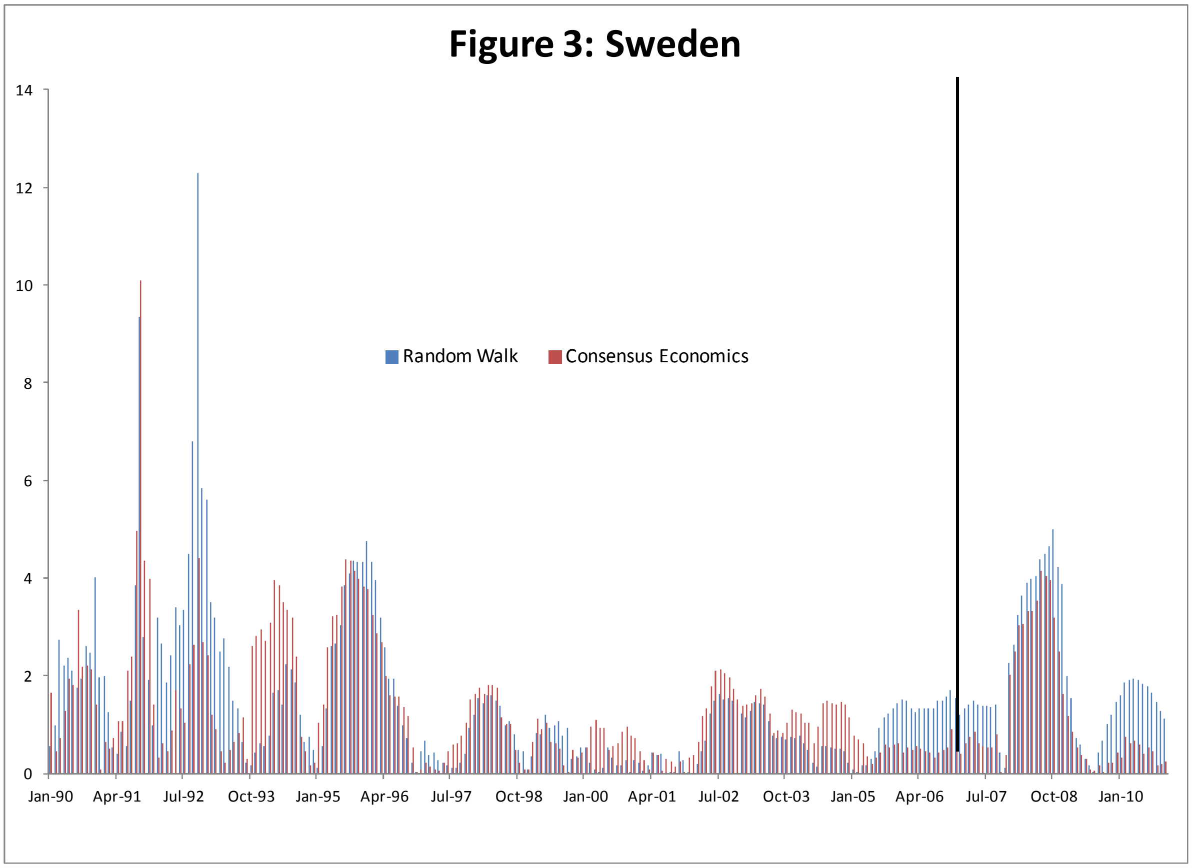

Figure 3 12-Month Ahead Absolute Forecast Errors of the 3-Month Bill Rate