Yield Expectations and the Effects of Macroeconomy and Monetary Policy

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Just preliminary

Motivation

- How do forecasts respond to changes in macroeconomic variables and monetary policy?
- Look at not average but micro data of professional monthly forecasts of yields on the Japanese 10-yr Government Bond (JGB) surveyed by the QUICK.
- Understand if the respondents are identical or non-identical (significantly different each other).

About QUICK Survey

- **QUICK Survey (QSS) surveys market participants, economists, and other professionals.**
- **QUICK Survey (QSS) surveys on their 1-month, 3-month, and 6-month forecasts of long term (10-yr) and short term interest rates at the end of each month.**
- **Sample period is July 1998 - April 2008. Thus forecast period is January 1999 – October 2008.**
- **Not all the participants answer each month, so that the data set is the unbalanced panel data.**

Notation

r_t: 10-yr JGB yield at *t*.

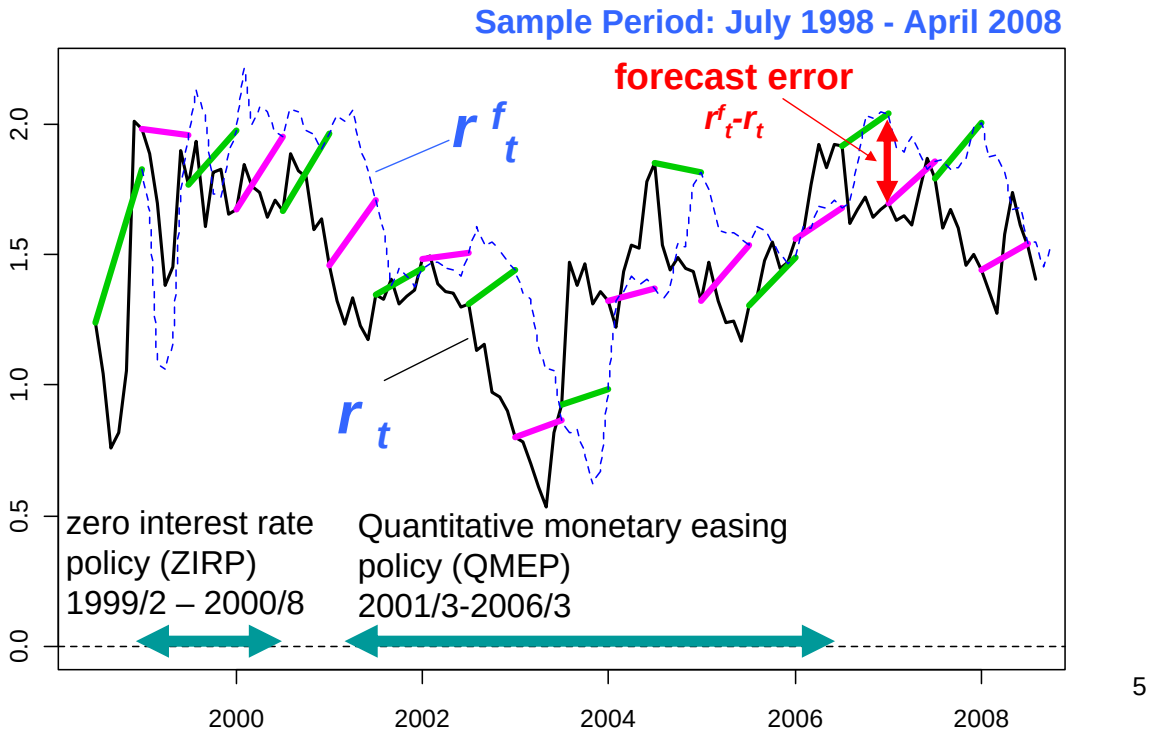
$r^f_{i,t}$: 10-yr JGB yield at *t* forecasted at (*t*-6) by forecaster *i*.

r^f_t: Average 10-yr JGB yield at *t* forecasted at (*t*-6).

(Average) forecast error: $r^f_t - r_t$

RMSE= $$\sqrt{\frac{1}{T}\sum_{t=1}^{T}(r_t^f - r_t)^2}$$

Mean JGB Yield: Forecast and Actual



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Findings and questions

- **Significant upper bias of forecasts against the actual data over time (from 1996 to 2008).**
- **RMSE of forecasters (0.355) > RMSE of simple flat (no-change) forecasts (0.324)**

  ➔The simple flat (no-change) forecasts outperform the professional forecasts.
- **Are those errors idiosyncratic or common across forecasters?**

Decomposition of errors by Bauer et al. (2006)

Y_t: realized economic data assumed to be normally distributed with mean μ_t and economy-wise common covariance matrix Ω_{rt}. Ω_{rt} reflects the aggregate shocks affecting the realized value of μ_t.

Y_{it}: individual forecast assumed to be normally distributed with mean μ_t and forecast-wise covariance matrix Ω_{ft}. Ω_{ft} reflects the discrepancy in forecasts across forecasters.

Forecast error of forecaster *i*: $X_{it} = Y_{it} - Y_t$

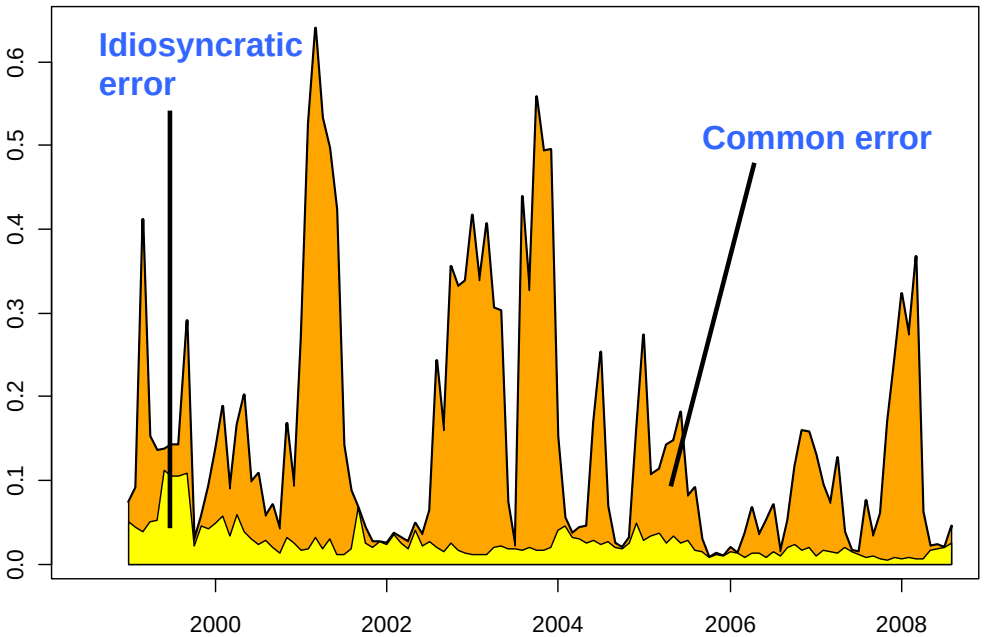
mean = 0

variance matrix = $\Omega_{rt} + \Omega_{ft}$

= common error + idiosyncratic error

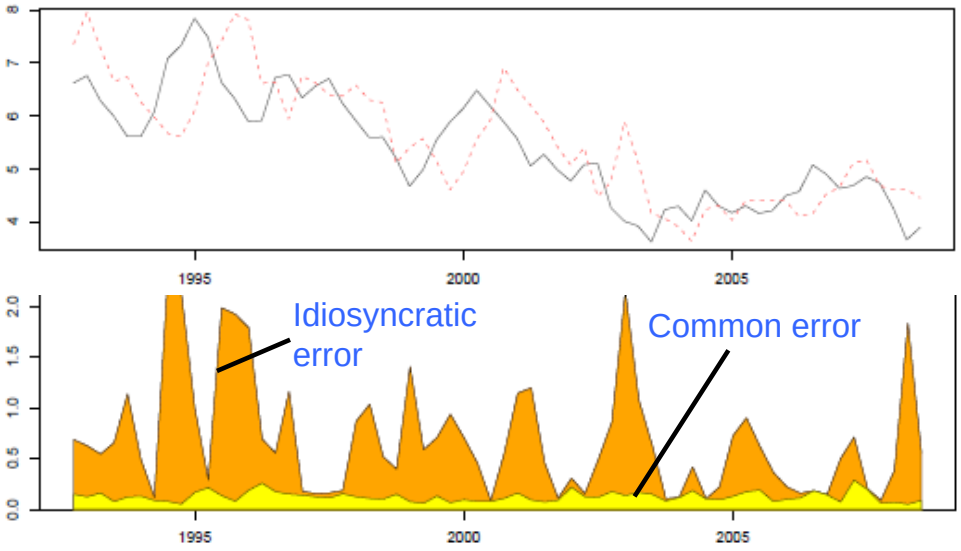
Decomposing RMSE of 10-yr JGB yields

- **Common factor is dominant.**



Reference: Decomposing RMSE of 10-yr T-note

- **The similar tendency is observed in the case of the United States, but the forecasts and realized values cross over time.**

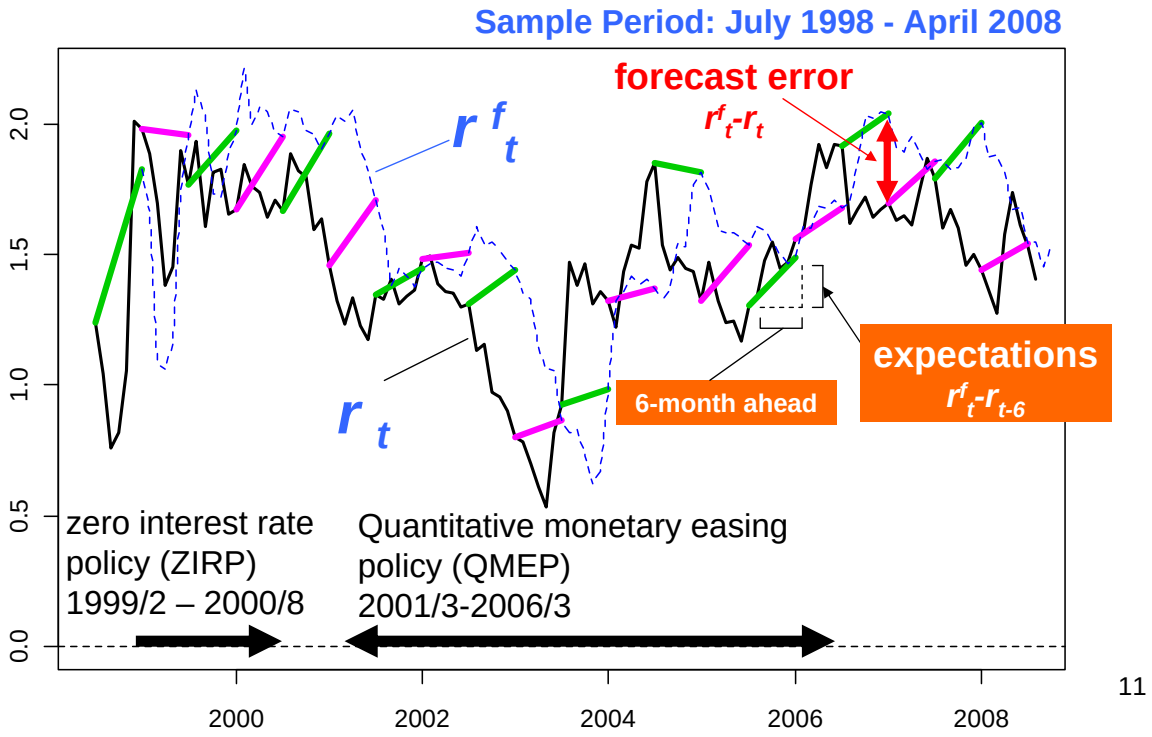


Notes: Philadelphia Fed's *Survey of Professional Forecasts* is used to compute the above graph.

What is of interest?

- **The majority of research on economic forecast focuses on whether forecast error is rational or not.**
  - **— Mullineaux (1978), Zarnowitz (1985), Aggarwal et al. (1995), Ito (1990), Gordon (2008), Schrim (2003) and many others.**
- **Japanese JGB market's forecasts show upper bias mainly caused by common factors.**
- **Particularly, forecasts $(r_{ft} - r_t)$ suggest that six-moth later, 10-yr JGB yield is (almost always) higher than the present 10-yr JGB yield.**
- **We define $(r_{ft} - r_{t-6})$ as "expectations (with upper tendency)" and explore what explains them. Ball and Croushore (2003) has the similar motivation.**

Mean JGB Yield: Forecast and Actual

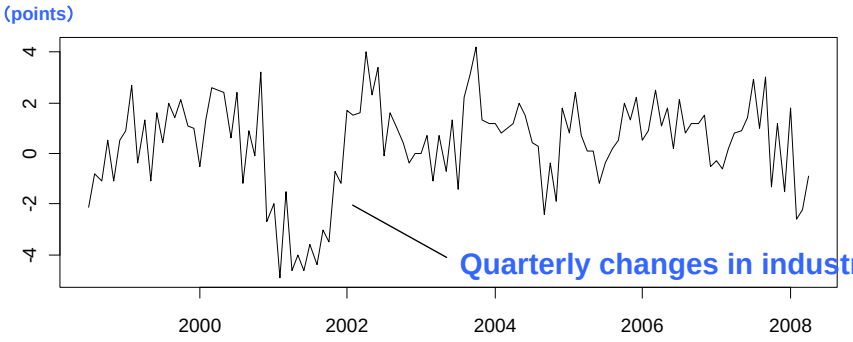


Factors affecting forecasts are …

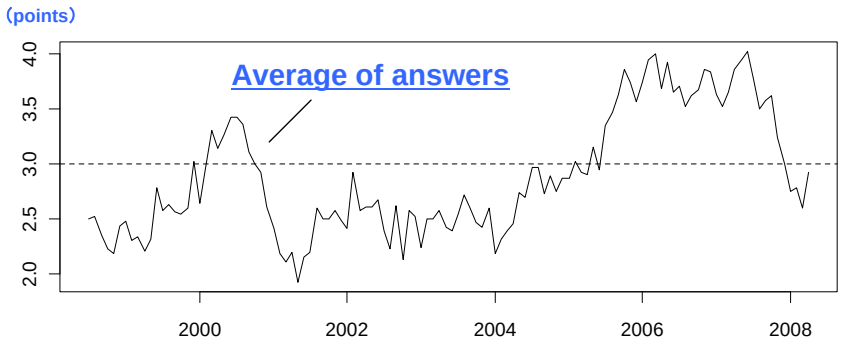
- **QSS collects the information on which factors forecasters focus.**
- **Factors are (i) business cycles, (ii) prices, (iii) monetary policy, (iv) exchange rates, (v) foreign interest rates, (vi) stock prices.**
- **Forecasters can answer**
  1. strongly positive 2. positive
  3. neutral
  4. negative 5. strongly negative
  for each factor. Note that "negative" means that the factor has a negative impact on JGB price, so that "negative" has a positive impact on JGB yields.
- **Find the proxy of each factor to conduct regression.**

Business cycle factors

- **When the economy is booming, a rise in yields expectation increases.**



Correlation = 0.33

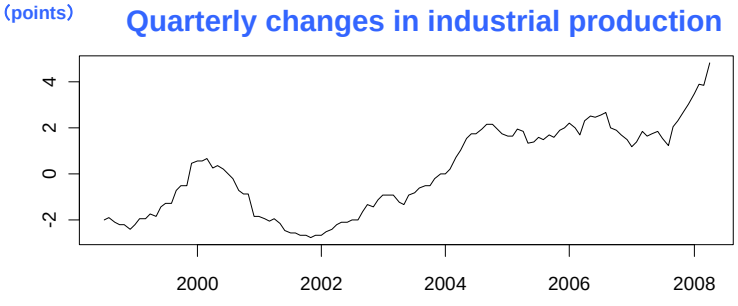


Yields rise

Yields fall

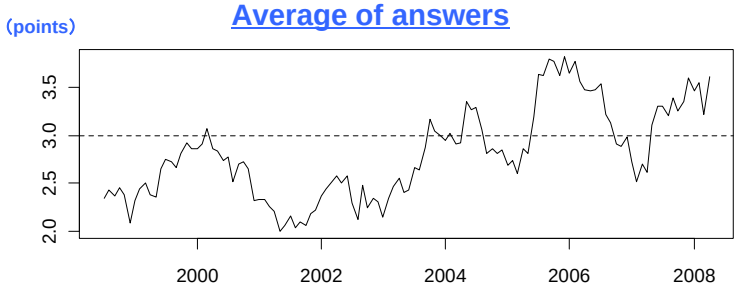
Price factors

- **When prices increase, a rise in yields expectation increases.**



Correlation = 0.84

Yields rise



Yields fall

Forecasters look at …

- **List of proxies for the factors.**

Business cycle factor	Quarterly growth in industrial production
Price factor	Annual Growth in Corporate Goods Price index
Monetary policy factor	Overnight rate QMEP dummy (01/3-06/3 = 1)
Exchange rates factor	Quarterly change in ¥$ exchange rate
Foreign interest rates factor	Spread between T-note yields and JGB Yields
Stock prices factor	Quarterly growth in TOPIX

Regression Model 1

Available when forecasting

$$\bar{r}_t^f - r_{t-6} = \alpha + \boldsymbol{x}'_{t-6}\boldsymbol{\beta} + \epsilon_t$$

- ✓ **Simple OLS regression**
- ✓ **Explanatory variables x correspond to the six factors listed in the table in the previous slide.**
- ✓ **Sample period: 1999/1 – 2008/4**

Regression Model 1 $\bar{r}_t^f - r_{t-6} = \alpha + \boldsymbol{x}'_{t-6}\boldsymbol{\beta} + \epsilon_t$

	Parameter	Significance
Business cycle factor	-0.003	
Price factor	0.014	*
Monetary policy factor 1	0.104	
Monetary policy factor 2 (dummy)	-0.030	
Exchange rates factor	0.004	***
Foreign interest rates factor	0.103	***
Stock prices factor	-0.001	
Constant	-0.171	

R-sq = 0.292, # of observation = 118

Regression Model 2 (Panel, fixed effect model)

- Use survey results to obtain micro level mechanism and asymmetry of forecasts.

$$r_{i,t}^f - r_{t-6} = \alpha_i + \boldsymbol{x}'_{i,t-6}\boldsymbol{\beta} + \epsilon_{i,t}$$

  - ✓ Unbalanced panel data regression
  - ✓ Explanatory variables x correspond to the cross terms of each variable.
    ex. Business cycle factor · dummy 12
    = business cycle factor if a forecaster answers 1. strongly positive or 2. positive, else 0.
    ex. Business cycle factor · dummy 45
    = business cycle factor if a forecaster answers 4. negative or 2. strongly negative, else 0.
  - ✓ Sample period: 1999/1 – 2008/4

Regression Model 2 $r^f_{i,t} - r_{t-6} = \alpha_i + \boldsymbol{x}'_{i,t-6}\boldsymbol{\beta} + \epsilon_{i,t}$

	Dummy 12	Dummy 45
Business cycle factor	-0.006**	0.004
Price factor	0.002	-0.004
Monetary policy factor 1	0.120***	0.106***
Monetary policy factor 1· Monetary policy factor 2	-0.086***	0.003
Exchange rate factor	0.003***	0.006***
Foreign interest rates factor	-0.001	0.012***
Stock prices factor	-0.001	-0.001***
Constant	0.167***	

R-sq = 0.05, # of observation = 3096

Findings from the panel regression

- Monetary policy factor has significant effects on "expectations". This result might suggest that the BOJ's commitment policy worked.
  During the QMEP, the BOJ committed that it would not raise short-term interest rates unless "three conditions (ex. Positive CPI)" were sufficed.
- Exchange rates factor also has significant effects on "expectations". This result is consistent with the fact that Japanese economy has been depending on external demand.
- Business cycle, stock price, and foreign interest rates factors show somewhat mixed results. Price factor is not important.

Conclusion

- **Japanese yield forecasts have a significant upper bias, which is common across forecasters.**
- **“expectations”, defined as the gap between the 6-month yield forecasts and the actual yields at the time when forecasts were done, are positive over time, as well.**
- **Monetary policy factor and exchange rates factors have significant effects on “expectations”.**
- **What are needed are**
  1. **conduct robustness check.**
  2. **try slope dummy (QMEP / non-QMEP).**
  3. **add theoretical explanation.**
  4. **give better name for (r_{ft} - r_{t-6})**