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**Research Report**

## Norges Bank's Endogenous Interest Rate Path and Its Impact on Interest Rate Expectations

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# STAFF MEMO

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# Norges Bank's endogenous interest rate path and its impact on interest rate expectations

Olav Syrstad<sup>δ</sup> and Dagfinn Rime<sup>ψ</sup>

## Introduction

Norges Bank has published its own forecasts for the key policy rate since 2005. The Reserve Bank of New Zealand introduced this practice as early as in 1997. Later, in 2007, the Swedish Riksbank also started to publish its interest rate forecasts, followed by the Czech National Bank in 2009.

In this note we take a closer look at Norges Bank's interest rate forecasts and their impact on interest rate expectations extracted from market prices. Rather than attempting to answer normative questions about the desirability of interest rate forecasts, we present a short, descriptive overview of how interest rate expectations have changed around the time of publication of Norges Bank's interest rate paths. Finally, we perform a straightforward comparison of Norges Bank's and market participants' forecast accuracy.

## Methodology

Norges Bank publishes its interest rate forecast as the quarterly average of the key policy rate for each quarter up to 3 years ahead. Norges Bank also publishes its forecast for the money market premium (quarterly average). Until the third quarter of 2008, Norges Bank assumed a fixed money market premium equal to 25 basis points for the entire forecast horizon. The bankruptcy of Lehman Brothers generated substantial volatility in money market premiums and the forecast for this premium became important in order to set the appropriate policy rate. To be able to construct an interest rate forecast that is comparable with market prices, we add Norges Bank's forecast for the money market premium to the forecast for the key policy rate.

As the presentation of market data differs from that of Norges Bank's interest rate path, we need to transform market forward interest rates into quarterly averages. We convert the data as follows:

- We use Forward Rate Agreement (FRA) data from Bloomberg. FRA data reflect market participants' view of 3-month NIBOR (Norwegian Interbank Offered Rate) on the respective IMM date.<sup>1</sup>
- The IMM date never coincides with a change of quarter. In order to make the data comparable, we conduct a linear interpolation between the respective contracts in order to construct a comparable quarterly average for the market's forecast of 3-month NIBOR.

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<sup>1</sup> **IMM dates** are the four quarterly dates of each year which most futures contracts and option contracts use as their scheduled maturity date or termination date. The IMM dates are the third Wednesday in March, June, September and December. IMM stands for the International Money Market.

An example may shed light on the procedure: Assume Norges Bank published its *Monetary Policy Report* on March 14, 2012, including an endogenous key policy rate path and Norges Bank's forecast for the money market spread. By adding the forecast for the money market spread, we have created a Norges Bank money market rate path (3-month NIBOR). The first complete quarter in Norges Bank's forecast will be the second quarter of 2012. This quarter runs from 1 April 2012 to 1 July 2012. However, the next IMM date (which the market price is based on) is 16 March 2012 and the second IMM date is 16 June 2012. This means that the FRA market gives a market price for 3-month NIBOR on 16 March 2012 and on 16 June 2012. By conducting the following linear interpolation, we transform market data into a forecast for the quarterly average:

***Quarterly average of market data for second quarter*** = ((the number of days from the start of Q2-12 to the IMM date in June/the number of days in Q2-12)\*3M FRA on March IMM date) + ((the number of days from the IMM date in June until end of Q2-12/the number of days in Q2-12)\*3M FRA on June IMM date)

We can now compare the Norges Bank market path with market participants' expectations as expressed in the FRA market.

### **Interest rate forecasts**

The following section presents all the interest rate paths and the subsequent reaction in terms of changes in interest rate expectations in the market since the first central bank path was published on 2 November 2005. In the graphs, the blue dots show the Norges Bank published interest rate path, the red dots represent the market path the day before and the green dots represent the market path the day after the *Monetary Policy Report* was published. The solid line represents the actual outcome of 3-month NIBOR. Note that the first point in the market path is not comparable with the Norges Bank path. This is because Norges Bank does not publish a forecast for the quarter when the report is published.

The figures show that up to June 2008 the market paths and the Norges Bank paths were more or less aligned. This may be interpreted to indicate that the reaction pattern from Norges Bank was consistent and transparent. Furthermore, it must also imply a similar interpretation of the economic outlook by market participants and Norges Bank. Additionally, the change in the market path one day before compared with one day after the publication of the Norges Bank rate path is rather small. This may either be evidence of a predictable monetary policy reaction pattern or that the new information provided by a new central bank rate path does not move market expectations very much.

In late 2008 and in 2009, the divergence between market expectations and Norges Bank's published interest rate forecasts increased. In the last quarter of 2008, the Norges Bank rate path had a greater impact on market prices than previously, i.e. the change in market expectations the day before compared with the day after the publication of the *Monetary Policy Report* was more pronounced. High economic uncertainty during this period may be a reasonable explanation for both the divergence between market expectations and the central

bank rate path and the major shift in the market path towards the Norges Bank rate path in the last quarter of 2008.<sup>2</sup>

In 2010 the graphs again look similar to the ones before the third quarter of 2008. Market expectations are now broadly in line with those of Norges Bank. The reactions to the publication of new rate paths from Norges Bank are in general very small. This may suggest that the reaction pattern of Norges Bank is well known by market participants.

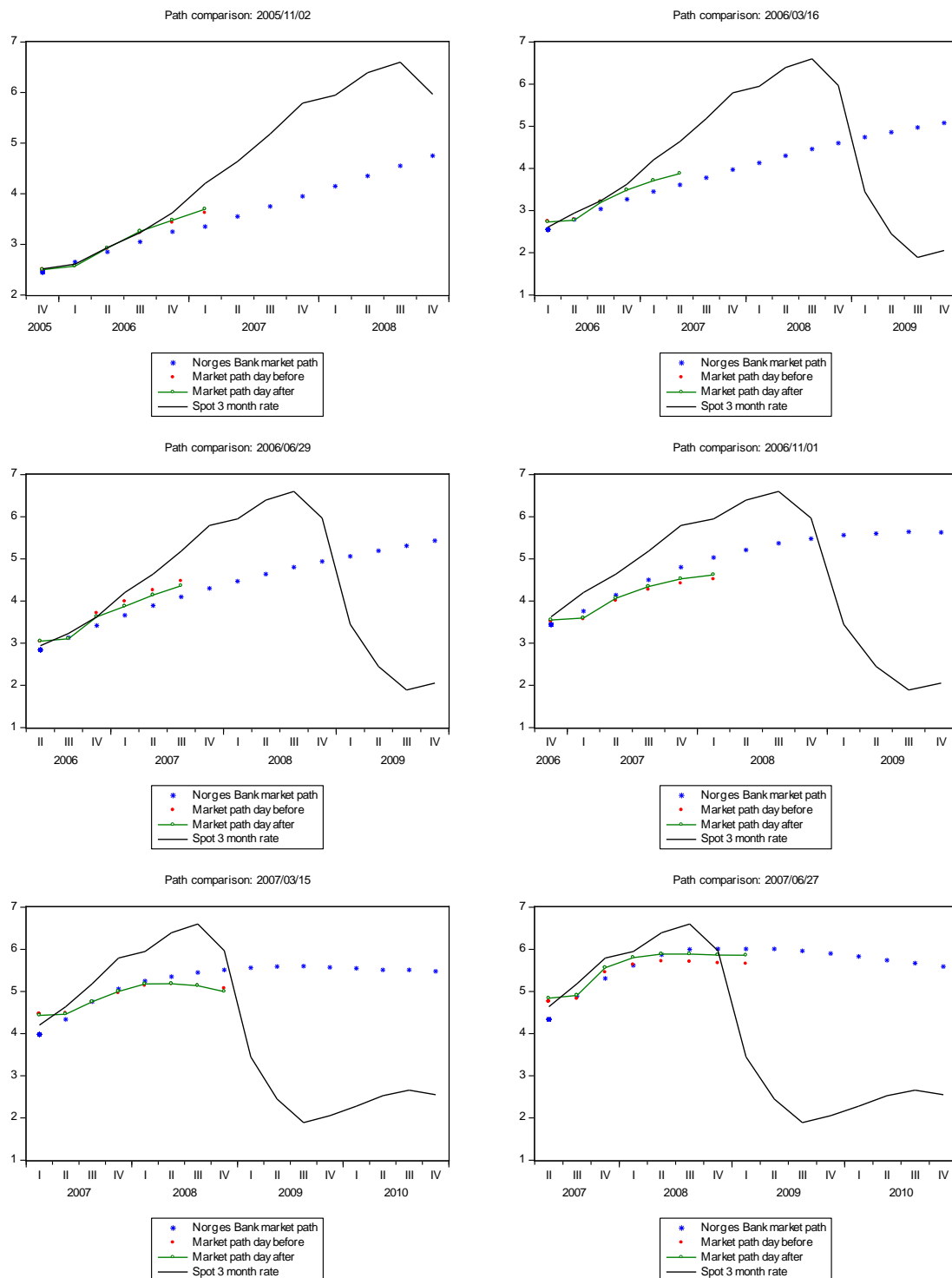
From the second quarter of 2011, there is a noticeable change in this pattern as market expectations start to deviate substantially from Norges Bank's rate path at the long end. In the June and October *Monetary Policy Reports* in 2011, market paths were considerably below the paths published by Norges Bank. It is also notable that even with a large difference between the market path the day before the *Report* was published and the central bank rate path that was published, the newly announced central bank path had little impact on market reactions. One reason for this development, especially related to the Norges Bank path in October 2011, may have been that the large interest rate differential vis-à-vis trading partners implicit in the Norges Bank path was not seen as credible by market participants.

Norges Bank revised down the interest rate path throughout 2012 and 2013, which in turn has resulted in a Norges Bank path that is more in line with the market path.

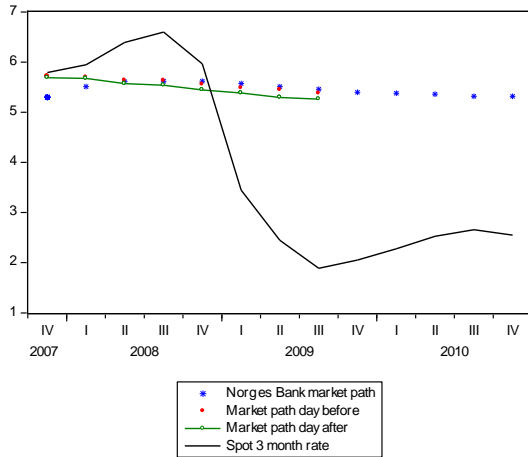
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<sup>2</sup> See also speech by Governor Øystein Olsen (2014) "A decade of forward guidance in Norway" available at <http://www.norges-bank.no/en/about/published/speeches/2014/8-april-oystein-olsen-new-york/>

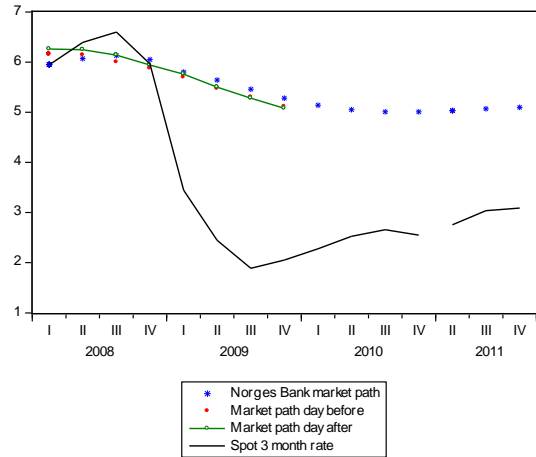
**Chart 1.** *Norges Bank's forecast for 3-month NIBOR (Norges Bank market path), the market forecast for 3-month NIBOR before and after the publication of Norges Bank's Monetary Policy Report and the realized 3-month NIBOR (spot rate).*



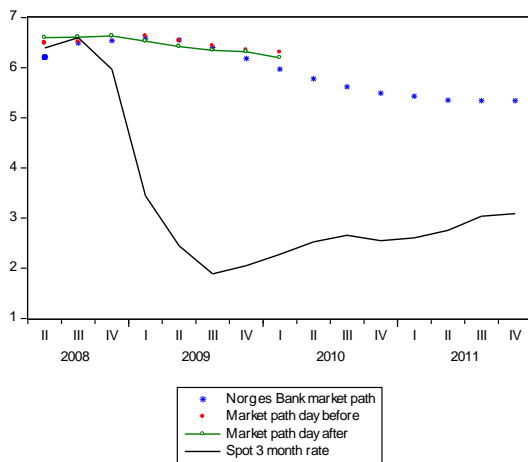
Path comparison: 2007/10/31



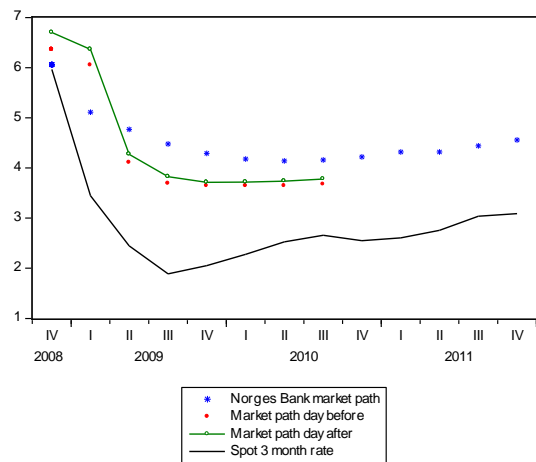
Path comparison: 2008/03/13



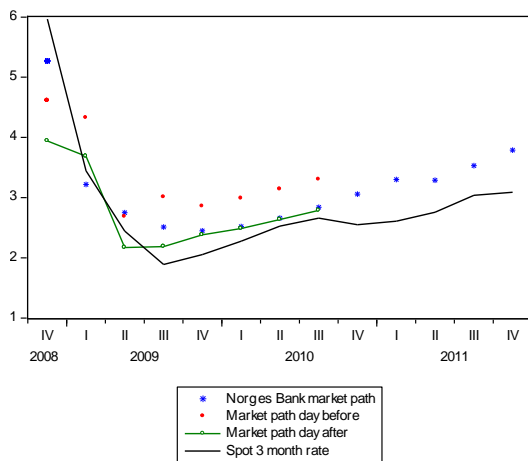
Path comparison: 2008/06/25



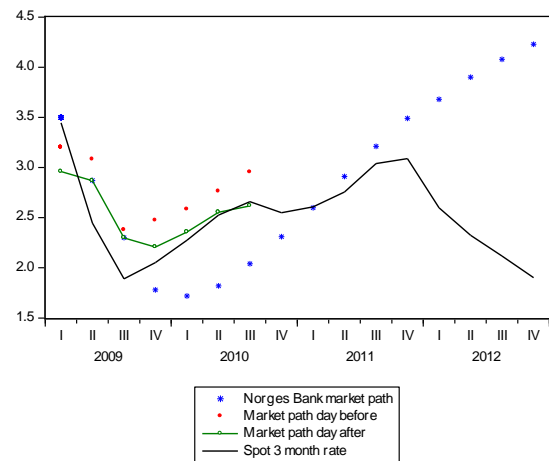
Path comparison: 2008/10/29



Path comparison: 2008/12/17

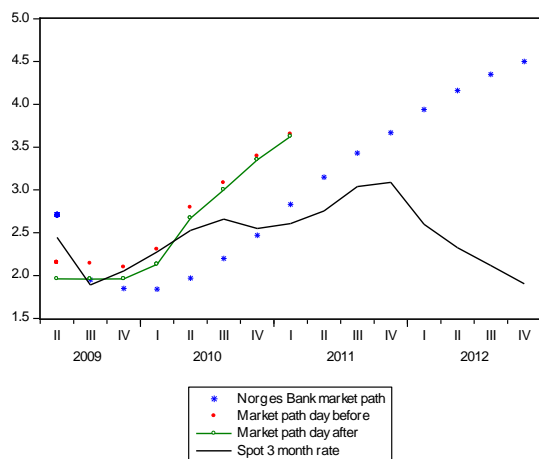


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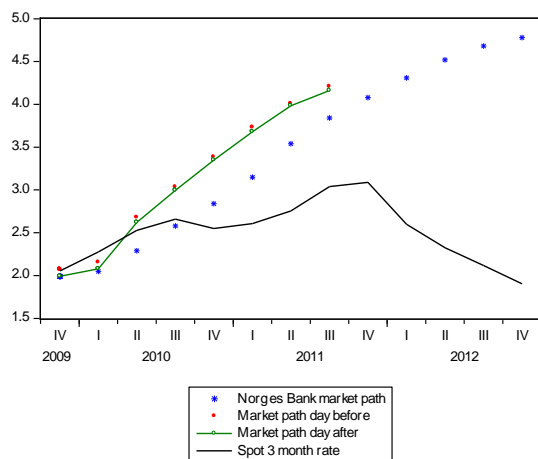




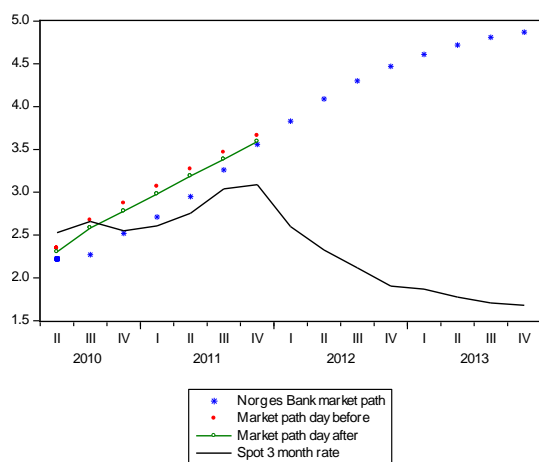
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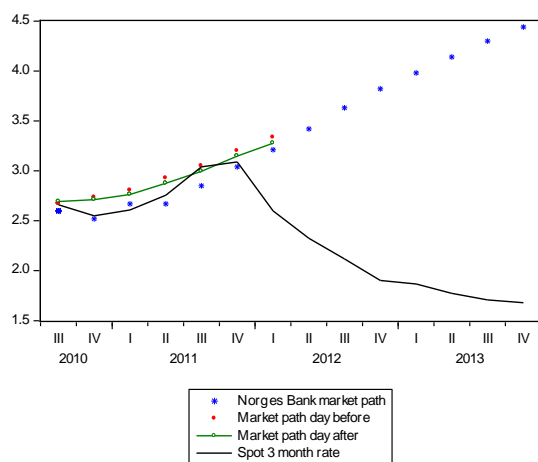
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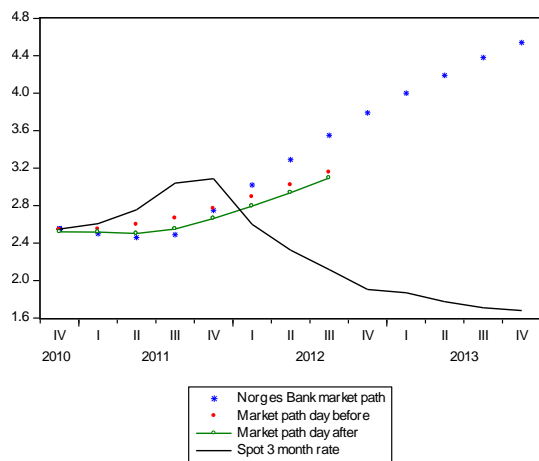
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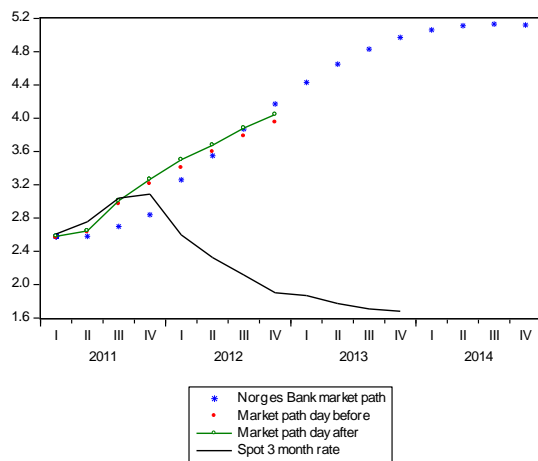
Path comparison: 2010/06/23



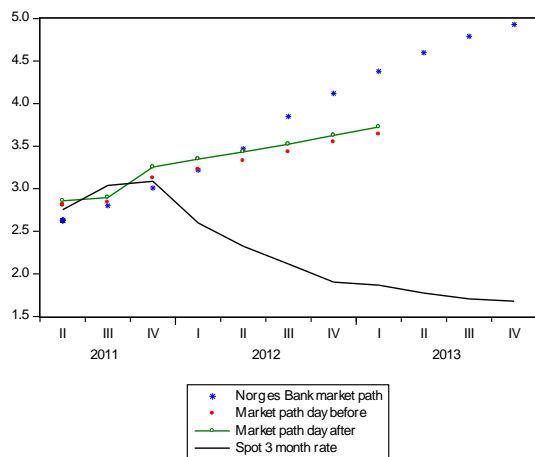
Path comparison: 2010/10/27



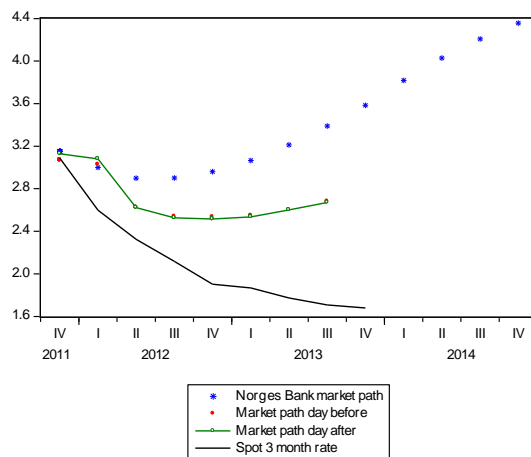
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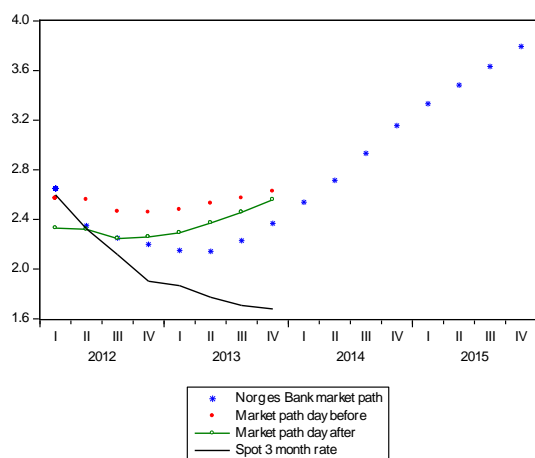
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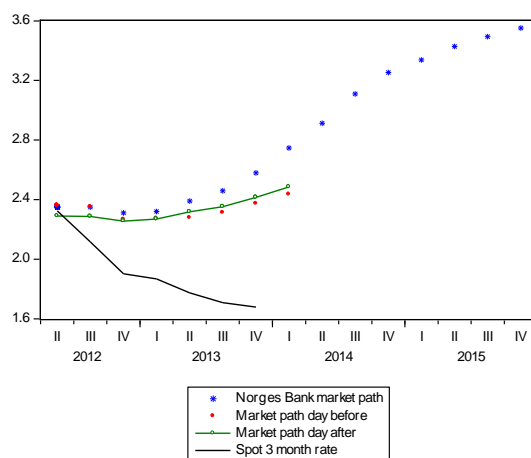
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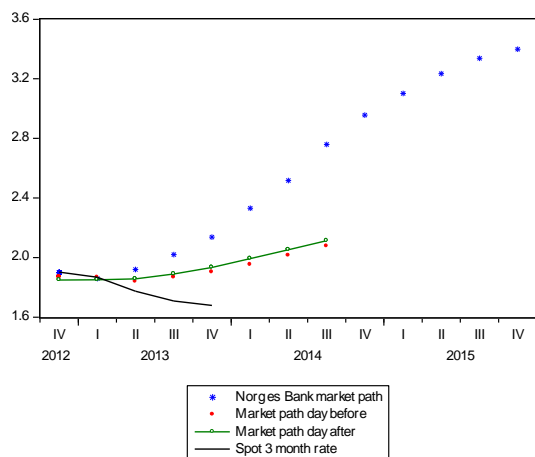
Path comparison: 2012/03/14



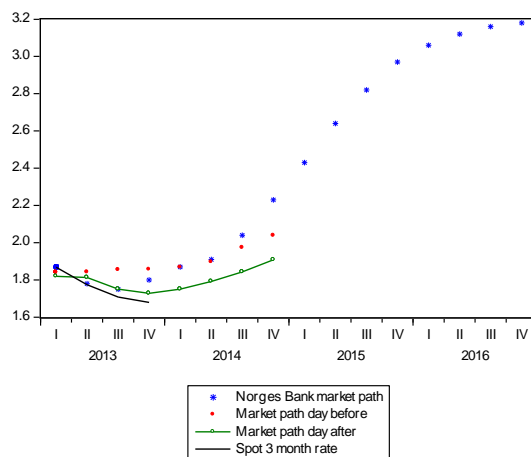
Path comparison: 2012/06/20

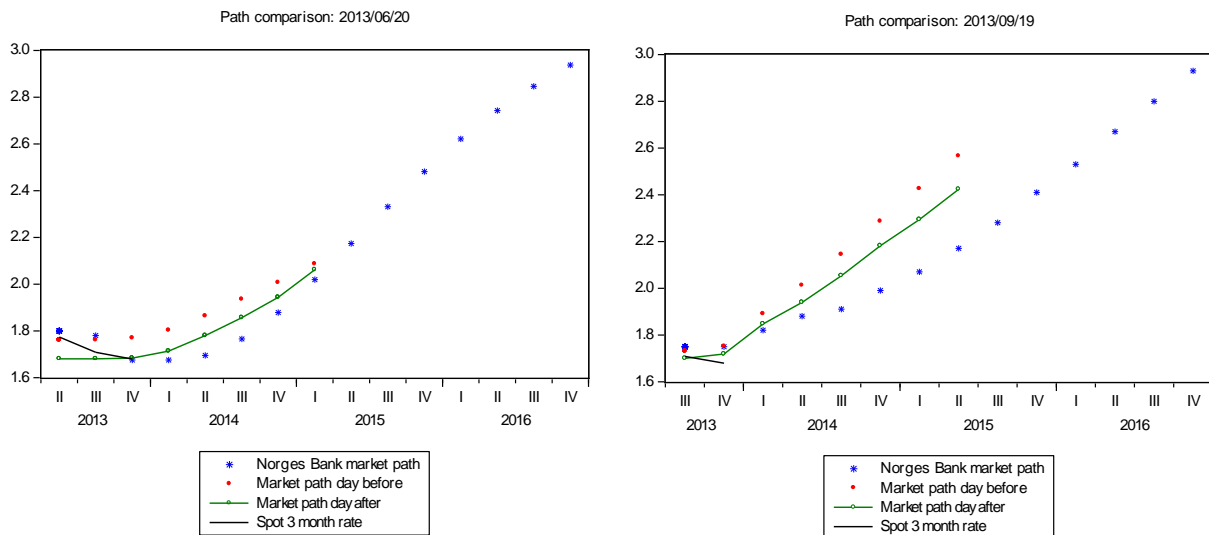


Path comparison: 2012/10/31



Path comparison: 2013/03/14

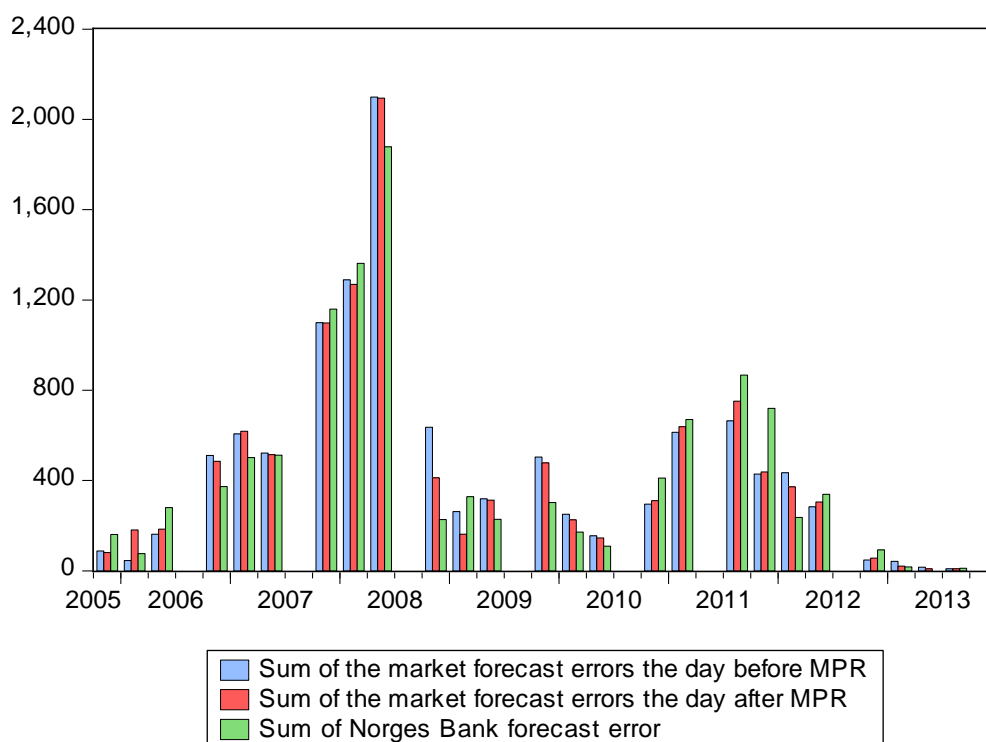




## Forecast performance

In order to gauge forecast performance, our preferred measure is the accumulated absolute value of the forecast error. This means that we simply calculate the absolute value of the difference between the market paths (before and after the *Monetary Policy Report*) with the actual outcome of 3-month NIBOR over the following quarters. We repeat this exercise for the Norges Bank path. In Chart 1, all horizons - to the extent we have market data - are summarised and presented report by report. The blue bar represents the sum of the market's forecast error the day before and the red bar is the market's forecast error the day after publication of the *Report*. The green bars show Norges Bank's forecast errors. Note that for the latest reports we have few observations since the actual NIBOR rate was not yet realised.

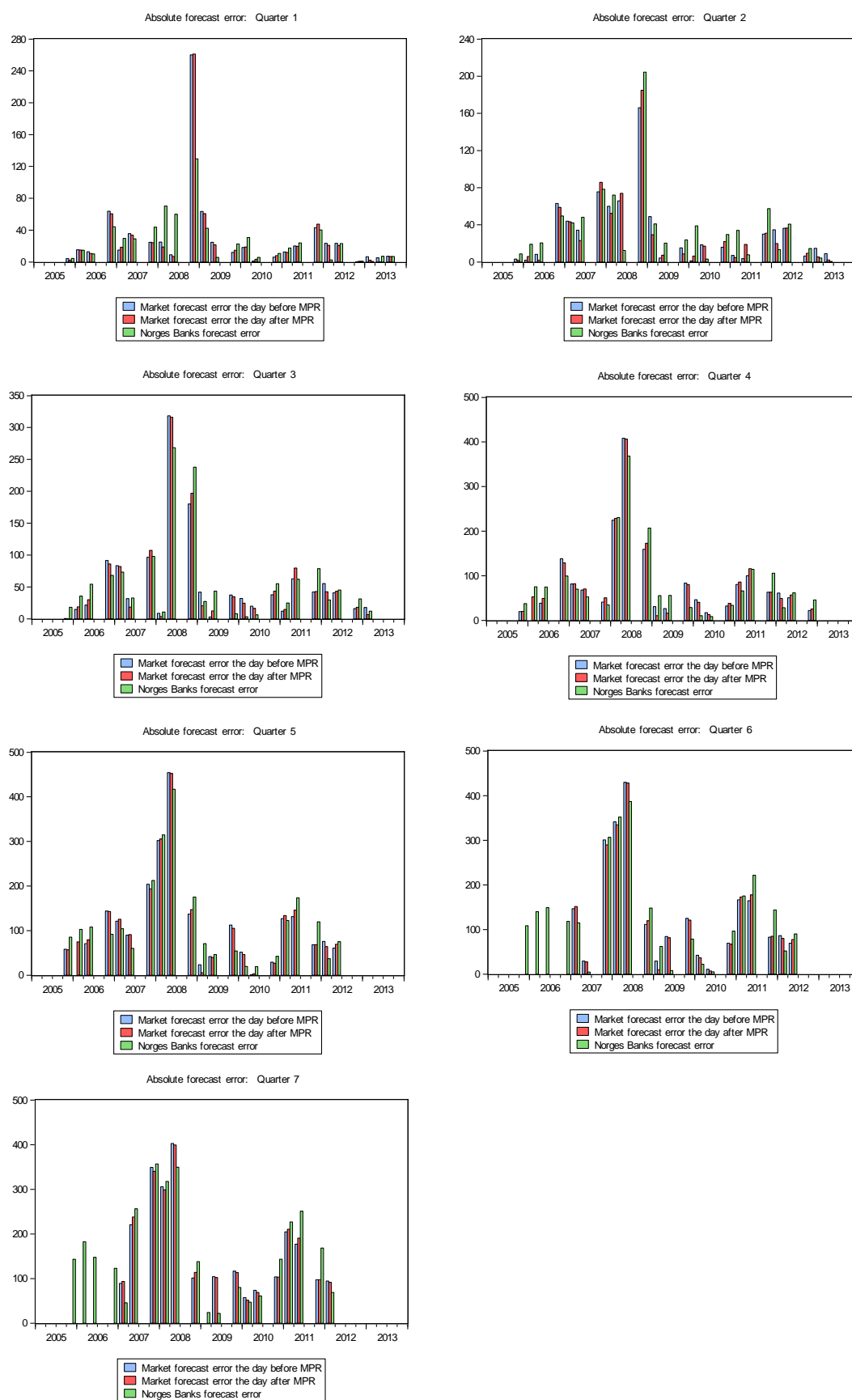
**Chart 2.** *Sum of forecast errors (compared to the realized 3-month NIBOR) split between Norges Bank's forecast for 3-month NIBOR and the market forecast for 3-month NIBOR before and after the publication of Norges Bank's Monetary Policy Report. Basis points.*



Summarised over the full sample period, the market forecast one day before the *Report* showed the best performance on 9 out of 22 occasions (excluding the reports in 2013 due to a short evaluation period), while the market forecast the day after showed the best performance on 3 occasions. The Norges Bank forecast was the most accurate on 10 occasions. This means that the interest rate forecasts of Norges Bank and the market are approximately equally good when looking at the sum of all horizons.

The following 7 graphs present the absolute forecast errors for each horizon from 1 quarter ahead up to 7 quarters ahead. The most striking result from these graphs is that there is no systematic difference in forecast performance between Norges Bank and the market across horizons. One might think that Norges Bank would do relatively better on short horizons since Norges Bank actually decides on the short-term interest rate. However, since the forecasts are for the market rate, the forecast errors in the short run are primarily driven by the forecast for the risk premium, especially during and after the recent financial crisis.

**Chart 3.** *Forecast errors at different horizons. Basis points.*



## **Conclusions**

During periods of relatively low volatility in financial markets, Norges Bank's published interest rate forecasts have been more or less in line with market pricing. This may be because market participants have a good understanding of Norges Bank's reaction pattern and a similar assessment of the economic outlook. After 2010 divergence increased, with likely causes being increased uncertainty about the future state of the international economy and a lack of confidence among market participants in the sustainability of the large interest rate differential against Norway's trading partners implied by Norges Bank's interest rate path. Over the past year Norges Bank has lowered the interest rate path considerably and it is now more in line with market expectations.

Norges Bank's forecasts and market forecasts have been quite similar in performance when summarised over all horizons. If we look more closely at each horizon, it is somewhat surprising at first sight to find that forecast performance does not vary much across forecast horizons. A natural assumption would be that Norges Bank's forecast is more accurate in the short term, since the bank controls the key policy rate. However, this result is largely driven by the financial crisis and the difficulties of forecasting the money market risk premium, which in turn increased Norges Bank's forecast errors in the short term.